FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

BIDIRECTIONAL ASSOCIATIONS BETWEEN PARENTAL DISTRESS AND BEHAVIOR PROBLEMS IN CHILDREN WITH DEVELOPMENTAL DELAY

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Brynna Hope Heflin

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To: Dean Michael R. Heithaus
College of Arts, Sciences and Education

This dissertation, written by Brynna Hope Heflin, and entitled Bidirectional Associations Between Parental Distress and Behavior Problems in Children with Developmental Delay, having been approved in respect to style and intellectual content, is referred to you for judgement.

We have read this dissertation and recommend that it be approved.

_____
Jeremy W. Pettit

_____
Jonathan Comer

_____
Catherine Coccia

_____
Daniel M. Bagner, Major Professor

Date of Defense: June 6, 2022

The dissertation of Brynna Hope Heflin is approved.

_____
Dean Michael R. Heithaus
College of Arts, Sciences and Education

_____
Andrés G. Gil
Vice President for Research and Economic Development
and Dean of the University Graduate School

Florida International University, 2022

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ABSTRACT OF THE DISSERTATION

BIDIRECTIONAL ASSOCIATIONS BETWEEN PARENTAL DISTRESS AND BEHAVIOR PROBLEMS IN CHILDREN WITH DEVELOPMENTAL DELAY

by

Brynna Hope Heflin

Florida International University, 2022

Miami, Florida

Professor Daniel M. Bagner, Major Professor

Increased levels of behavior problems in children with developmental delay (DD) highlight the need for increased attention to factors that may contribute to impairments. Specifically, early intervention services for children with DD have improved caregiver-report of child behavior problems, but less is known about how treatment may impact objective measures of behavior problems in children with DD. Furthermore, examination of the associations between caregiver distress and child behavior problems is needed to better understand the mechanisms by which interventions can effectively disrupt associations.

This dissertation is comprised of four chapters that are focused on the early identification of child behavior problems in the context of treatment, as well as associations with caregiver mental health symptoms and acculturation. Initially, I outline the use of an observational coding scheme used to code early aggressive behaviors within a secondary data analysis of infants receiving an adapted version of Parent-Child Interaction Therapy (PCIT) (n =58). In Chapter III, I examined the existing literature (n = 19 studies) examining associations between caregiver distress and behavior problems in

young children with DD. Findings from the review paper prompted Chapters IV and V, which provided examination of associations between caregiver distress and child behavior problems, as well as specific examination of the impact of treatment, internet-delivered PCIT (iPCIT), and acculturation processes on associations in families from primarily minoritized groups with children with developmental delay and behavior problems (N = 150; 75 iPCIT, 75 RAU). Findings from Chapter IV support associations between caregiver distress and child behavior problems, the moderating role of iPCIT, and moderating roles of acculturation and enculturation in the interactions between child behaviors and caregiver distress. Findings from Chapter V suggest that caregiver distress functions differently with observational coding of child behaviors than with caregiver-report of child behaviors.

The collection of work presented in the current dissertation emphasize the potential impact treatment can have on familial processes between child and parent, as well as the importance of consideration of acculturation and enculturation processes in families. Future research should continue to examine components of treatment that may alter associations between caregiver distress and child behavior problems.

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CHAPTER I

Introduction

Children with developmental delay (DD) are more likely to display elevated levels of behavior problems (Baker et al., 2003; Baker et al., 2010) and have parents who report higher levels of distress, including depressive symptoms and parenting stress (Feldman et al., 2007; Hayes & Watson, 2013) than their typically developing peers. Studies examining behavioral parenting interventions have demonstrated large decreases in behavior problems among children with DD, as well as decreases in caregiver levels of stress, depression, and anxiety (Agazzi et al., 2017; Ros & Graziano, 2019). Despite research demonstrating the impact of treatment on caregiver symptoms and child behaviors, research has not yet examined how treatment impacts associations between caregiver functioning and behavior problems in children with DD. Furthermore, research has relied on caregiver-report of child behavior problems despite demonstrated discrepancies between caregiver report and observational coding (Brotman et al., 2008). Prior research provides support for transactional associations between caregiver distress and child behavior problems in early childhood for children with DD. However, less attention has been placed on examination of associations between caregiver distress and behavior problems in children with DD from minoritized backgrounds, utilization of a multi-method assessment of child behavior problems and broadened operational definition of caregiver distress, and assessment of acculturation and enculturation, as well as treatment effects, on these processes.

My dissertation is comprised of three manuscripts and a supplemental chapter of null findings that are focused on associations between early child behavior problems and caregiver mental health symptoms, as well as the impact of treatment and acculturation on these associations. In the first paper (Chapter II), I provide results from the use of an observational coding scheme to code early childhood aggressive behaviors in infants at-risk for behavior problems that show support for the effect of a home-based adaptation of PCIT for infants on decreases in observed aggressive behaviors. In the second paper (Chapter III), I present a systematic review of the literature examining associations between caregiver mental health symptoms and early behavior problems in children with DD. This study showed the need for further research examining child behavior problems and different components of caregiver distress independently (e.g., depression, anxiety, and stress), as well as the consideration of demographic and cultural considerations such as the impact of acculturation and enculturation on these associations. Additionally, the systematic review further emphasized the lack of multi-method assessment of child behavior problems present in the existing literature.

Within Chapter IV, I utilize structural equation modeling and moderation analyses to examine the bidirectional associations between caregiver report of child internalizing and externalizing problems and caregiver symptoms of depression, anxiety and stress for families with children with DD and behavior problems randomized to control and internet-delivered Parent-Child Interaction Therapy (iPCIT) conditions (N = 150 families across groups). Additionally, I utilize moderation analyses to examine the role of caregivers' acculturation and enculturation levels on the associations between caregiver symptoms and child behavior problems in early childhood. Later, within Chapter V, I

examine the use of the aggression coding scheme to measure early childhood aggressive behaviors and associations with caregiver symptoms. In this study, I similarly utilize structural equation modeling to examine the bidirectional associations between different observed aggressive behaviors occurring in early childhood and caregiver symptoms of depression, anxiety, and stress, as well as how associations may differ within families receiving internet-delivered parent-child interaction therapy (iPCIT) for their children with DD and behavior problems. Findings presented in Chapter V demonstrate differences in use of observational coding and parent-report of child behavior problems, which were previously examined in Chapter IV.

The work included within the present dissertation highlights how child behaviors and caregiver symptoms are intertwined. Additionally, the work points to the potential of early intervention services in weakening associations between caregiver distress and early behavior problems in children with DD. Furthermore, the present research highlights the importance of considering of acculturation and enculturation values for families, particularly in the context of behavioral stressors in treatment. Future research directions are discussed within the subsequent papers included.

CHAPTER II

Impact of Parenting Intervention on Observed Aggressive Behaviors in At-Risk Infants

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Abstract

Aggressive behaviors in early childhood persist through childhood and adolescence and result in negative outcomes. However, studies assessing aggressive behaviors in early childhood have focused primarily on parent report. Additionally, the effects of parenting interventions and associated parenting skills on early observed aggression have not been examined. In the present study, we examined the direct effect of a brief, in-home adaptation of Parent-Child Interaction Therapy, the Infant Behavior Program (IBP), on observed frequency of aggressive behaviors and global ratings of aggression in infants ages 12 to 15 months. Additionally, we examined behaviorally-based parenting skills as a mechanism by which the IBP impacted observed infant aggressive behaviors. Sixty infants with elevated levels of behavior problems were randomized to receive the IBP or standard pediatric primary care. Infants receiving the IBP demonstrated a significant decrease in the observed frequency of aggressive behaviors during infant-led play across a 3-month follow-up. Furthermore, the intervention led to decreases in parental use of don't skills (i.e., directive and negative parent statements), which, in turn, led to decreases in the frequency of observed aggressive behaviors at a 3-month follow-up. However, effects were not maintained at a 6-month follow-up. Results provide preliminary evidence for the efficacy of a brief parenting intervention on reducing the frequency of infant aggressive behaviors, including the indirect effect of the IBP on the frequency of aggressive behaviors through reductions in parenting skills. The study highlights the importance of targeting negative parenting practices to decrease subsequent aggressive behaviors in early childhood.

Impact of Parenting Intervention on Observed Aggressive Behaviors in At-Risk Infants

Aggression is moderately stable across childhood and adolescence (Coie & Dodge, 1998; Huesman et al., 1996; Reiss & Roth, 1993; Shaw et al., 2012) and is associated with negative outcomes later in life, such as high rates of juvenile involvement (Shaw et al., 2012), rejection from peers (Ferris & Grisso, 1996), and elevated levels of anxiety, depression and suicidal ideation (Liu et al., 2014; Rosenberg & Rossman, 1998; Shaw et al., 2012). Aggression beginning in early childhood has been associated with more significant and problematic long-term consequences (e.g., antisocial behavior, criminality, conviction of a crime) compared to aggression that begins during late adolescence or early adulthood (Moffitt et al., 1996; Kokko et al., 2009). Given the negative impact of early onset aggressive behaviors on later outcomes, the goal of this paper was to examine the effect of an early behavioral parenting intervention on early childhood aggressive behaviors.

In early childhood, aggression has been defined as frustration that is exhibited by physical actions towards others or objects, without considering the intentionality of the action (Alink et al., 2006; Tremblay et al., 2004). While intentionality is considered in the conceptualization of aggression in later childhood (Coie & Dodge, 1998), intentionality of aggressive behaviors is not feasible to measure in early childhood (Alink et al., 2006; Tremblay et al., 2004). It is possible that the functionality and operationalization of "aggression" differs in infancy when compared to later childhood and adolescence. However, research on aggressive behaviors during early childhood without consideration of intentionality is still feasible and differs from behaviors of typical infants (Alink et al.,

2006, Carter et al., 2004). Specifically, aggressive behaviors that are aimed at objects or people (e.g., throwing objects) have been shown to have longitudinal stability even when examining aggression in 1-year-olds (Keenan & Shaw, 1994; Mesman et al., 2008) and do not include behaviors that are accounted for by developmental concerns such as motor limitations (e.g. heavy-handed contact with the floor or a toy as the result of a lack of motor control). Aggression has been identified in children as young as 12 months of age (Alink et al., 2006; Carter et al., 2004; Carter et al., 2003; Cummings et al., 2009) and is moderately stable and related to later frequency of aggressive behaviors (Alink et al., 2006). However, the few studies that have examined aggression in early childhood focused primarily on 18- to 24-month-olds (Mesman et al., 2001; Angold et al., 1999) even though the 12- to 15-month age range can be a unique opportunity for early intervention given feasibility of identifying aggression and its stability at this early age range (Campbell, 2002; Zahn-Waxler et al., 1990; Mesman et al., 2008; see below). Furthermore, while aggressive behaviors must be considered in the context of what is developmentally appropriate, the "presence of a pattern or constellation of symptoms," such as an infant's consistent display of aggressive behaviors (Campbell, 1995), indicates that such behaviors can be measured given the evidence supporting relation of early aggressive behaviors to aggression during later childhood (Alink et al., 2006).

Levels of observed aggression in 2-year-old children have been shown to predict higher levels of parent report of child externalizing problems at 5 years (Zahn-Waxler et al., 1990). However, research on aggression in children under the age of 2 years relies overwhelmingly on parent report of aggressive behaviors (Crick et. al., 1997; Tremblay et al., 1999, 2004) rather than observational coding of aggressive behaviors.

Observational coding, as compared to parent report, can provide a more objective measure of aggressive behaviors, although research has found discrepancies between parent report and observational coding of aggressive behaviors (Brotman et al., 2008; Webster-Stratton et al., 2001). For example, Brotman and colleagues (2008) found that a preventive parenting intervention led to significant decreases in the frequency of observed physical aggression using the child physical negative and child destructive codes from The Dyadic Parent-Child Interaction Coding System-Revised (DPICS-R: Robinson & Eyberg, 1981) from baseline to the end of treatment in a high-risk sample of 4- to 6-year-olds. However, there was not a significant intervention effect on parent ratings of child aggression. While Brotman and colleagues focused on preschool- and kindergarten-aged children, the results nevertheless emphasize the importance of including observational coding measures in the assessment of child aggressive behaviors, as parent report may not capture the entire picture.

The System for Coding Early Physical Aggression (SCEPA; Keenan & Shaw, 1994) is a measurement tool for coding observed aggression in early childhood. The SCEPA is an observational measure of aggressive behaviors and includes the observation of the frequency of aggressive behaviors (Keenan & Shaw, 1994). The SCEPA has been used with children as young as 18 months and was shown to be moderately stable and reliable and associated with later observed aggressive behaviors and parent-reported externalizing behavior problems at 24 months, particularly in low-stress, naturalistic situations (Keenan & Shaw, 1994; Keenan et al., 1998). However, observational coding of aggressive behaviors in infants under 18 months of age has only been examined in one study to our knowledge. Specifically, Mesman and colleagues (2008) conducted a

psychometric study of the SCEPA and found that physical aggression can be reliably observed and coded using the SCEPA with 1- to 4-year-olds. However, the frequency of aggressive behaviors was coded in the clinic during a mother-child snack situation and three frustration tasks (i.e., clean up, a situation in which the child was not allowed to play with toys, and a problem-solving task), and was not examined in response to an intervention. Thus, the current study aimed to extend previous work by examining the effect of a parenting intervention on levels of infant aggressive behaviors in a more naturalistic observation of a positive parent-infant interaction during play in the home.

Parent-infant play interactions are typically the context in which parents learn to follow their child's lead during the first phase of behavioral parenting interventions, such as the Child Directed Interaction (CDI) phase of Parent-Child Interaction Therapy (PCIT; Eyberg & Funderburk, 2011; McNeil et al., 2013). Parenting skills and behaviors, such as those taught in the context of PCIT, have been shown to decrease parent-report of externalizing problem behaviors (McKee et al., 2008), such as aggression, in older children. Given the occurrence of aggressive behaviors in children under 2 years of age (Alink et al., 2006; Kennan et al., 1998; Tremblay et al., 1999; Tremblay et al., 2004; Van Zeijl et al., 2006) and the effect PCIT has had on parent report of child externalizing and aggressive behaviors (McCart et al., 2006; McMahon et al., 2006; Pearl, 2009), research should examine the extent to which parenting interventions lead to reductions in observed aggressive behaviors in children younger than 2 years. Specifically, a randomized controlled trial of an abbreviated, in-home adaptation of PCIT for high-risk infants, referred to as the Infant Behavior Program (IBP), demonstrated that 12- to 15-month-old infants who received IBP displayed significantly lower levels of aggressive

behaviors per parent report across post and 3- and 6-month follow-up assessments, when compared to infants in standard pediatric primary care (Bagner et al., 2016). However, the main outcome paper demonstrating the initial efficacy of the IBP did not report on observed frequency of infant aggressive behaviors due to extensive resources and time needed to code these behaviors (Brotman et al., 2008). Additionally, the primary aims of the federally-funded main outcome study did not include a plan to conduct observations of infant aggression. Thus, in an effort to address the gap in the literature, the primary focus of this secondary data analysis is to examine the effect of the IBP on observed aggressive behaviors.

In addition to main effects on aggressive behaviors, behavioral parenting interventions target changes in parenting behaviors, such as increases in positive parenting behaviors (e.g., praises), which have been shown to be associated with lower levels of parent report of child aggression (Atilli, 1989; Pettit et al., 1997; Rothbaum et al., 1995). Similarly, high levels of negative parenting behaviors (e.g., critical statements) have been shown to be associated with higher levels of parent report of child aggressive behaviors (McFadyen-Ketchum et al., 1996; Stover et al., 2016). Despite research on the relation between observed child aggressive behaviors and parenting behaviors (Del Vecchio & O'Leary, 2006), studies have not examined the indirect effect of parenting behaviors on subsequent observed child aggression in children. Thus, the current study also included an examination of the extent to which changes in parenting behaviors following the IBP were associated with changes in observed aggressive behaviors.

In the present study, we examined the effect of the IBP on changes in the observed frequency of aggressive behaviors and global ratings of aggression in infants

ages 12 to 15 months who were randomly assigned to receive the IBP or standard pediatric primary care. Research has demonstrated a positive impact of the IBP on infant behavior, including parent report of levels of infant aggressive behaviors and observed infant compliance (Bagner et al., 2016), but did not report on the effect of the IBP on observed frequency or global ratings of infant aggressive behaviors. We hypothesized that infants randomized to the IBP would display lower levels of observed frequency of aggressive behaviors and lower global ratings of aggression at a post-intervention and at 3- and 6-month follow-up assessments compared to those randomized to standard care.

In addition to the primary aim to examine the direct effect of IBP on observed aggression, we examined, as an exploratory aim, the indirect effect of behaviorally-based parenting skills as a potential mechanism by which the IBP impacted observed infant aggressive behaviors. Specifically, research demonstrated the IBP led to significant increases in "do" skills and significant decreases in "don't" skills, which parents learn to use and avoid, respectively, during infant-led play (Bagner et al., 2016). Do skills include praises, behavioral descriptions, and reflections, whereas don't skills include questions, commands and criticisms. We hypothesized: (a) parenting do skills would mediate the effect of the IBP on the observed frequency and global rating of aggressive behaviors, such that higher levels of do skills at post-intervention would be associated with lower levels of observed frequency and lower global rating of infant aggressive behaviors at follow-up and (b) parenting don't skills would mediate the effect of the IBP on the observed frequency and global rating of aggressive behaviors, such that higher levels of don't skills at post-intervention will result in higher levels of observed frequency and global rating of infant aggressive behaviors at follow-up.

Method

The current study is a secondary data analysis of a randomized controlled trial of the IBP. The primary outcome data on the IBP are reported elsewhere (Bagner et al., 2016) and demonstrated that infants receiving the IBP displayed significantly lower levels of aggressive behavior per maternal report across post and 3- and 6-month follow-up assessments. Infants were also significantly more compliant to maternal commands at the 6-month follow-up when compared to infants in standard care. In addition, mothers showed significantly higher levels of behaviorally-based parenting do skills and lower levels of behaviorally-based parenting don't skills during an infant-directed play situation compared to mothers in the standard care group. The present study expanded on these findings by examining the effect of the IBP on the observed frequency of infant aggressive behavior and severity of infant aggressive behaviors through a global rating of aggression, as well as the indirect effect of parenting skills on the observed frequency and global rating of infant aggression. Study procedures were approved by the university and hospital Institutional Review Boards.

Participants

Mother-infant dyads with a 12- to 15-month-old were recruited during wellness visits at a pediatric primary care clinic in a large children's hospital in South Florida. The mother was the identified primary caregiver in all families that participated in the study. Study inclusion criteria included: a) infants above the 75th percentile on the Brief Infant-Toddler Social and Emotional Assessment (Briggs-Gowan & Carter, 2006), a screener of infant behavior problems, b) mothers were required to speak English or Spanish. English-speaking mothers were required to receive an estimated IQ score of 70 or higher on two

subtests (the Vocabulary and Matrix Reasoning subtests) of the Wechsler Abbreviated Scale of Intelligence (Wechsler, 1999), and Spanish-speaking mothers were required to receive an average scaled score of 4 or higher on the Vocabulary and Matrix Reasoning subtests of the Escala de Inteligencia Wechsler Para Adultos-Third Edition (Pons et al., 2008), if they chose to complete the assessment in Spanish.

Data for the current study include the 58 families that were randomized to the IBP or standard pediatric primary care. There were no significant differences on demographic variables between families in the standard care or IBP group. Infants were between 12 and 15 months, with an average age of 13.52 months (*SD* = 1.31). The majority of infants were reported to be of Hispanic ethnicity (94.8%) and White race (82.8%). Mothers were on average 29.9 years (*SD* = 5.3), and the majority of mothers (90%) reported a Hispanic ethnicity. The mean IQ *T*-score for mothers was 46.35 (*SD* = 12.55), which was derived from an average of the *T*-scores on the vocabulary and matrix reasoning subtests of the WASI and following the conversion of scaled scores to *T*-scores and subsequent average of the *T*-scores on the vocabulary and matrix reasoning subtests of the EIWA-III. A majority of the families (60%) reported incomes below the poverty line. Spanish was the primary language spoken by the majority of caregivers (56.7%). Table 1 provides participant demographic and outcome variable information at baseline.

Procedure

Families that met study criteria at the time of screening were scheduled for a baseline assessment, during which questionnaires and behavioral observations of mother-infant interactions were administered in the family's home. Sixty eligible mother-infant dyads consented to participate and were randomly assigned using a computer-generated

random numbers list to receive the IBP or standard pediatric primary care, in which the infant received care as usual (i.e., sick and well visits at the pediatric primary care clinic) but did not receive the IBP. Of the sixty randomized mother-infant dyads, 58 families completed the baseline assessment. A second assessment was conducted approximately 2 months following the baseline assessment and represented the post-intervention assessment. Follow-up assessments were conducted 3 and 6 months after the post-intervention assessment. Families were compensated $50 for completion of each assessment. Of the 58 families that completed the baseline assessment, 48 families completed the post-intervention assessment (83% retention), and 46 families complete the 3- and 6-month follow-up assessments (79% retention). Videotaped observations between the mother and infant were conducted at each home assessment. Levels of infant aggressive behaviors were observed and coded during a 10-min infant-led play situation, which included a 5-min warm-up period at each assessment time-point. Infant aggressive behaviors were observed and coded during 10 minutes of infant-led play to allow for a more naturalistic observation of infant behaviors, consistent with previous use of the SCEPA measure (Mesman et al., 2008). Levels of behaviorally-based parenting skills were observed and measured over a 5-min period, consistent with recommendations for coding DPICS during child-led play (Shanley & Niec, 2011)

Measures

Aggressive Behaviors. The first and second authors, who are both bilingual and were masked to intervention group, coded five aggressive frequency behaviors in infants using the SCEPA measure created by Kennan and Shaw (1994): socially appropriate aggression (usually directed at objects, but fulfills the goals of the task), aggressive intent

(must have visible force, but with no evaluation of intent to harm), game playing (actions, such as knocking over a tower of blocks), temper tantrums (forceful contact with ground), and banging toys together (repetitive banging with force). Given the relatively low frequency of aggressive behaviors in each individual category, we created a cumulative or total aggressive behavior frequency variable for all analyses consistent with Mesman and colleagues (2008). Thus, frequency of aggressive behaviors refers to the sum of aggressive behaviors each child exhibited during the 10-min observation period. Additionally, each child was rated on a scale from 1 (unaggressive) to 4 (severely aggressive), based on the Global Aggression Rating Scale defined by Keenan and Shaw (1994). The intent to hurt or harm someone or something is not taken into consideration on the Global Aggression Rating Scale or frequency of aggressive behaviors codes, as intentions are difficult to assess at any age (Hartup, 2005). Coders in the current study completed training videos and coded 20% of the videos for interrater reliability. Consistent with intraclass correlations reported by Mesman and colleagues (2008), intraclass correlations in the present study ranged from .90 to .99 for the five individual aggressive behavior codes, and were .99 for both the overall frequency of infant aggressive behaviors code and the global aggression rating.

Behaviorally-Based Parenting Skills. The DPICS (Eyberg et al., 2005) was utilized to measure behaviorally-based parenting skills. The DPICS-III has demonstrated reliability and validity with parents of infants and children from predominately Hispanic backgrounds and among Spanish-speaking families (Bagner et al., 2016; McCabe et al., 2012). For the current study, parent codes were categorized into behaviorally-based do skills and don't skills (defined above). Undergraduate student coders were trained to meet

80% reliability using a DPICS criterion tape and were masked to intervention condition. Overall, kappa for the DPICS codes used in the current study was .89.

Intervention

The IBP is a home-based adaptation of the CDI phase of PCIT for high-risk infants and their families. Parents in IBP are taught to follow their infant's lead in play by increasing their use of behaviorally-based parenting do skills and decreasing their use of behaviorally-based parenting don't skills. Parents are also taught to ignore any safe, but disruptive behaviors, such as temper tantrums. Consistent with standard PCIT, the first session is a teach session during which the parents are taught the do and don't skills and role-play these skills with the therapist. The sessions following the teach session are coaching sessions, during which the therapist provided live coaching to parents while they played with their infant. Doctoral students in clinical psychology served as therapists for the intervention and were supervised by a PCIT Master Trainer (senior author). Sessions took place weekly in the parents' home for approximately 1 to 1.5 hours. Outside of sessions, parents were instructed to practice the skills they learned in session with their infant for 5 min each day of "special time." Families were offered a maximum of seven sessions, including the teach session, and completed the intervention in an average of 6.1 sessions. All sessions were videotaped in the home. Adherence to the IBP protocol was assessed and coded for 63% of randomly selected sessions based on the percentage with which the therapists implemented key intervention elements, such as checking in with parents and teaching the parenting skills. The adherence of the intervention of each session was 97%.

Data Analysis

Analyses were conducted in SPSS version 24. Linear mixed models (Verbeke & Molenberghs, 2009) were used to examine the effect of group on the observed frequency of aggressive behaviors and global aggression rating scores over a continuous time variable. For all models, the natural log of months elapsed since the baseline visit was used as the time predictor to linearize the relation between time and the outcomes. We proposed that infants randomized to IBP would display greater decreases in the overall frequency of aggressive behaviors code and global aggression rating scores across time compared to those randomized to standard care.

Furthermore, we used the PROCESS macro (Hayes, 2012) in SPSS to explore potential mechanisms by which the IBP led to decreases in observed aggressive behaviors. Specifically, we examined the effect of group on levels of behaviorally-based parenting skills at post-intervention (controlling for parenting skills at baseline) and the effect of behaviorally-based parenting skills on levels of infant aggressive behaviors at 3- and 6-month follow-ups (controlling for infant aggressive behaviors at baseline). Consistent with previous research (Garcia et al., 2015; Blizzard et al., 2017), do and don't skills were treated as continuous variables. The change in both mediators (i.e., behaviorally-based parenting do and don't skills) was represented by frequencies at the post-intervention assessment. We proposed that increases in behaviorally-based parenting do skills and decreases in behaviorally based parenting don't skills from baseline to post-intervention would predict lower levels of the frequency of infant aggressive behavior and global aggression rating scores at 3- and 6-month follow-ups.

Results

Missing Values Analysis and Covariates

Fifty-eight families completed the baseline assessment and were included in the analyses (30 families in the intervention group and 28 families in standard care). Missing value analysis showed that missingness on outcome variables was consistent with a missing at random pattern (Rubin, 1976). The groups did not significantly differ on any demographic characteristics, parenting do and don't skills at baseline, or observed frequency and global aggression rating scores of aggressive behaviors at baseline (as shown in Table 1). Thus, no covariates were included in the models except outcome variables at baseline to model change over time in the mediation analyses.

Descriptive Analyses

Descriptive statistics were conducted to examine the distribution of the frequency of aggressive behaviors and global aggression rating scores at baseline. We conducted tests to examine the normality and homoscedasticity of the residuals, which indicated that assumptions were met. The minimum total frequency of aggressive behaviors was 0 and the maximum was 43, indicating that the highest number of aggressive behaviors at any time point from a single child was 43. The minimum global aggression rating item was 1 and the maximum was 4 for all children at all time points. The modal rating for global aggression was 1 at baseline. Table 2 presents means and standard deviations for the observed frequency and global rating of aggressive behavior by group (standard care vs. intervention) at each time point. Table 3 presents correlations between the proposed mediator, parenting do and don't skills, and aggression at each time point.

Effect of IBP on Observed Frequency and Global Ratings of Infant Aggressive Behavior

A mixed model was tested to investigate differences in change between the IBP and control groups in the frequency of aggressive behaviors over time. Both linear and quadratic components were included in the model. The time variable was centered to reduce collinearity between the linear and quadratic components, and centered at the baseline to make the results more interpretable. At the baseline of the study, the mean frequency of aggressive behaviors for infants in the control group was 6.29 and the mean frequency of aggressive behaviors for infants in the IBP group was 7.43 (p = .53), indicating the groups did not differ significantly in frequency of aggressive behaviors at baseline. There was a significant negative linear decline, b = -1.87, F(1,175.21) = -2.55, p = .01, and a significant quadratic trend, b = .20, F(1,154.37) = 2.64, p = .009, in the observed frequency of aggressive behaviors between groups over the four time points, such that findings suggest that infants randomized to receive the IBP displayed a decrease in the slope of the frequency of aggressive behaviors across baseline through 6-month follow-up compared to infants randomized to standard care.

Based on the means across time for observed frequency of aggressive behaviors (see Figure 1), follow-up probing was conducted by re-centering the time variable at 6-month follow-up. At the 6-month follow-up, there was a non-significant negative linear decline, b = .94, F(1,43.96) = 1.50, p = .14, and a non-significant difference in frequency of aggressive behaviors between groups, b = -1.45, F(1,36.40) = -1.06, p = .30, such that the rate of change in the observed frequency of aggression at the 6-month follow-up did not significantly differ between the IBP and the standard care groups. This probing

indicated that while the quadratic model was significant and the rate of change in and frequency of observed aggression differed between groups at post and the 3-month follow-up, the rate of change in observed aggression or the frequency of observed aggressive behaviors did not differentially change between groups at the 6-month follow-up. Table 4 presents the results of the overall mixed model analysis as centered at baseline with observed frequency of aggressive behaviors over time.

A mixed model was also used to test nonlinear change differences between the IBP and control groups in global aggression rating scores over time. Both linear and quadratic components were included in the model with the time variable centered at baseline to reduce collinearity between the linear and quadratic components. At baseline, the mean global aggression rating score for standard care was 1.88 and the mean global aggression rating score for the IBP was 1.70 (p = .47). There was not a significant difference between groups in linear decline, b = -.003, F(1,129.69) = -.77, p = .44) or in quadratic trend, b = .00002, F(1,129.95) = 1.20, p = .23) in global aggression rating scores over the four time points. There was also no significant difference in the global aggression rating scores between groups, b = -.23, F(1,129.90) = -1.04, p = *.30.*

Indirect Effect of IBP on Observed Frequency and Global Ratings of Infant Aggressive Behaviors Via Behaviorally-Based Parenting Skills

We used the PROCESS macro for mediation (Hayes, 2012) to test the exploratory hypothesis that the association between intervention group and observed frequency of infant aggressive behaviors and global aggression rating scores at 3- and 6-month follow-ups would be accounted for by behaviorally-based parenting skills at post-intervention. The significance of the total and mediator-specific indirect effects was determined using

bias-corrected bootstrapped 95% confidence intervals (CIs) based on 5,000 bootstrapped samples.

Indices of model fit for the indirect effect of group membership on observed frequency of aggressive behaviors through behaviorally-based parenting don't skills demonstrated good model fit (Bollen & Long, 1993) for the 3-month follow-up model. The direct effect of intervention group membership (i.e., IBP or standard care) on observed frequency of infant aggressive behaviors at the 3-month follow-up was significant, b = -5.95, p=.044, CI [-11.74, -0.16]. The effect of intervention group membership on the mediator, behaviorally-based parenting don't skills at post-intervention, was also significant, b = -11.46, p = .01, 95% CI [-20.266, -2.650], such that mothers randomized to the IBP significantly decreased their use of parenting don't skills from pre- to post-intervention compared to mothers randomized to standard care. The effect of behaviorally-based parenting don't skills at post-intervention on observed frequency of infant aggressive behaviors at the 3-month follow-up when controlling for intervention group membership was also significant, b = .38, 95%, p < .001, CI [.195, .564], such that higher levels of parenting don't skills at post-intervention were associated with a higher frequency of infant aggressive behaviors at the 3-month follow-up. Total effects revealed that when controlling for behaviorally-based parenting don't skills at post-intervention, intervention group membership was not a significant predictor of observed frequency of infant aggressive behaviors at the 3-month follow-up, b = -1.60, p =.54, 95% CI [-6.84, 3.63]. The standardized indirect effect (MacKinnon, 2008) for the path from intervention group membership to frequency of aggressive behaviors through

behaviorally based parenting don't skills was -.476, indicating a medium effect. Figure 2 displays the regression coefficients for the 3-month follow-up model.

A similar model assessing the indirect effect of intervention group membership on observed frequency of infant aggressive behaviors at the 6-month follow-up through behaviorally-based parenting don't skills at post-intervention was not significant, as don't skills were not significant in predicting aggression at the 6-month follow-up. Models assessing the effect of intervention group membership on global aggression rating scores at 3- and 6-month follow-ups through behaviorally-based parenting don't skills at post-intervention were also not significant. Similar models were conducted to assess the effect of intervention group membership on the observed frequency and global ratings of infant aggressive behaviors at 3-and-6-month follow-ups through behaviorally-based parenting do skills at post-intervention. No models including behaviorally-based parenting do skills as the mediator were significant for either observed frequency of aggressive behaviors or global aggression rating scores outcomes, as the indirect effects in these models were not significant.

Discussion

The current study examined the direct effect of the IBP, a brief and home-based behavioral parenting intervention, on decreasing observed infant aggressive behaviors. Despite research supporting that aggression can be measured in children as young as 12 months of age (Alink et al., 2006; Carter et al., 2004; Carter et al., 2003; Cummings et al., 2009), little empirical work has examined the effect of interventions on observed aggressive behaviors in infants. Consistent with our hypothesis, findings revealed a significant group effect on the observed frequency of aggressive behaviors during infant-

led play across time points, such that infants in the intervention group displayed statistically significant decreases in observed frequency of aggressive behaviors compared to infants in the standard care group. However, follow-up probing of the data indicated the rate of this change at the 6-month follow-up was not significant, which suggests the direct effect of the IBP on the observed frequency of aggressive behavior was not maintained in the long term.

Research has demonstrated the continuity of aggressive behaviors from early childhood into adulthood (Olweus, 1979; Tremblay, 2000; Piquero et al., 2012). However, theory also suggests that children's ability to learn to regulate their emotions and aggression may result in peak levels of aggressive behaviors in toddlerhood that decline in later childhood (Tremblay, 2000). Nevertheless, research has not focused on the long-term stability of aggression in children as young as 12-months and has not examined the impact of parenting interventions on the long-term stability of aggressive behavior in comparison to a control group. Thus, future research is needed to assess the stability of aggressive behaviors from infancy across early and later childhood, the differences present in the function and display of aggressive behaviors across age, and the potential impact of parenting interventions during these time periods.

Despite the lack of direct effects at the 6-month-follow-up, these findings provide support that the SCEPA (Mesman et al., 2008) was sensitive to changes in observed aggression in infants under 18 months of age following an intervention and is the first study to demonstrate decreases in the frequency of observed aggressive behaviors in infants from predominately low-income and underserved ethnic minority families. Despite significant findings on the frequency of observed aggressive behaviors, there was

no significant group effect on global ratings of aggression across time points. The lack of significant effects on the global rating scale may be due to the limited range in scores (i.e., 1 to 4), as well as low variability across time points and within groups. The overall low global ratings in the sample was not surprising given the very young children included in the current sample. Nevertheless, future research should examine global ratings of aggression to assess whether this measure of aggression may be more relevant with older children, who may exhibit a greater intensity of aggressive behaviors. Specifically, the overlap between phenomenology and type of aggression during infancy and during later childhood may differ, as intentionality can be measured in older children (Coie & Dodge, 1998). Future research could examine differences in global ratings of aggression across different child ages, which may inform the need for adaptations to ensure the measure is more sensitive to aggressive behaviors that occur during infancy.

In addition to examining the direct effect of the IBP on infant aggressive behaviors, we conducted an exploratory examination of the indirect effect of behaviorally-based parenting skills as a mechanism by which the IBP led to decreases in observed infant aggressive behaviors. Despite research demonstrating the direct effect of behavioral parenting interventions on parenting skill acquisition (Blizzard et al., 2018; Hanisch et al., 2014) and the indirect effect of changes in parenting behaviors on parent-reported child aggressive behaviors (Hoeve et al., 2009; Rothbaum & Weisz, 1994; Patterson, 1982), no study to our knowledge has examined the indirect effect of parenting skills on the relation between a parenting intervention and observed aggressive behaviors. The current findings supported our hypothesis that levels of behaviorally-based parenting don't skills at post-intervention mediated the effect of the IBP on the observed frequency

of aggressive behaviors at the 3-month follow-up assessment, such that decreases in use of don't skills were associated with decreases in the observed frequency of aggressive behaviors. Thus, therapists should target reductions in negative parenting behaviors to reduce aggressive behaviors in the short term. However, behaviorally-based parenting don't skills did not mediate the effect of the IBP on observed frequency of aggressive behaviors at the 6-month follow-up, which may be due to the lack of a significant direct effect of the IBP on infant aggression at the 6-month follow-up.

In contrast to behaviorally-based parenting don't skills, results suggested behaviorally-based parenting do skills did not mediate the effect of the IBP on the observed frequency of aggressive behaviors at the 3- or 6-month follow-ups. Research has documented the impact do skills have on other outcomes, such as child prosocial behaviors (Hanisch et al., 2014) and language (Garcia et al., 2018; Garcia et al., 2015; Tannock et al., 1992). Studies have found that parents who exhibit negative parenting skills, such as decreased responsiveness to child's needs (Hart et al., 1998), increased use of harsh verbal and physical discipline (McKee et al., 2007), and more criticism towards their children (Campbell, 1995, Hoeve et al., 2009), are more likely to have children who display higher rates of aggressive behaviors. Thus, it is possible that decreasing don't skills is more important in reducing aggressive behaviors than the promotion of do skills, as don't parenting behaviors may lead to the maintenance and escalation of aggressive behaviors. Future research should further assess the differential impact of do and don't skills on observed aggressive behaviors, as well as potential mechanisms by which changes in parenting behaviors lead to changes in observed infant aggressive behavior.

We also examined the indirect effect of behaviorally-based parenting do and don't skills on the relation between group and global ratings of aggression. However, findings demonstrated that neither do or don't skills had a significant indirect effect between group and global ratings of infant aggression at the 3- or 6-month follow-ups. Given that there was no significant direct effect of the IBP on global ratings of aggression, it is not surprising that parenting skills was not a significant mediator. Additionally, global ratings of aggression only ranged from 1 to 4, so it is possible that these ratings did not capture variability among participants.

The current study included a predominantly ethnic minority sample, which was both a strength and a limitation, as the study targets an underserved and underrepresented population but one that limits generalizability of findings. Additionally, the relatively small sample size and limited timeline for follow-up (6 months) does not provide the opportunity to examine long-term effects of the IBP on observed aggression. Thus, future research should examine the relation between behavioral parenting interventions and observed aggressive behaviors in a more heterogenous sample and over a longer period of time, such as following children when they enter school and have more opportunity to display aggression with peers (Barth et al., 2004). Additionally, while adherence in intervention delivery was measured in the present study, competence of therapists was not measured. Thus, future research should also examine how well therapists delivered the intervention content, as their competence with the delivery of the intervention may impact study outcomes.

A second limitation is the that we did not combine parent report and observational measures of aggression in our analyses. Previous research showed the IBP had a

significant effect on parent-reported levels of infant aggression (Bagner et al., 2016), whereas the current study focused on observational coding of aggressive behaviors. Ad hoc analyses revealed that parent-reported levels of infant aggression were not correlated with observed infant aggression used in the current study. The lack of association between parent report of aggression and observed infant aggression has been previously reported (Brotman et al., 2008) and highlights the need for future research to incorporate a multimethod approach to measuring infant aggression. Additionally, future research should assess infant observed aggression in other contexts, such as with peers or siblings. Finally, although we demonstrated support for the indirect effect of behaviorally-based don't skills, we did not consider other variables that may have mediated or moderated the effect of IBP on observed aggressive behaviors, such as intervention engagement (e.g., homework practice, session attendance) or parental psychopathology, which could impact the parent's ability to incorporate the parenting skills taught during IBP.

Despite these limitations, the current study extends the literature by examining the effect of a brief, behavioral parenting intervention on observed aggressive behaviors in infants aged 12 to 15 months. The study findings provide initial support for the use of a behavioral parenting intervention to decrease the frequency of observed aggressive behaviors. Furthermore, results suggest decreasing negative parenting behaviors may be a mechanism by which parenting interventions can affect infant observed aggression and highlight the importance of specifically targeting a decrease in these negative behaviors. Findings could have broader implications for prevention, such as providing psychoeducation to parents about the importance of reducing directive verbalizations

during play to reduce infant aggression in other settings (e.g., pediatric primary care), and should be explored in future research.

Table 2.1. Participant baseline demographic variables and outcome variables.

	Total Sample (n = 60)		Intervention Group (n = 31)		Standard Care Group (n = 29)		
	%	*n*	%	*n*	%	*n*	*p* value
Child sex (male)	55	33	58	18	52	15	.62
Child minority status	98	59	97	30	100	29	.70
Mother minority status	95	57	94	29	97	28	.54
Mother English speaking (vs. Spanish)	43	26	55	17	31	9	.07
High school graduate or less	70	42	65	20	76	22	.34
Below poverty line	60	35	58	18	63	17	.70
	Mean	*SD*	Mean	*SD*	Mean	*SD*	*p* value
Child age (months)	13.49	1.31	13.71	1.40	13.25	1.18	.18
Mother age (years)	29.66	5.49	30.03	5.50	29.25	5.56	.59
Mother IQ T-Score*	46.35	12.55	47.21	12.17	45.43	13.09	.59
Observed Aggression Total	6.86	6.64	7.43	7.66	6.29	5.53	.53
Global Aggression Rating	1.79	.91	1.70	.95	1.88	.86	.47
“Do” Skills	4.19	3.95	4.35	4.10	4.02	3.85	.75
“Don’t” Skills	23.96	19.96	24.83	19.00	23.02	21.26	.73

Note. IQ = Intellectual Quotient.

* T-scores were combined between the WASI and EIWA-III Vocabulary and Matrix Reasoning subtests

Table 2.2. Means and Standard Deviations of Observed Aggression Coding Schema Across Time Points.

	Total Sample		Intervention		Standard Care	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
Aggression Total Time 1	7.09	6.77	7.89	7.83	6.29	5.53
GRS Time 1	1.79	.91	1.70	.95	1.88	.86
Aggression Total Time 2	6.56	6.67	5.16	5.58	7.58	7.28
GRS Time 2	1.84	1.04	1.57	.93	2.08	1.10
Aggression Total Time 3	6.05	8.97	2.94	3.33	8.38	11.05
GRS T3	1.44	.78	1.30	.73	1.57	.81
Aggression Total Time 4	3.19	4.45	3.89	5.70	2.67	3.27
GRS T4	1.53	.64	1.65	.67	1.40	.60

Note. GRS = Global Rating Scale of Aggression

Table 2.3. Correlations Among Parenting Skills and Outcome Variables.

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Aggr T1	.22	-.09	.004	.21	-.08	.24	.01	.23	.02	.34*	-.02	.17	.19	.28	.02
2 GRS T1	--	.11	.44**	.22	.46**	-.08	.17	.15	-.02	-.05	.15	-.06	.00	.03	.22
3 Do T1	--	--	.46**	-.17	.01	.10	.17	-.22	-.18	.20	.38*	-.23	.02	.16	.27
4 Don't T1	--	--	--	-.11	.17	.10	.46**	.05	-.001	.18	.54**	-.17	.06	.21	.53**
5 Aggr T2	--	--	--	--	.52**	-.18	.15	.26	.15	-.07	-.08	.27	-.17	-.05	-.03
6 GRS T2	--	--	--	--	--	-.24	.18	.17	.29	-.24	.00	.21	.12	-.20	.14
7 Do T2	--	--	--	--	--	--	-.09	-.12	-.28	.85**	-.07	.03	.05	.75**	-.02
8 Don't T2	--	--	--	--	--	--	--	.60**	.03	-.08	.74**	.01	.04	-.15	.76**
9 Aggr T3	--	--	--	--	--	--	--	--	.38*	-.12	.52**	.12	-.02	-.17	.55**
10 GRS T3	--	--	--	--	--	--	--	--	--	-.19	.03	.50**	.35*	-.23	.02
11 Do T3	--	--	--	--	--	--	--	--	--	--	.01	.13	.08	.82**	-.05
12 Don't T3	--	--	--	--	--	--	--	--	--	--	--	-.10	-.08	-.12	.71**
13 Aggr T4	--	--	--	--	--	--	--	--	--	--	--	--	.33	-.03	-.09
14 GRS T4	--	--	--	--	--	--	--	--	--	--	--	--	--	.04	.05
15 Do T4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-.01
16 Don't T4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note. *p<.05; **p<.01

Aggr. T1 = Aggression Frequency Total at Time 1; GRS T1 = Global Rating Scale of Aggression at Time 1; Do T1 = Behaviorally Based Parenting "Do" Skills at Time 1; Don't T1 = Behaviorally Based Parenting "Don't" Skills at Time 1; same abbreviations used for follow-up time points

Table 2.4. Mixed Model Effects of IBP on Frequency of Observed Aggressive Behaviors Over Time

	Frequency of Aggressive Behaviors					
Variable	***b***	***SE***	***t***	***p***	***LLCI***	***ULCI***
Time	.68	.40	1.68	.10	-.12	1.47
Time*Time	-.11	.04	-2.55	.01	-.20	-.02
Group	.74	1.54	.48	.63	-2.33	3.81
Interaction (Time*Group)	-1.87	.73	-2.55	.01	-3.31	-.42
Quadratic (Time*Time*Group)	.20	.07	2.64	.009	.05	.34

Note. LLCI = Lower level confidence interval, ULCI = Upper level confidence interval

Figure 2.1. Group Means Across Time for Observed Frequency of Aggressive Behaviors.

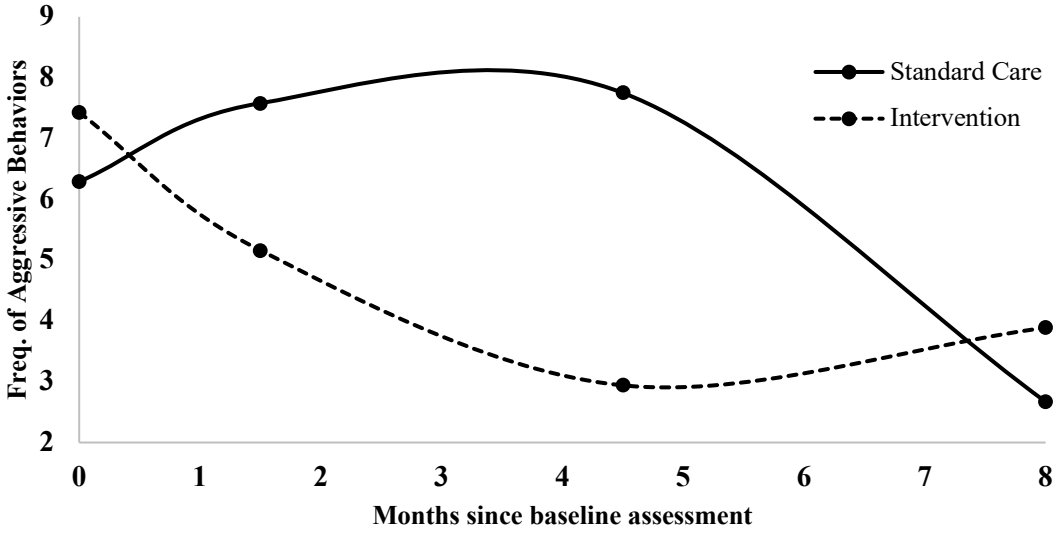
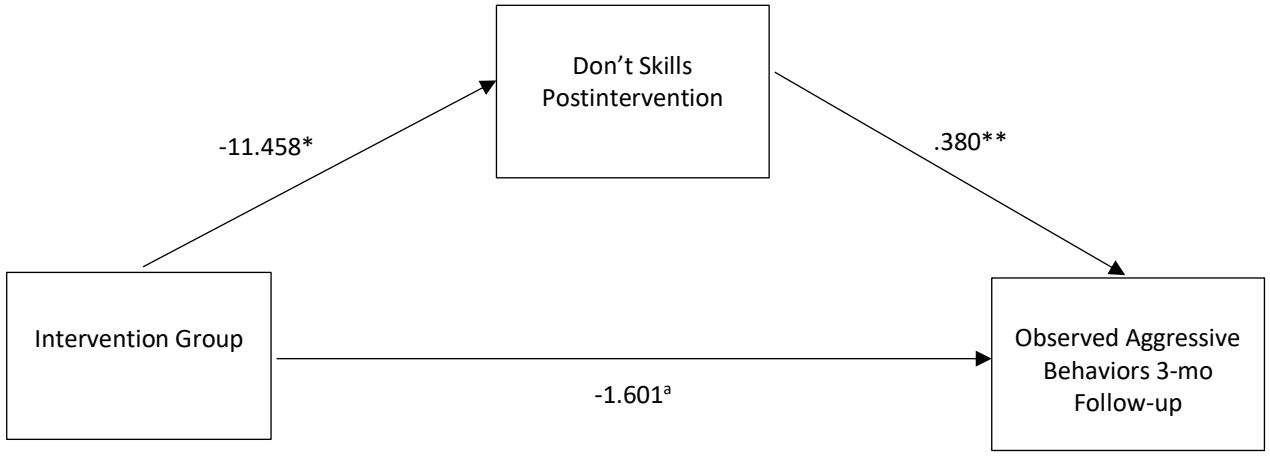


Figure 2.2. Mediating Effect of Parenting Don't Skills at Post-Intervention on Relation between Intervention and Frequency of Infant Observed Aggressive Behaviors at 3-Month Follow-up. Model controlled for baseline levels of parenting skills and infant observed aggressive behaviors



*p < .05
***p < .001
[a]significant indirect effects; 5,000 bootstrap samples

CHAPTER III

Associations between Behavior Problems in Children with Developmental Delay and Caregiver Distress: A Review of the Literature

This manuscript has been submitted to the Journal on Developmental Disabilities.

Heflin, B. H., Pettit, J. W., & Bagner, D. M. (2022). Associations between behavior problems in children with developmental delay and parental distress: A systematic review. (*Under review*)

Abstract

This systematic literature review examined the association between behavior problems (i.e., internalizing, externalizing, and total problems) in children with developmental delay (DD) and caregiver distress (i.e., stress, depression, and anxiety) across 19 peer-reviewed articles. We found behavior problems in children with DD were consistently associated with caregiver distress, and some studies showed support for bidirectional effects across early childhood. Additionally, higher levels of child behavior problems were found to predict higher levels of caregiver distress above and beyond the impact of the child's DD. Little variability was found in associations across different measures of child behavior problems and caregiver distress. Study findings suggest that associations between caregiver distress and child behavior problems may change across development, with less consistent associations across adolescence. All studies reported a higher rate of boys than girls in samples, but no studies examined the impact of child sex or caregiver demographic characteristics (e.g., age, race, ethnicity, language spoken, or socioeconomic status) on the association between child behavior problems and caregiver distress. Directions for future research include the need to assess for socio-cultural and demographic factors, as well as test of theoretical models, that may impact the association between behavior problems in children with DD and caregiver distress.

Key words: Caregiver distress, child behavior problems, developmental delay, early childhood

A review of the literature: Behavior problems in children with developmental delay and caregiver distress

Young children with developmental delay (DD) display significantly higher levels of externalizing and internalizing behavior problems compared to their typically developing peers (Baker et al., 2002; Crnic et al., 2004; Dekker et al., 2002; Merrell & Holland, 1997). Specifically, nearly half of children with DD also met diagnostic criteria for co-occurring psychopathology, such as attention-deficit/hyperactivity disorder, oppositional defiant disorder, separation anxiety disorder, and generalized anxiety disorder (Dekker & Koot, 2003). Importantly, behavior problems in children with DD are also associated with adverse outcomes, including higher rates of physical restraint and medication, as well as increased need for institutional care (Chan & Sigafoos, 2000; Emerson, 1995). Furthermore, higher levels of behavior problems in children with DD are associated with increased financial and emotional burden on families, as well as increased likelihood for exclusion from services pertaining to their delay (Roberts et al., 2010).

In addition to increased risk in the child, compared to caregivers of typically developing children, parents of children with DD have been shown to exhibit higher levels of "caregiver distress," which we conceptualize as including symptoms of depression (Nguyen et al., 2018), anxiety (Vilaseca et al., 2019), and stress (i.e., overall stress and stress about parenting; Fidler et al., 2000; Hastings, 2002; Hayes & Watson, 2013; Lee, 2013). Additionally, studies showed child behavior problems mediated the association between DD and levels of parenting stress (Baker et al., 2002; Hauser-Cram et al., 2001). Baker and colleagues (2003) showed support for a transactional model in

which higher levels of caregiver stress specifically predicted worse child behavior problems and vice versa over a one-year period in 36- to 48-month-old children with DD, but the study did not include other measures of caregiver symptoms, such as symptoms of depression and anxiety. Furthermore, higher levels of caregiver stress have been shown to negatively impact treatment outcomes in early childhood behavioral interventions (Strauss et al., 2012), suggesting that higher levels of caregiver distress for parents of children with DD may impede services which may further compound caregiver distress and child behavioral improvements.

A previous review (Crnic et al., 2004) examined factors associated with the prevalence of behavior problems in children with DD. While the review did not broadly examine caregiver distress and its association with child behavior problems, Crnic and colleagues (2004) summarized previous literature examining stress specifically and found parents of children with DD reported higher levels of stress than parents of typically developing children. Additional research not included in Crnic and colleagues (2004) review has examined the association between other components of caregiver distress, such as caregiver depressive and anxiety symptoms, and child behavior problems. For example, parental depressive and anxiety symptoms, even when they are "mild" or subclinical, may change the nature of the interactions with their children, which can impact child behavior (West & Newman, 2003). Furthermore, parenting stress mediates the association between child behavior problems and decreased parenting self-efficacy. In turn, child behavior problems mediate the associations between parenting stress and higher levels of parental depressive and anxiety symptoms in parents of children with autism spectrum disorder (ASD; Rezendes & Scarpa, 2011).

In a systematic review examining the association between behavior problems in children with ASD and parental distress, Yorke and colleagues (2018) found that positive associations between parental stress and child internalizing and externalizing behavior problems were greater than associations between parental depressive and anxiety symptoms and child internalizing and externalizing behavior problems. However, this review did not examine the association between caregiver distress and behavior problem in children with DD and other disabilities (e.g., intellectual disability, learning disorders, language and speech disorders). Thus, given the differential associations between the components of parental distress and behavior problems in children with ASD, as well as prior associations between caregiver stress specifically and behavior problems in children DD, it is important to conduct a review to examine the associations between caregiver distress (i.e., stress, depression, and anxiety symptoms) and behavior problems (i.e., internalizing and externalizing behavior problems) in children with DD.

Rationale for Current Review

Children with DD exhibit higher levels of behavior problems when compared to typically developing (TD) peers and parents of children with DD exhibit higher levels of "distress" than parents of TD children. Furthermore, given the unique financial, relational, and emotional impacts on families with children with co-occurring DD and behavior problems, as well as the impact of caregiver distress on early intervention services, it is important to examine the associations between child behavior problems and caregiver distress in studies including children with DD. Specifically, examining the associations in children with DD could provide clinicians with the knowledge to better identify which families are at risk for worse outcomes, as well as improve treatment

services and care for families experiencing high levels of distress. Despite the review of caregiver distress within the ASD population (Yorke et al., 2018), a review has not examined caregiver distress among families of children with DD. This represents an important gap in the literature given that children with DD are at the same or greater risk for behavior problems than children with more severe delays or ASD (Crnic et al., 2004; Grizenko et al., 1991). Furthermore, ASD is not typically diagnosed in children younger than 2 years of age, with the average age of diagnosis at 3.1 years (Mandell et al., 2005). However, behavior problems can be reliably assessed as young as 12 months of age (Carter & Briggs-Gowan, 2006), and children with or at-risk for DD show higher levels and greater stability of behavior problems than TD children (Baker et al., 2003; Merrell & Holland, 1997). Thus, it is particularly important to examine behavior problems in early childhood for children with or at-risk of DD, as well as how behavior problems in children with or at-risk for DD function comparatively to behavior problems in children with ASD.

Given the reliable assessment of child behavior problems by 12 months of age, coupled with high levels of distress among caregivers of children with DD, research needs to examine associations between caregiver distress and child behavior problems including in children younger than 2 years, which is an age range excluded from previous reviews. Furthermore, the current review focuses on children ages 0 to 5 given that global developmental delay can only be diagnosed within this age range (Levy, 2018). Previous research demonstrated differences in behavior problems in ASD and DD populations, as well as potential differences in levels of distress among caregivers of children with ASD versus other delays, research examining the associations between caregiver distress and

child behavior problems specifically within DD populations is needed. Thus, the current review aims to fill the gap in the literature by including all studies with children younger than 5-years-old and expand on the previous Crnic (2004) review by summarizing the literature over the past 16 years. Given the focus on DD and not ASD, the current review has no overlapping studies with the Yorke and colleagues (2018) review, and the 19 studies included are unique to this review.

In addition to a focus on older children, previous reviews (Crnic et al., 2004; Yorke et al., 2018) did not explore different methods used (e.g., caregiver report, observations, diagnostic interviews) to examine the associations between caregiver distress and child behavior problems. Furthermore, a growing body of research has examined the impact of various demographic factors on caregiver distress and child behavior outcomes, but they have not been examined in previous reviews. For example, research supports that caregiver distress may impact children differentially depending on the caregiver role (e.g., mother or father) and the severity of symptoms (Carro, 1993; Davé et al., 2008). Additionally, parents from racial and ethnic minority backgrounds have been found to experience greater levels of stress that are, in part, a result of societal structures that perpetuate income disparities (Nomaguchi & House, 2013). Furthermore, research showed caregiver distress may vary depending on the child's age or the impact of race or ethnicity on parenting stress (Bulcroft et al., 1996). For example, when children are exposed to people outside of their familial culture in early childhood, parental stress increases (Bulcroft et al., 1996). Finally, externalizing behavior problems are reported more commonly in boys, whereas internalizing behavior problems are reported more commonly in girls (Skogli et al., 2013).

Current Review

The current review aims to explore the role of the following demographic variables on the association between caregiver distress and child behavior in children with DD: (a) child age, (b) child sex, (c) child delay diagnosis, (d) caregiver age, I caregiver role, (f) caregiver relationship status, (g) race, ethnicity, and language of child and caregiver, and (h) family income. The current systematic review included studies that examined the cross-sectional, longitudinal, and transactional associations between caregiver distress and behavior problems in children with DD.

Specifically, the objectives of this review were to (a) examine the concurrent associations between caregiver distress and behavior problems in children with DD and 5-years-old or younger, (b) examine the longitudinal associations between caregiver distress and behavior problems in children with DD, (c) identify differences in research methods used and how these differences impacted associations between caregiver distress and child behavior problems, and (d) explore how demographic variables differed across studies examining associations between behavior problems and caregiver distress. We hypothesized that caregiver distress and child behavior problems will be positively associated with one another across types of distress (i.e., stress, depression, and anxiety) and behavior problems (i.e., externalizing and internalizing) cross-sectionally and longitudinally. We hypothesized that studies would rely on caregiver-report measures to assess both distress and behavior problems, and associations would be consistent across measurement method.

Methods

Search Strategy

An electronic database search was conducted in three databases popular to the fields of mental health (PsycINFO, PubMed and Google Scholar) by using the following search phrases: (behavior problems OR externalizing behavior OR internalizing behavior) AND (developmental delay) AND (toddlers OR preschooler) AND (parental stress OR parental depression OR parental anxiety). Articles written in languages other than English were excluded. Additionally, given the previous review of caregiver distress and behavior problems in children with DD (Crnic et al., 2004), articles published prior to 2004 were excluded from the current review. The database searches were conducted on November 13, 2020.

Study Selection

The search initially identified 5,251 unique papers. To be included in the analysis, articles had to be: (1) an empirical study, (2) published in a peer-reviewed journal, (3) written in English, (4) published after 2004, (5) a study including children with a mean age of 5 years or younger (at the initial assessment for longitudinal studies), (6) a study including children with DD based on prior report or identification and assessment of delay in the context of the study, and (7) measurement of and reporting on the association between child behavior problems and caregiver stress, anxiety, and/or depression, but not caregiving behaviors. Studies including children with ASD were included if the study included a separate group of children with DD but without ASD. A total of 19 studies were included in the final database. Information regarding the comprehensive search for peer-reviewed empirical articles and exclusion reasons are summarized in Figure 1.

Included Studies

Of the 19 articles meeting inclusion criteria, seven articles (Azad et al., 2013; Baker et al., 2005, 2010; Ciciolla et al., 2013; Dennis et al., 2018; Neece et al., 2012; Rodas et al., 2016; Zeedyk & Blacher, 2017) reported on data from the Collaborative Family Study (Baker et al., 2002). Additionally, two articles (Woodman, 2014; Woodman et al., 2015) reported on data from the Early Intervention Collaborative Study (Hauser-Cram et al., 2001). Lastly, Tervo reported data from the same study in two different articles (2010, 2011), and two studies conducted by Estes and colleagues (2009, 2013) reported on data from a larger study testing the effectiveness of the Early Start Denver model. Thus, in the present review, 13 of the 19 articles (68.4%) used data from four larger studies, with a remaining six of the 19 articles (36.8%) reporting on distinct samples. Given the low number of distinct samples of children and caregivers (n = 11), there was not enough information to calculate effect sizes, and little information was provided about associations with demographic variables. Thus, formal meta-analytic strategies were not used to summarize overall effects (Valentine et al., 2010). Instead, we present a narrative synthesis of the included studies.

Data Extraction

The following variables were extracted: year of publication, sample size, location of study, age of child, study inclusion/exclusion criteria, name of measure(s) and type of method (e.g., self-report, observational coding, diagnosis/diagnostic interview) for measuring child behavior problems and caregiver distress, type of method for DD diagnosis, study design, and results. Key details of each study are presented in Table 1.

Results

Participants

The reviewed studies collectively included a total of 8,497 children and their caregivers. Most studies included participants from the United States (*n* = 17, 89.5%), and the remaining studies included participants from the United Kingdom (*n* = 1, 5.3%), Canada (*n* = 1, 5.3%). Given that 13 of the 19 articles used data from four larger, parent studies, only 6 of the articles reported on distinct samples, with the remaining articles using different portions of the participants from the four larger parent studies. Further information is provided in the discussion.

Association between behavior problems in children with DD and parental distress

Of the 19 studies included in the current review, the majority of studies either examined the association between a component of caregiver distress and behavior problems in children with DD (*n* = 6, 31.6%) or compared this association between samples of TD children and children with DD (*n* = 9, 47.4%). The remaining studies compared this association between children with low birthweight or born prematurely and children with DD (*n* = 1, 5.3%), children with DD and children with ASD (*n* = 2, 10.5%), or TD children, children with DD, and children with ASD (*n* = 1, 5.3%). One study examined differences in the associations between caregiver distress and child behavior problems in children with known causes of DD (e.g., biological conditions such as fetal alcohol syndrome or brain damage), unknown causes of DD (e.g., global developmental delay), and children at risk for, but without prior diagnosis of, DD as identified through low birthweight or premature birth (Feldman et al., 2007).

Among the five studies examining the association between caregiver distress and behavior problems in children with DD, all found higher levels of caregiver-reported child behavior problems were associated with higher levels of caregiver stress. The most common approach utilized to compare the associations between caregiver distress and child behavior problems was between TD children and children DD. Three studies found that total child behavior problems were significantly and positively associated with caregiver depressive symptoms across TD and DD groups (Cheng et al., 2015; Eisenhower et al., 209; Zeedyk & Blacher, 2017), and one study found that total child behavior problems were significantly and positively associated with general psychological caregiver distress measured through the Kessler Psychological Distress Scale (Bailey et al., 2019; K-6; Kessler et al., 2002), consistent with studies that only included children with DD. Additionally, total child behavior problems were significantly and positively associated with caregiver depressive symptoms after covarying for the severity of developmental functioning (Cheng et al., 2015; Eisenhower et al., 2009; Rodas et al., 2016; Zeedyk & Blacher, 2017). Furthermore, the interaction between developmental functioning and total child behavior problems was associated with higher levels of caregiver stress, depressive symptoms, and poor physical health in mothers of children with DD, such that parental health was the poorest when children had high levels of total behavior problems and low developmental functioning (Eisenhower et al., 2009). Additionally, maternal depressive symptoms moderated the association between total child behavior problems and physical health such that high levels of depressive symptoms and high levels of total child behavior problems resulted in the worst physical health outcomes for mothers (Eisenhower et al., 2009).

Longitudinal studies examining differences in TD children and children with DD showed varied results. Four studies found no differences in associations with caregiver stress (Azad et al., 2013; Baker et al., 2005; 2010; Neece et al., 2012) or caregiver depressive symptoms (Baker et al., 2005) and child externalizing behavior problems between TD children and children with DD from ages 1 to 10 years. One study found evidence of a positive association between general psychological maternal distress and child internalizing and externalizing behavior problems, although levels of behavior problems and general psychological maternal distress decreased over time, with smaller decreases in mothers of children with DD than in TD children (Bailey et al., 2019). Furthermore, one study found child externalizing problems at 3 years predicted general psychological maternal distress in mothers 1 year later, but the reciprocal effect was not supported (Ciciolla et al., 2014). Additionally, Ciciolla and colleagues (2014) found bidirectional positive associations between maternal distress behavior problems in children from 3 to 5 years, but the associations were not significant in the TD group.

The three studies examining differences in associations between caregiver distress and behavior problems in children with ASD and children with DD showed varied results. All studies found that maternal stress was predicted by total child behavior problems, including internalizing and externalizing behaviors, but not the diagnosis of ASD or DD (Brei et al., 2015; Estes et al., 2009). Although Estes and colleagues (2009) found higher levels of caregiver stress, depressive and anxiety symptoms, as well as total child behavior problems, in the ASD group compared to the DD group, the association between caregiver stress and total child behavior problems was stronger in the DD group than in the ASD group, which suggests a difference in how developmental status impacts

the associations between caregiver symptoms and child behavior problems. The other study showed total child behavior problems were significantly and positively associated with higher levels of caregiver stress regardless of group (Brei et al., 2015).

Lastly, one study investigated the associations between caregiver distress and child behavior problems across three groups: ASD, DD, and TD. Estes and colleagues (2013) found that total child behavior problems were a significant predictor of levels of caregiver stress, depression, and anxiety among parents of children with ASD and DD, but not for TD children.

Measurement of Child Behavior Problems

Differences in Methods and Type of Behavior Problems. Overwhelmingly, studies relied on caregiver report of child behavior problems, with roughly 95% of studies utilizing only caregiver-report measures. The Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001), a caregiver-report questionnaire of child externalizing and internalizing behavior problems, was the most widely utilized measure of child behavior problems (n = 14; 73.7% of studies). Items are rated on a 3-point Likert-style scale from 0 (absent) to 2 (occurs often); the CBCL has strong support for reliability and validity (Achenbach 1991, 1992). For children with DD, the CBCL has yielded varied reliability and validity depending on the subscale (Esbensen et al., 2018) but provides sufficient reliability and validity as a measure of early childhood behavior problems (Levy et al., 2019). All studies that included the CBCL as the measure of child behavior problems included the externalizing, internalizing, and/or total behavior problems scale scores. Additionally, Tervo (2010, 2011) examined syndrome score subscales (emotionally

reactive, anxious/depressed, somatic complaints, withdrawn, sleep problems, attention problems and aggressive behaviors) on the CBCL.

Other studies included in this systematic review used the Aberrant Behavior Checklist (ABC-C; Aman & Singh, 1994; *n* = 3, 15.8%), the Preschool and Kindergarten Behavior Scales – Second Edition (PKBS-2; Merrell, 2002; *n* = 1, 5.3%), and the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2006; *n* = 1, 5.3%). One study utilized both the CBCL and the ABC-C (Brei et al., 2015). Only one study (Baker et al., 2010) utilized a method other than caregiver report of child behavior. Specifically, Baker and colleagues (2010) used the dysregulation coding system across various lab-based tasks and the Diagnostic Interview Schedule for Children IV – Parent Version (DISC-IC; Costello, Edelbrock & Costello, 1985).

Consistent with limited variability in the methods used to measure child behavior problems, there was consistency in the type of behavior problems assessed, as all studies reported on internalizing, externalizing, and/or total behavior problems, with additional specificity discussed below. Studies showed highly correlated cross-sectional effects and predictive associations between internalizing behavior problems and general psychological caregiver distress (Bailey et al., 2019; Ciciolla et al., 2014), caregiver stress (Woodman et al., 2015), and depressive symptoms (Rodas et al., 2016). Similarly, all studies examining the associations between caregiver distress and externalizing behavior problems showed significant, positive associations. Studies examining total behavior problem composite scores also reported significant, positive associations between caregiver distress and child problem behaviors cross-sectionally and over time (Azad et al., 2013; Brei et al., 2015; Cheng et al., 2015; Ciciolla et al., 2014; Dennis et

al., 2018; Eisenhower et al., 2009; Estes et al., 2009, 2017; Feldman et al., 2007; Neece et al., 2012; Tervo 2010, 2011; Woodman, 2014; Zeedyk & Blacher, 2017). Thus, results across studies showed consistent associations between caregiver distress and internalizing, externalizing, and total behavior problems in children with DD. The two studies that examined subscales of the CBCL found support for associations dependent on subscale scores. Specifically, Tervo (2010) found that parenting stress increased as parents reported higher levels of emotional reactivity, withdrawal, and oppositional defiant problems. Tervo (2011) found that children with parent-reported attention problems on the CBCL experienced significantly higher levels of behavior problems and parenting stress than children without reported attention problems.

Measurement of Caregiver Distress

Differences in Methods and Type of Caregiver Distress. Inclusion criteria for caregiver distress (i.e., symptoms of stress, depression, or anxiety) were broad in order to capture various types of distress among caregivers of children with DD. Thus, measures of caregiver distress were more varied than child behavior problems. Further, more studies utilized multiple self-report ratings of caregiver distress (n = 6, 31.6%), when compared to those that utilized multiple reports or methods of child behavior problems (n = 2, 10.5%). However, all studies used self-report of caregiver distress rather than previous/present diagnosis or a clinical interview, in contrast to the assessment of child behavior problems in which one study used the Diagnostic Interview Schedule for Children (Baker et al., 2010).

The Parenting Stress Index, both short and long forms, (PSI-SF, PSI; Abidin, 1995; Abidin, 2012) was the most widely utilized measure of caregiver stress among

caregivers of children with DD (*n* = 6; 31.6%). The PSI and PSI-SF require caregivers to rate statements about general life and parenting stressors on a 5-point Likert scale. Five studies used the PSI-SF and two used the PSI long form. Of the four studies that used the PSI-SF, two used the parental distress subscale and two used the total score. The two studies using the PSI long form used the parent domain score. Other measures of parental stress levels used in the studies in the current review were the Family Impact Questionnaire (FIQ; Donenberg & Baker, 1993; *n* = 5, 26.3%) and the Questionnaire on Resources and Stress (QRS; Holroyd, 1974; *n* = 2, 10.5%).

To measure caregiver depressive symptoms, the Center for Epidemiological Studies Depression Scale was the most widely used (CES-D; Radloff, 1977; *n* = 5, 26.3%). The CES-D is a 20-item self-report measure of depressive symptoms. Other measures of caregiver depressive symptoms included the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1975; *n* = 2, 10.5%) and the Beck Depression Inventory-Second Edition (BDI-II; Beck et al., 1996; *n* = 1, 5.3%). Studies also combined anxiety and depression subscales of the BSI to create a "caregiver distress" factor (Estes et al., 2009, 2013). The assessment of general psychological caregiver distress was also measured with the use of the Symptom Checklist – 35 (SCL-35; Derogatis, 1994; *n* = 1, 5.3%) or the Kessler Screening Scale for Psychological Distress (K-6; Kessler et al., 2002; *n* = 1, 5.3%). Percentages for caregiver distress methods of measurement add to greater than 100% because five studies included more than one questionnaire to assess caregiver distress (Baker et al., 2005, 2010; Eisenhower et al., 2009; Estes et al., 2009, 2013).

Despite various constructs of caregiver distress assessed in the scope of the current review, as well as the variety of self-report measures used to assess these

constructs, outcomes did not differ based on the construct examined or measure used. Studies assessing caregiver stress levels found that higher levels of caregiver stress were associated with higher levels of total child behavior problems and vice versa (Azad et al., 2013; Baker et al., 2005; Brei et al., 2015; Ciciolla et al., 2014; Dennis et al., 2018; Estes et al., 2009, 2013; Neece et al., 2012; Tervo, 2010, 2011; Woodman et al., 2015). Fewer studies examined caregiver depressive symptoms, but results were also consistent across different measures, including the BSI (Estes et al., 2009, 2013) and the CESD (Baker et al., 2005; Cheng et al., 2015; Eisenhower et al., 2009; Zeedyk & Blacher, 2017), showing higher levels of total child behavior problems predicted higher levels of caregiver depressive symptoms across TD, DD, and ASD samples. One study examining differences in etiology of DD showed caregiver depressive symptoms, as reported on the BDI-II, were higher for caregivers of children with global DD than those caregivers with children with biological conditions that contributed to their DD (e.g., fetal alcohol syndrome, down syndrome, spina bifida; Feldman et al., 2007). Only one study examined caregiver anxiety symptoms (Estes et al., 2013) and showed that total child behavior problems were associated with caregiver anxiety symptoms regardless of the child's delay.

Role of demographic variables

Child Age. Only three studies (15.8%) included children under 2 years (Tervo 2010, 2011; Estes et al., 2013), with the youngest age of 18 months. Seven studies (36.8%) included children between 2 and 5 years and the remainder (42.1%) followed children longitudinally from as young as 3 to as old as 18 years. All studies examining the association between caregiver distress and child behavior problems in children

ranging in age from 18 months to 11 years consistently showed positive cross-sectional and longitudinal associations between child behavior problems (e.g., internalizing, externalizing and total problems) and caregiver symptoms of stress, depression, and anxiety, regardless of child age. One study examining total child behavior problems found significant positive associations with caregiver depressive symptoms between 3 and 9 years but not between 9 and 13 years (Zeedyk & Blacher, 2017). Woodman and colleagues (2015) also found varied support for associations across different child age ranges. Specifically, while there was support for a transactional model between caregiver stress and child internalizing behavior problems between 3 and 5 years, child internalizing behavior problems predicted caregiver stress between 5 and 10 years, whereas caregiver stress predicted internalizing behaviors between 15 to 18 years. These findings suggest associations between caregiver distress and child internalizing and externalizing behavior problems may change across development.

Child Sex. All studies reported that the majority of the children included in the samples were boys. Baker and colleagues (2010) was the only study to examine rates of disruptive behaviors among TD and DD populations across boys and girls and found no differences in rates across sexes. No studies reported on the impact of child sex on the association between child behavior problems and caregiver distress.

Child Delay Diagnosis. Three studies (15.8%) used data from assessments prior to and separate from the study. The remainder of the studies (n = 16; 84.2%) used diagnostic measures to assess for developmental functioning at the beginning of or during the course of the study. The association between child behavior problems and caregiver distress did not differ based on the use of different measurements of child delay. Across

most studies, higher levels of behavior problems were associated with or predictive of higher levels of caregiver distress when controlling for the impact of developmental functioning or diagnosis (Bailey et al., 2019; Brei et al., 2015; Cheng et al., 2015; Dennis et al., 2018; Eisenhower et al., 2009; Estes et al., 2009; Feldman et al., 2007; Tervo, 2010, 2011; Woodman et al., 2014, 2015; Zeedyk & Blacher, 2017).

Caregiver Age. Of the twelve studies (63.2%) that reported parent age, ten reported the mean parent age was 30-years-old and older (83.3%; Bailey et al., 2019; Baker et al., 2010; Dennis et al., 2018; Eisenhower et al., 2009; Estes et al., 2009, 2013; Feldman et al., 2007; Neece et al., 2012; Rodas et al., 2016; Woodman et al., 2014, 2015). One study reported that 51.2% of the mothers in the sample were 29-years-old or younger and was the only study to include teenage mothers, who experienced the highest prevalence of depressive symptoms (Cheng et al., 2015). No studies examined the effect of parent age on associations between child behavior and caregiver distress.

Caregiver Role. Ten of the included 19 studies (52.6%) reported only on maternal distress (Azad et al., 2013; Bailey et al., 2019; Baker et al., 2010; Cheng et al., 2015; Ciciolla et al., 2014; Eisenhower et al., 2009; Estes et al., 2009, 2013; Woodman et al., 2015; Zeedyk & Blacher, 2017). An additional five studies (26.3%) included reports from fathers and other caregivers (e.g., adoptive parents, grandmothers, aunts) and examined the impact of caregiver role on the associations, but they did not compare rates of caregiver distress between the different caregivers (Brei et al., 2015; Dennis et al., 2018; Feldman et al., 2007; Tervo, 2010, 2011). One of the five studies specified that parental distress included reports from adoptive parents and other family members, such as grandmothers or aunts (Feldman et al., 2007). Studies examined various aspects of

caregiver distress across different caregiving roles and illustrated varied results. Specifically, two studies showed consistent reports of transactional associations between caregiver stress levels and child behavior problems over time for both mothers and fathers, as well as decreases in caregiver stress over time (Neece et al., 2012; Woodman et al., 2014). However, Woodman (2014) found total child behavior problems had a significantly greater effect on subsequent maternal stress levels than on paternal stress levels. Baker and colleagues (2005) found that both mothers and fathers reported higher levels of depressive symptoms and lower levels of marital adjustment when their children presented with higher levels of clinically significant total behavior problems. However, total child behavior problems predicted maternal well-being but not paternal well-being (Baker et al., 2005). Additionally, Rodas and colleagues (2016) found that child internalizing behaviors problems were predicted by greater levels of paternal depressive symptoms but not by maternal depressive symptoms.

Caregiver Relationship Status. Of the 19 studies in the current review, 13 studies (68.4%) reported information regarding the relationship status of the caregivers, all of which reported that the majority of parents with children with DD were married (Azad et al., 2013; Baker et al., 2005, 2010; Cheng et al., 2015; Ciciolla et al., 2014; Dennis et al., 2018; Feldman et al., 2007; Eisenhower et al., 2009; Neece et al., 2012; Tervo, 2010, 2011; Woodman et al., 2014, 2015). Two studies examined the impact of marital status or marital adjustment on caregiver distress. Cheng and colleagues (2015) reported that 69.1% of mothers were married but found that the highest prevalence of depressive symptoms was in mothers who were divorced, separated, or widowed. Baker and colleagues (2005) reported that total child behavior problems were significantly

positively associated with higher levels of caregiver depressive symptoms and marital adjustment problems across TD and DD groups. No studies examined the impact of caregiver relationship status on the association between caregiver distress and child behavior problems.

Child and Caregiver Race and Ethnicity. Across the 16 studies that reported race and ethnicity in the sample for either the child or caregiver, 15 of the 16 studies (93.8%) reported samples that were > 50% non-Hispanic White. Dennis and colleagues (2018) conducted the only study with a predominately Hispanic/Latinx sample (50%). Furthermore, of the 16 studies that reported race and ethnicity, only 4 studies (21.1%) reported the breakdown of sample demographics by group (Bailey et al., 2019; Baker et al., 2005; Cheng et al., 2015; Dennis et al., 2018). Only one study examined the effect of race and ethnicity on study outcome variables and found that non-Hispanic Black mothers experienced the highest prevalence of depressive symptoms, and Hispanic/Latinx mothers reported lower CESD scores than other demographic groups (i.e., non-Hispanic/Latinx White, non-Hispanic/Latinx Black, non-Hispanic/Latinx other race) when they had male children (Cheng et al., 2015). No studies reported on the effect of race and ethnicity on the association between child behavior problems and caregiver distress.

Language of Child and Caregiver. One study reported the language spoken by the sample. Specifically, Dennis and colleagues (2018) stated that monolingual Spanish-speaking parents were included in the study, but only comprised 17.5% of the study sample. Brei and colleagues (2015) reported that non-English speaking families were

excluded. All other studies did not report information regarding language spoken or language inclusion criteria.

Family Income. Most studies reporting income showed more than 40% of the sample reported an annual income of greater than $50,000 (Azad et al., 2013; Baker et al., 2005, 2010; Dennis et al., 2018; Eisenhower et al., 2009; Estes et al., 2009; Feldman et al., 2007; Neece et al., 2012). One study found that mothers living in the lower quintiles of SES experienced higher levels of depressive symptoms (Cheng et al., 2015). Ciciolla and colleagues (2014) found that family income was significantly associated with internalizing and externalizing symptoms in 3-year-old children with DD and with levels of distress in their mothers. No other studies examined differential outcomes based on family income or SES, and no studies examined the effect of family income or SES on the association between child behavior problems and caregiver distress.

Discussion

This systematic literature review aimed to evaluate studies that assessed the associations between behavior problems in children with DD and caregiver distress. Across the 19 studies that were included in this systematic review, findings were consistent in that behavior problems in children with DD were positively associated with caregiver distress cross-sectionally. Furthermore, studies showed support for longitudinal bidirectional effects between behavior problems and parental distress across early childhood. Specifically, higher levels of child behavior problems, regardless of type of child behavior problem (e.g., internalizing, externalizing, or total), were found to be associated with higher levels of caregiver distress (i.e., stress, depressive and anxiety symptoms), above and beyond the extent of the child's developmental functioning.

Although we found limited information regarding the impact of demographic variables on associations, the current review highlights the importance of investigating the role of demographic and cultural factors in families with children with DD in the future.

This systematic literature review is the first to our knowledge to examine the associations between caregiver distress broadly and early child behavior problems over time among children with DD. Findings presented in the current review suggest that there may be increased risk for families with children with DD in presentation of both caregiver distress and child behavior problems, compared to families with TD children. Though the mechanisms through which the increased risk is conferred was not explored in the present review, associations between levels of caregiver distress and levels of child behavior problems over time in early childhood suggest a need for increased attention to familial processes within DD, as well as a focus on how clinical services can best help these families. Furthermore, the exploratory aims of the current review to assess the role of various demographic considerations highlights the lack of attention placed on demographic variables, such as caregiver relation, caregiver relationships, familial SES, and racial/ethnic identity that may impact associations between caregiver distress and child behavior problems.

Despite consistency in the findings during early childhood, longitudinal and bidirectional effects in studies where children's age range extended into adolescence (past 11-years-old) varied in terms of significant associations (Azad et al., 2013; Woodman et al., 2015; Zeedyk & Blacher, 2017). Thus, there may be a developmental shift in the associations when children mature into early adolescence, suggesting a need for developmental studies that extend from early childhood into adolescence. It is

possible that peer relationships may play a larger role than parental functioning in relation to the presentation of child behavior problems during adolescence given the emergence of strong peer relationships and peer pressure (Rankin Williams & Anthony, 2015). Specifically, children and adolescents with DD may have peer relationships that function differently than that of TD children and adolescents, and how peer relationships impact behavior problems may differ across clinical populations given social difficulties and cognitive delays among children with DD. However, research is needed within this area, in particular the social nuances present for children and adolescents with DD.

Although most of the studies showed consistent associations between caregiver distress and behavior problems in young children with DD, there were limitations across the studies included in the current review. Studies relied heavily on caregiver-report of child behavior problems and caregiver distress. Assessment method homogeneity is consistent with the literature in TD preschool populations (Luby et al., 2007). However, research has showed that caregiver distress can negatively influence caregiver perceptions of child behavior (Gerstein et al., 2009; Krain & Kendall, 2000). Additionally, research highlighted discrepancies between caregiver report and observational coding methods of child behavior problems, such that levels of behavior problems are higher when caregivers reported higher levels of negative child behaviors (Moens et al., 2018). Thus, it is possible that method variance inflated the associations between caregiver distress and child behavior problems. Future research studies should examine associations between parental distress and child behavior problems by including other measures, such as clinical interviews, observational coding methods, or report of symptoms and behaviors from teachers or other respondents.

Another limitation of the 19 articles in the current review was that no studies examined the role of cultural factors such as language spoken, race/ethnicity, or acculturation processes. Additionally, only 3 studies examined these processes in in children younger than 3 years (Estes et al., 2013; Tervo 2010, 2011) despite the capability to assess behavior problems during this age range using measures such as the Infant-Toddler Social and Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2006). While the ITSEA has been utilized to assess behavior problems in children with DD (Thurm et al., 2018), associations between child behavior problems and caregiver distress have not been examined in early childhood for children with DD under 18 months of age or with the ITSEA. Additionally, no study examined associations with children younger than 18 months of age. Thus, future research should examine the role of the associations among more diverse ethnic and racial samples, as well as in children ages birth to 3-years-old.

A limitation of the current review is the lack of examination of parenting behavior, which is a possible mechanism through which caregiver distress and child behavior problems are associated and should be examined in future research. However, parenting behavior as a mechanism through which caregiver distress and child behavior problems are associated within developmental delay has not yet been researched sufficiently for an independent review. Additionally, the samples across the 19 studies were not racially or ethnically diverse, as 18 of the 19 studies limited participation to English-only speaking families. The present review only included studies written in English, which may contribute to the limitation of participation within studies to English-only speaking families. Furthermore, the articles included in the present study reflect the

impact of large, parent studies, as 13 of 19 studies included pulled subsets of the larger parent studies for the samples. As a result, the 8,497 children cited in the present review may reflect overlap, as we were unable to verify which children overlapped across individual studies stemming off the larger parent studies. Future research would benefit from evaluation of the bidirectional associations between caregiver distress and behavior problems in a larger variety of parent studies conducted by a more varied pool of research teams.

Despite the limitations of the current review, the findings highlight the bidirectional associations between caregiver distress (depression, anxiety and stress symptoms) and behavior problems (internalizing, externalizing and total behaviors) in early childhood within the DD population. Additionally, the current review provides evidence of consistency across sub-domains of caregiver distress and child behavior problems, illustrating the need for future studies to assess associations between the latent constructs. Furthermore, the current review provides support for associations between caregiver distress and child behavior problems transactionally over time, but we cannot draw conclusions regarding causality. Specifically, future research should examine how targeting caregiver distress subsequently results in decreases in child behavior problems and vice versa, explore mechanisms of change through which associations between factors are altered, and evaluate the impact of development from early childhood into late adolescence.

Table 3.1. Characteristics of included studies.

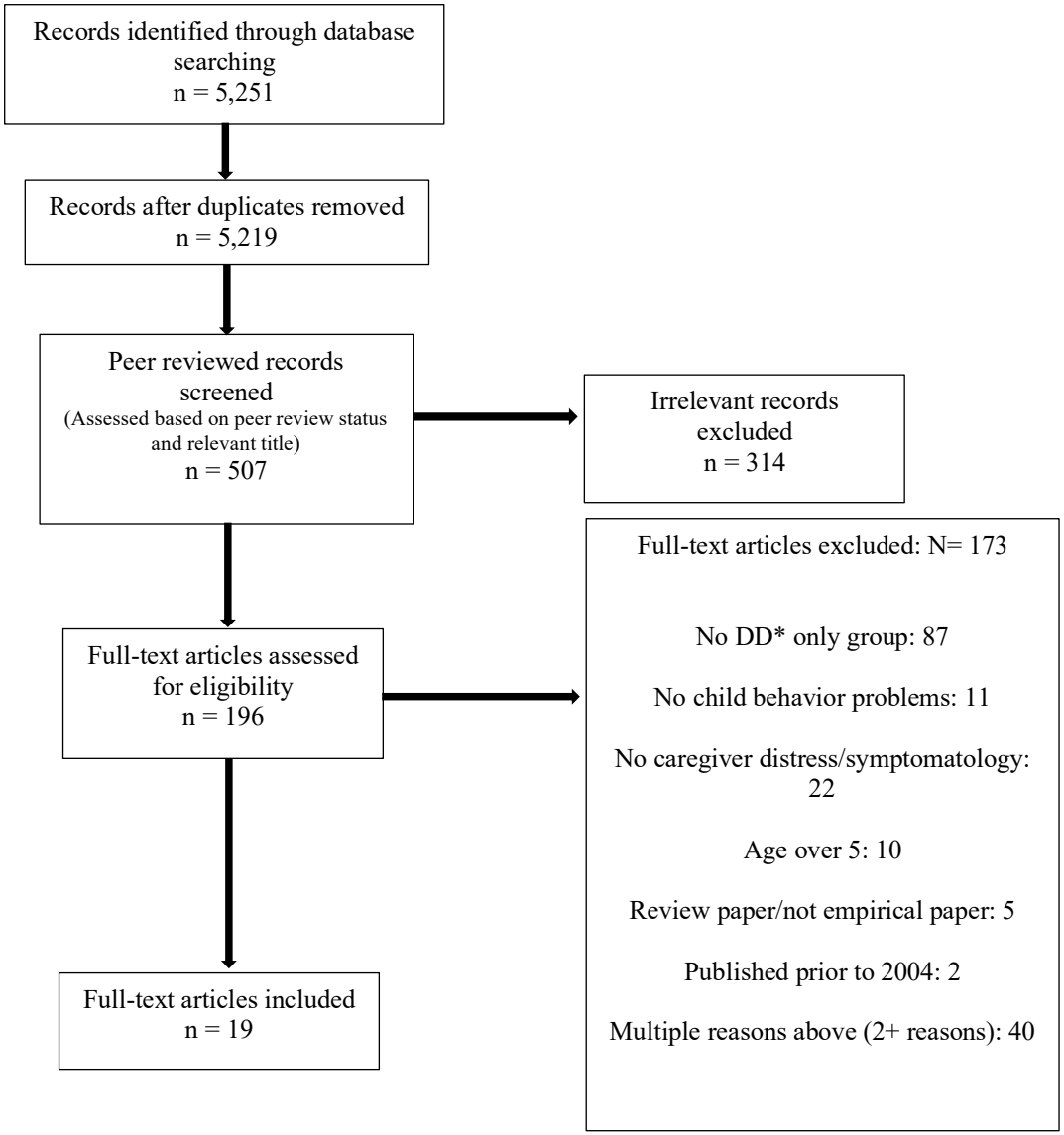
Author, Year	# of Caregiver-Child Dyads by Dx group	% Boys in DD Sample	Race/ Ethnicity	Measurement of child behavior	Measurement(s) of caregiver distress	Measurement of dev. Delay
Azad et al., 2013	219 Tot – 94 DD, 125 TD	60.6%	69.1% Anglo	CBCL (total problem score)	FIQ (negative impact score)	Stanford-Binet; Vineland Adaptive Scales of Functioning
Bailey et al., 2019	555 ID	64.5%	57.3% White British, 27.7% Asian/Asian-British	SDQ (internalizing and externalizing composites)	K6 scale	"Standardised cognitive assessment scores"
Baker et al., 2005	214 Tot – 81 DD, 10 Borderline, 123 TD	65.4%	60.7% White, 15.9% Hispanic, 6.1% Black, 2.85% Asian, 14.8% Other	CBCL (total problem score)	FIQ (negative impact score); CES-D	BSID-II
Baker et al., 2010	236 Tot – 66 DD, 32 borderline, 141 TD	60%	57.4% White	Dysregulation coding system; DISC	FIQ (negative impact score); Symptom checklist	Stanford-Binet
Brei et al., 2015	40 Tot – 19 ASD, 21 DD	72.5%	NR*	ABC-C (composite score); CBCL (total problem score)	PSI-SF (parental distress subscale)	Vineland Adaptive Behavior Scales; Mullen Scales of Early Learning
Cheng et al., 2015	5,100 tot – 8.5% DD (population study)	67.6%	58.4% White, 13.8% Black, 5.5% Other, 22.3% Hispanic	PKBS-2 (summary score)	CES-D	BSID-III

Ciciolla et al., 2014	250 Tot – 110 DD, 140 Td	67.3%	26.4% Hispanic in DD	CBCL (internalizing and externalizing scores)	SCL-35	BSID-II
Dennis et al., 2018	102 DD	70.9%	50% Hispanic, 27.3% White, 2.7% Black, 2.7% Asian, 17.3% Other	CBCL (total problem score)	PSI-SF (parental distress subscale)	Previous diagnosis
Eisenhower et al., 2009	218 Tot – 91 DD, 127 TD	65.9%	58.2% White	CBCL (total problem score)	CES-D; FIQ (negative impact score)	BSID-II
Estes et al., 2009	73 Tot – 51 ASD, 23 DD	61%	64% White	ABC-C (composite scale)	QRS (parenting stress score); BSI (depression and anxiety subscales)	Vineland Adaptive Behavior Scales
Estes et al., 2013	96 Tot – 46 ASD, 25 DD, 25 TD	78.5%	74% White	ABC-C (composite score)	QRS (parenting stress score); BSI (depression & anxiety scales)	Vineland Adaptive Behavior Scales
Feldman et al., 2007	178 Tot – 69 DD unknown, 67 DD known, 58 low birthweight/premature	54.4%	NR*	CBCL (total problem score)	BDI	Vineland Adaptive Behavior Scales
Neece et al., 2012	237 Tot – 144 TD, 93 DD	58.1%	54.1% White	CBCL (total problem score)	FIQ (negative impact score)	Previous diagnosis; Stanford-Binet
Rodas et al., 2016	156 Tot – 53 ID, 103 TD	60.4%	62.3% White	CBCL (internalizing score)	CES-D	Stanford-Binet; Vineland Adaptive Behavior Scales

Tervo, 2010	281 DD	69.8%	81.4% White	CBCL (total problem score and subscales)	PSI-SF (total score)	Clinic assessment; Child Development Inventory
Tervo, 2011	201 DD	70.6%	83.3% White	CBCL (total problem score and subscales)	PSI-SF (total score)	Clinic assessment; Child Development Inventory
Woodman, 2014	108 DD	54%	90% White	CBCL (total problem score)	PSI (parent domain)	Vineland Adaptive Behavior Scales
Woodman et al., 2015	176 DD	55%	90% White	CBCL (Internalizing and externalizing scales)	PSI (parent domain)	Previous diagnosis
Zeedyk & Blacher, 2017	223 Tot – 58 ID/DD, 33 Borderline, 91 TD	58.1%	NR*	CBCL (total problem score)	CES-D	Stanford-Binet; Vineland Adaptive Behavior Scales

Note.
NR* = Not reported
All acronyms included in text.

Figure 3.1. Study Selection Diagram.



Chapter IV

Caregiver Distress and Behavior Problems in Young Children with Developmental Delay: The Role of Treatment, Acculturation and Enculturation

Caregiver Distress and Behavior Problems in Young Children with Developmental Delay: The Role of Treatment, Acculturation and Enculturation

Behavior problems, defined herein as encompassing both externalizing (e.g., hyperactivity, aggression, defiance) and internalizing (e.g., worries, sadness) problems, in children with DD are associated with adverse outcomes, such as higher rates of physical restraint, use of medication for behavior management, and decreased self-regulation skills tied to school readiness (Chan & Sigafoos, 2000; Emerson, 1995; Pears et al., 2014). Children with DD display significantly higher levels of both externalizing and internalizing behavior problems compared to their typically developing (TD) peers (Baker et al., 2002; Crnic et al., 2004; de Ruiter et al., 2007). Additionally, caregivers of children with DD exhibit higher levels of depressive symptoms (Nguyen et al., 2018), anxiety (Vilaseca et al., 2019), and stress (Fidler et al., 2000; Hastings 2002; Hayes & Watson, 2013; Lee, 2013) compared to parents of TD children. Given the higher rates of behavior problems in children with DD and associated adverse outcomes, as well as higher levels of distress (i.e., symptoms of depression, anxiety, and stress) in caregivers of children with DD, understanding the associations between behavior problems in young children with DD and caregiver distress is particularly important.

Research has showed support for child-driven effects of behavior problems in young children on increased rates of caregiver distress. For example, levels of depressive and stress symptoms were higher among caregivers of children with DD when their child displayed elevated levels of externalizing problems (Herring et al., 2006; Zeedyk & Blacher, 2017). Additionally, caregivers of children with co-occurring DD and

externalizing problems reported higher levels of depressive symptoms relative to caregivers of children with DD but without externalizing problems (Feldman et al., 2007). Similarly, levels of behavior problems among children with autism spectrum disorder (ASD) predicted higher levels of caregiver anxiety (Hastings, 2003; Hastings et al., 2005). Lastly, children with developmental concerns and co-occurring behavior problems had caregivers with higher levels of stress (Eisenhower et al., 2009).

Research has also showed support for caregiver-driven effects of caregiver distress on increased rates of child behavior problems in early childhood. Specifically, children with DD who have caregivers with depression also have been shown to exhibit higher levels of behavior problems (Harvey et al., 2008) compared to children with DD without depressed caregivers. Additionally, children with DD whose caregivers reported higher levels of stress exhibited higher levels of maladaptive behaviors than children whose caregivers reported lower levels of stress (Baker et al., 2003; Estes et al., 2013). Furthermore, caregiver depressive and anxiety symptoms, even when they were mild or subclinical, predicted negative interactions with their children, which can impact child behavior (West & Newman, 2003).

Child internalizing and externalizing behavior problems appear to function differently in their associations with caregiver distress. For example, research shows support for caregiver-driven effects for caregiver stress among parents of children with DD and child internalizing problems (Baker et al., 2003; Estes et al., 2013). In contrast, research supports bidirectional effects between child externalizing behavior problems and caregiver stress for parents of children with ASD (Rodriguez et al., 2019). Given the documented child-driven and caregiver-driven associations between behavior problems in

children with DD and distress among caregivers of children with DD, research, although limited, has explored bidirectional associations between child and caregiver factors in early childhood.

Baker and colleagues (2003) showed support for a transactional model in which higher levels of caregiver stress predicted higher levels of total behavior problems and vice versa over a one-year period in 36- to 48-month-old children with DD, but the study did not include other measures of caregiver distress, such as symptoms of depression and anxiety. Other research has showed support for cross-sectional and predictive associations between child internalizing behavior problems and caregiver stress and depressive symptoms among families of a child with DD (Rodas et al., 2016; Woodman et al., 2015). Studies also showed significant positive cross-sectional associations between total behavior problems in children with DD and caregiver distress, though independent studies have not examined different facets of caregiver symptoms, such as depression and anxiety, within the same sample (Cheng et al., 2015; Dennis et al., 2018; Eisenhower et al., 2009; Estes et al., 2009, 2017; Feldman et al., 2007; Tervo 2010, 2011; Woodman, 2014; Zeedyk & Blacher, 2017). Given the gaps in the existing literature, the current study proposes to examine associations between different facets of caregiver symptoms and child behavior problems in children with DD.

Role of Treatment

Treatments, such as behavioral parenting interventions, have demonstrated large effects on decreasing child behavior problems (Comer et al., 2013), including both externalizing and internalizing problems (Chase & Eyberg, 2008; Gonzalez & Jones, 2016). Behavioral parenting interventions, such as Parent-Child Interaction Therapy

(PCIT), have shown decreases in behavior problems specifically among children with DD, as well as decreases in stress among their caregivers (Bagner & Eyberg, 2007; Bagner et al., 2010). Furthermore, studies examining PCIT for children with ASD showed decreases in caregiver distress (Agazzi et al., 2017; Ros & Graziano, 2019). Similarly, higher levels of overall caregiver distress have been shown to negatively impact outcomes following behavioral interventions for child behavior problems (Strauss et al., 2012). However, studies have not examined how behavioral parenting interventions such as PCIT may impact the interplay between caregiver distress and child internalizing and externalizing problems over time. Additionally, most of the previous studies examining PCIT were implemented at mental health clinics and did not utilize technological advancements to extend care to underserved populations (Comer et al., 2015).

Initial work demonstrated Internet-delivered PCIT (iPCIT) led to significant decreases in child behavior problems that are comparable to clinic-based PCIT (Comer et al., 2017), but research has not examined how iPCIT might impact the longitudinal associations between caregiver distress and child internalizing and externalizing problems in children with DD. Examination of the moderating effect of iPCIT on associations between caregiver distress and child behavior problems is important to help inform whether early intervention efforts that increase access for low-income and underserved populations can also disrupt reciprocal associations between child behavior problems and caregiver distress. Furthermore, given the rapid uptake in telehealth interventions during the Covid-19 pandemic, as well as the increased reach of telehealth services for youth and families from minoritized backgrounds (Truong et al., 2022), it is

important that samples include and specifically examine how treatment impacts interactions between caregiver distress and child behavior problems in children from minoritized backgrounds. Furthermore, research should examine how cultural factors, such as acculturation and enculturation, impact associations between caregiver distress and child behavior problems for families from minoritized backgrounds.

Acculturation and Enculturation Processes

Existing studies lack racial and ethnic diversity in their samples despite research showing that cultural minoritized groups may be at an increased risk for both caregiver distress and child behavior problems (Martinez et al., 2013; Nomaguchi & House, 2013). Parents from underrepresented racial and ethnic minoritized backgrounds have been found to experience greater levels of stress (Nomaguchi & House, 2013). Additionally, children from underrepresented racial and ethnic minoritized backgrounds are at higher risk for DD and for internalizing and externalizing behavior problems (Gudiño et al., 2009). Furthermore, depressive symptoms among caregivers from racial and ethnic minoritized backgrounds were associated with more severe delays and higher levels of externalizing problems in their children (Huang et al., 2013). Additionally, among caregivers identifying with a racial or ethnic minoritized background, caregiver depression was associated with higher rates of DD and externalizing behavior problems in children (Huang et al., 2013). Thus, it is important to assess associations between both caregiver distress and child behavior problems specifically within samples from diverse racial and ethnic minoritized backgrounds and to explore how cultural factors, such as acculturation and enculturation, impact these associations.

Acculturation is defined as the adoption of behaviors, attitudes, and values of the majority culture (Sussner et al., 2008; Wolin et al., 2009), whereas enculturation refers to the tie to one's native culture (Yoon et al., 2013). Research has showed that high levels of acculturation can occur simultaneously with high levels of enculturation (Cabassa, 2003; Heflin et al., 2020) and that these constructs may function differently (Heflin et al., 2020; Schwartz et al., 2010). High levels of acculturation may confer risk for families from minoritized backgrounds, though findings differ depending on the metric utilized to measure acculturation (e.g., majority language proficiency versus reported levels of acculturation). Specifically, research examining the role of acculturation has found that higher levels of caregiver depression and anxiety symptoms, as well as somatization, were positively associated with higher levels of family acculturation (Loukas et al., 2008). However, lower levels of majority language proficiency were associated with higher levels of internalizing and externalizing problems in typically developing Latinx children (Hovey & Magna, 2000; Dinh et al., 2002). Furthermore, in a meta-analysis examining the effect of acculturation and enculturation on mental health symptoms, research supports that acculturation is positively associated with symptoms of depression, anxiety, psychological distress, and negative affect, but that it is also associated with higher rates of self-esteem and life satisfaction (Yoon et al., 2013).

Whereas high levels of acculturation to U.S. culture seems to largely confer risk among families from minoritized backgrounds, enculturation has been shown to serve as a protective factor (Vega & Sribney, 2008; Yoon et al., 2013). Higher levels of overall behavior problems in typically developing children were associated with lower enculturation levels (Wood et al., 2017; Pawliuk et al., 1996). Furthermore, among adults

from minoritized backgrounds, higher levels of enculturation were associated with higher levels of self-esteem and life satisfaction (Yoon et al., 2013). Importantly, while the meta-analysis from Yoon and colleagues showed support for significant associations between acculturation and both negative and positive mental health outcomes, enculturation was only found to have significant positive associations with positive mental health outcomes (Yoon et al., 2013). While Yoon and colleagues did not examine the impact of acculturation and enculturation among caregivers, the results suggest that enculturation may promote positive mental health in adults. Importantly, no studies to our knowledge have examined the impact of acculturation and enculturation on bidirectional associations between caregiver distress and child behavior problems. Furthermore, our study would be the first to examine the impact of acculturation and enculturation on the impact of treatment on associations between child behavior problems and caregiver distress.

Present Study

In the present study, we examined the bidirectional associations between caregiver distress (i.e., symptoms of depression, anxiety, and stress) and externalizing and internalizing problems in 3- to 5-year-old children with DD from predominantly underrepresented racial and ethnic minoritized backgrounds. We hypothesized that there would be support for both child-driven and caregiver-driven relations between caregiver depression, anxiety, and stress symptoms and child internalizing and externalizing problems across the two-year period. Specifically, we hypothesized that higher levels of child behavior problems would predict higher subsequent levels of caregiver distress and vice versa.

In addition to assessing the associations within families with children with DD, we examined the effect of iPCIT on the associations between caregiver distress and child behavior problems. We hypothesized that associations would be weaker for families randomized to receive iPCIT compared to families randomized to the control group becasuse iPCIT may decrease the impact of caregiver distress on subsequent child behaviors and vice versa. Lastly, we examined the moderating role of acculturation and enculturation on the hypothesized bidirectional associations between child behavior problems and caregiver distress separately among both control and treatment groups. We hypothesized that acculturation and enculturation levels would moderate the hypothesized bidirectional associations such that the associations between caregiver distress and child behavior problems would be stronger for caregivers with higher levels of acculturation and lower levels of enculturation in both the control and treatment groups.

Method

Participants and Procedure

The current study is a secondary data analysis of participants from a larger randomized controlled trial (RCT) examining the efficacy of iPCIT for children with DD (citation of main outcome paper insert when available). Participating families were recruited at their child's exit evaluation from Part C Early Intervention (EI) services—a supplement to the Individuals with Disabilities Education Act that recommends statewide services to children birth to 3 years with DD. EI programs usually include home-based sessions to promote developmental outcomes and disproportionately serve families from underrepresented ethnic and racial minoritized backgrounds living in low-income

neighborhoods (Bringewatt & Gershoff, 2010). Study procedures were approved by the university Institutional Review Board and each EI site. Families in the study were recruited from three EI sites in a large city in the southeastern United States.

Participants were 3-year-old children aging out of EI services for DD and their primary caregiver. Study inclusion criteria were: (a) clinically significant score (i.e., T-Score $\geq$ 60) on the Externalizing Problems scale of the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001); and (b) the primary caregiver spoke English or Spanish. Families were excluded if: (a) the child was receiving medication for problem behaviors; (b) the child was deaf or blind; (c) the primary caregiver reported the child displayed severe social communication deficits related to autism spectrum disorder (ASD) as indicated by scores >75 on the Social Responsiveness Scale (SRS-2; Constantino, 2012); or (d) the primary caregiver scored a standard score < 4 on the vocabulary subtest of the Weschler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) or the La Escala de Inteligencia Wechsler Para Adultos – Third Edition (EIWA-III; Pons et al., 2008).

Families were initially screened during their child's exit evaluation for EI Services, which occurred within 3 months of the child's 3rd birthday, and then participated in a home-based baseline assessment once the child turned 3-years-old and EI services were terminated. During the exit evaluation, written consent was obtained for 805 families, and 683 completed screening. Of the screened families, 197 (29.0%) met study eligibility criterion, and 486 were ineligible (79.4% scored < 60 on the CBCL Externalizing Problems subscale, 14.6% scored > 75 on the SRS-2, 2.1% scored < 60 on the CBCL Externalizing Problems subscale and > 75 on the SRS-2, 2.1% of caregivers scored < 4 on the WASI-II/ EIWA-III, and 1.8% met other exclusion criteria). Of the 197

eligible families, 150 families (76.0%) completed the baseline assessment and were randomized in the larger clinical trial. The 150 families that were randomized did not significantly differ on demographic or study characteristics from the 47 eligible families that were not randomized. The study includes assessments of children and their parents at four time points from age 3 years to age 4 years and 6 months (i.e., Time 1, Time 2, Time 3, Time 4). Time 1 refers to assessments completed at week 0, when children were on average 36 months (3 years) old. Time 2 assessments occurred at week 20. Time 3 occurred 6-months following Time 2 assessment. Time 4 assessments were completed 12-months after the Time 2 assessment.

Analyses included the sample from the larger study (n = 150), across both the control (n = 75) and iPCIT (n = 75) conditions. Treatment sessions occurred over the 20-week period between T1 and T2 assessments, during which time the control group received referrals for services in the community. Demographic information of the whole sample (n = 150) and the treatment and control conditions (n = 75, each group) are reported within the main outcome paper (main outcome paper citation). See Table 4.1 for more information regarding baseline demographics for the current sample. Primary caregivers completed questionnaires via RedCap on a tablet provided by the study, or on their own device, and received $100 for their participation in each assessment.

Primary Measures

Caregiver Distress. The Depression, Anxiety, & Stress Scale (DASS-21; Lovibond & Lovibond, 1995) is a 21-item self-report questionnaire with three subscales: depression, anxiety, and stress. Items are rated on a 4-point Likert-style scale from 0 (did not apply) to 3 (applied very much or most of the time). Research showed the 7-item

DASS-21 depression subscale to be valid with non-clinical US samples (Sinclair et al., 2011). In the current study, we used the DASS-21 depression, anxiety, and stress subscales separately to assess primary caregiver depression, anxiety and stress symptoms, and internal consistency in the current sample was good for all subscales (depression subscale $\alpha = .87$, anxiety subscale $\alpha = .81$, stress subscale $\alpha = .89$). We utilized the depression, anxiety, and stress subscales as indices of caregiver distress at all four time points.

Child Behavior Problems. The *Child Behavior Checklist 1.5 to 5 Years* (CBCL; Achenbach & Rescorla, 2001) is a parent-report questionnaire of child externalizing and internalizing problems. Items are rated on a 3-point Likert-style scale from 0 (absent) to 2 (occurs often) and has demonstrated strong reliability and validity (Achenbach 1991, 1992). In the current sample, the CBCL demonstrated excellent to good reliability for both the externalizing subscale ($\alpha = .90$) and internalizing subscale ($\alpha = .89$) at Time 1. We used the externalizing and internalizing problem scales as indices of child behavior problems at all four time points.

Acculturation and Enculturation. The *Abbreviated Multidimensional Acculturation Scale* (AMAS-ZABB; Zea et al., 2003) is a 42-item questionnaire of acculturation and enculturation across three dimensions of identity, language competence, and cultural competence. Items are rated on a 4-point Likert-style scale from 1 (strongly disagree, not at all) to 4 (strongly agree, extremely well). The total acculturation score assesses the extent to which respondents identify with and can successfully navigate the U.S.-American mainstream culture and perceived English language competency. The total enculturation score assesses the extent to which

respondents identify with and are proficient in their self-identified "culture of origin." The AMAS-ZABB has demonstrated a reliable factor structure and strong validity within Latinx samples (Zea et al., 2003). In the current sample, the AMAS-ZABB has demonstrated excellent reliability for both the acculturation subscale (α = .96) and enculturation subscale (α = .94). Acculturation and enculturation were assessed at baseline.

Data Analysis

Analyses were conducted in MPlus v8.2 using a structural equation modeling (SEM) framework, consisting of a four-wave, cross-panel design. The maximum likelihood estimation was used to estimate missing values. Six SEM models were examined individually for depression, anxiety, and stress subscales, as well as for internalizing and externalizing scales. To report analyses in the most succinct way, multi-group analyses were conducted to examine these associations separately for families randomized to the control group and families randomized to iPCIT. For the first aim to examine the bidirectional associations between caregiver distress and child internalizing and externalizing problems, results were reported only from the associations for families randomized to the control group. However, to examine the effect of treatment on these association, the associations across groups were compared. The multiple group approach allows for estimation of models across groupings simultaneously using all available datapoints. Consistent with expert recommendations (Hayes & Preacher, 2013), pathways from earlier timepoints to later timepoints for caregiver distress symptoms and child behavior problems were included for optimal fit (see Figure 4.1). Therefore, all models for both control and treatment groups were fully saturated (i.e., exactly identified), and

thus exhibited perfect model fit. Associations between caregiver symptoms and child behavior problems in each model within the control group are presented in Table 4.2. Associations between caregiver distress symptoms and child behavior problems in each model within the treatment group (i.e., iPCIT) are presented in Table 4.3.

Hypotheses pertaining to the moderating role of acculturation and enculturation were examined at each cross-lagged time point, enabling the evaluation of the moderating role of acculturation and enculturation while also accounting for the directionality of the associations between caregiver symptoms and child behavior problems in each model within the control group. Moderation modeling was conducted in SPSS using the PROCESS macro (Hayes, 2012) to assess the moderating role of acculturation and enculturation in associations between caregiver symptoms and child behavior problems within the control condition. Moderation modeling was conducted in SPSS due to the readily available indices, as well as support for utilizing regression rather than structural equation modeling fit indices (Hayes, 2022). Moderation effects of acculturation and enculturation are presented in Tables 4.4 and 4.5.

Results

Descriptive Analyses

Descriptive analyses examined the distribution of caregiver symptoms and child behavior problems. According to the DASS-21 classifications of depression, most (77.3%) caregivers were in the "normal" range of symptoms, with remaining caregivers falling in the mild to moderate (15.3%) or severe to and extremely severe depression (7.4%) ranges at baseline. Similarly, most caregivers (79.7%) were in the "normal" range of symptoms on the anxiety subscale, with remaining caregivers falling in the mild to

moderate (12.6%) or severe to extremely severe anxiety (7.2%) ranges at baseline. Lastly, most (78.5%) caregivers were in the "normal" range of stress symptoms, with remaining caregivers falling in the mild to moderate (13.4%) or severe to extremely severe stress (8.1%) ranges at baseline. According to the CBCL cutoffs, at baseline (Time 1) 49.8% of caregivers reported "normal" (< 60 T-score) on the internalizing subscale and 38.9% on the externalizing subscale. On the internalizing subscale, 50.2% of caregivers reported borderline/clinical range T-scores, while on the externalizing subscale 61.1% of caregiver reported borderline/clinical range T-Scores.

Table 4.1 includes the means and standard deviations for the DASS subscales at Time 1, CBCL internalizing and externalizing subscales at Time 1, and the acculturation and enculturation scales from the AMAS-ZABB. All measures demonstrated sufficient variability in the current sample.

Multiple-Group SEM: Models of the Transactional Associations between Caregiver Distress and Child Behavior Problems

The base model consisted of a four-wave, cross-panel design (Figure 1). Initially, model fit was tested with constraints on parent to child lags, and the child to parent lags were freed to vary. Additionally, model fit was tested with constraints on child to parent lags, and the parent to child lags were freed to vary. Constrained models exhibited poor fit, as demonstrated by Tucker-Lewis Index (TLI) values < .95 and Root Mean Square Error of Approximation (RMSEA) < .05. Specifically, fit indices ranged across models to demonstrate poor fit (TLI: .77 – .92; RMSEA: .075 – .27). Furthermore, placing or removing constraints on some of the cross-lagged paths across time points did not significantly impact model fit. To address the poor fit of the models, we allowed residuals

of child behavior problems and caregiver distress to correlate freely, allowing for shared variance between time points. Thus, models estimating each pathway were utilized as fully saturated models, demonstrating perfect fit. All cross-lagged models were estimated using MPlus8.

Transactional Associations within the Control Group between Caregiver Distress and Child Behavior Problems

Results for each pathway are displayed in Table 4.2. Findings provide support for bidirectional predictive associations at one time point between caregiver depressive symptoms and child internalizing problems within the control group. Specifically, bidirectional support was found as higher levels of caregiver depressive symptoms at T2 significantly predicted higher levels of child internalizing problems at T3, *b(se)* = .29(.12), $p = .02$, and higher levels of child internalizing problems at T2 also significantly predicted higher levels of caregiver depressive symptoms at T3, *b(se)* = .22(.08), $p = .01$.

Findings also supported child-driven pathways between child behavior problems and caregiver distress. Specifically, higher levels of child internalizing problems at T2 significantly predicted higher levels of caregiver anxiety symptoms at T3, *b(se)* = .22(.08), $p = .01$. Additionally higher levels of child externalizing problems at T2 significantly predicted higher levels of caregiver depressive symptoms at T3, *b(se)* = .18(.08), $p = .02$, and higher levels of child externalizing problems at T2 and T3 significantly predicted higher levels of caregiver stress symptoms at T3, *b(se)* = .19(.08), $p = .01$, and T4, *b(se)* = .20(.08), $p = .02$, respectively. Finally, analyses provided support for one significant caregiver-driven pathway within the control group. Caregiver stress at T1 significantly, but negatively, predicted child internalizing problems at T2,

b(se) = -.20(.09), *p* = .03, such that lower levels of caregiver stress predicted higher levels of child internalizing problems. All other cross-lagged paths in the model were non-significant.

Impact of Treatment on Bidirectional Transactional Relations between Caregiver Distress and Child Behavior Problems

Results for the treatment group are presented in Table 4.3. Results utilizing multiple group SEM modeling (MG-SEM) uses regressions for two separate groups, but regressions were estimated in one model that was informed by all the data for those families within the control (presented above) and treatment groups. Thus, results presented are results from a single model with results divided by group. As a result, there are no statical corrections or constraints made (Hess et al., 2022; Shi et al., 2018). When results yield significant paths in one group but not the other, it is implied that the effect at that time point is moderated by the treatment group.

Findings support child-driven pathways such that higher levels of child externalizing problems at T2 predicted higher levels of caregiver depressive, *b(se)* = .14(.06), *p* = .01, and anxiety, *b(se)* = .13(.07), *p* = .05, symptoms at T3. There was no support for any caregiver-driven or bidirectional pathways within the treatment group. All other cross-lagged paths were non-significant.

Moderating Effects of Acculturation and Enculturation

Results from acculturation and enculturation moderation analyses within the control and treatment groups at each time-lag for bidirectional cross-lagged panel model results are presented below in Table 4.4 and Table 4.5 (Table 4.4: caregiver-driven pathways; Table 4.5: child-driven pathways).

Acculturation

Within the control group, acculturation levels moderated the caregiver-driven associations between caregiver depressive symptoms at T2 and child internalizing problems at T3. Specifically, caregiver depressive symptoms at T2 significantly positively predicted child internalizing problems at T3 when caregiver acculturation to mainstream U.S. culture was at the mean, *b(se)* = .26(.12), $p = .03$, or one standard deviation above the mean, *b(se)* = .56(.16), $p < .001$, but not when caregiver acculturation was one standard deviation below the mean. For child-driven pathways in the control group, acculturation levels also moderated the association between child externalizing problems at T1 and caregiver anxiety symptoms at T2 within the control group. Results indicated that the moderation was not significant at the mean or one standard deviation above or below the mean, which prompted follow-up analyses utilizing the Johnson-Neyman method to determine what value of the moderator significantly moderated the association. The Johnson-Neyman method indicated that caregiver acculturation levels significantly moderated the association when caregiver acculturation levels fell below 1.12 (relative to *M*= 3.15, *SD* = .71), *b(se)* = -.67(.33), $p = .05$. Lastly, acculturation levels also moderated the association between child externalizing problems at T1 and caregiver stress symptoms at T2. Follow-up analyses utilizing the Johnson-Neyman method indicated that caregiver acculturation levels significantly moderated the association between child externalizing problems at T1 and caregiver stress symptoms at T2 when caregiver acculturation levels fell below 1.62 (relative to *M*= 3.15, *SD* = .71), *b(se)* = -.61(.30), $p = .05$). Notably, there were no significant moderating effects of

acculturation on associations between caregiver distress and child behavior problems in the treatment condition.

Enculturation

In the control group, enculturation levels moderated the caregiver-driven association between caregiver anxiety symptoms at T2 and child internalizing problems at T3, *b(se)* = -.29 (.13), *p* = .04. However, follow-up probing indicated that conditional effects were not significant one standard deviation below, at, or above the mean. Follow-up use of the Johnson-Neyman method indicated there were no statistically significant transition points within the observed range of the moderator, indicating that the effect is not significant within the parameters of the data in the current sample. Enculturation levels moderated the associations between child-driven associations with child internalizing and externalizing problems at T1 and caregiver depressive symptoms at T2. Specifically, child internalizing and externalizing problems at T1 significantly positively predicted caregiver depressive symptoms at T2 when caregiver enculturation levels were one standard deviation below the mean (internalizing problems: *b(se)* = .30(.11), *p* = .01; externalizing problems: *b(se)* = .35(.13), *p* = .01), and significantly negatively predicted caregiver depressive symptoms when caregiver enculturation levels were one standard deviation above the mean (internalizing problems: *b(se)* = -.21 (.09), *p* = .03; externalizing problems: *b(se)* = .-.22 (.10), *p* = .03).

Within the treatment group, enculturation levels moderated the caregiver-driven pathways between caregiver depression and stress symptoms at T1 and child externalizing problems at T2. Specifically, caregiver depressive symptoms at T1 significantly positively predicted child externalizing problems at T2 when caregiver

enculturation was at the mean, *b(se)* = .29 (12), *p* = .02, or one standard deviation above the mean, *b(se)* = .61 (.22), *p* = .01, but not when caregiver enculturation was one standard deviation below the mean. Similarly, caregiver stress symptoms at T1 significantly positively predicted child externalizing problems at T2 when caregiver enculturation was one standard deviation above the mean, *b(se)* = .43 (.16), *p* = .01, but not when caregiver enculturation was at or below the mean. There were no significant moderating effects of enculturation levels on child-driven associations between child behavior problems and caregiver distress in the treatment condition.

Discussion

The current study provided an examination of the associations between caregiver distress and child behavior problems, as well as the impact of iPCIT, acculturation, and enculturation levels on these associations, among families with young children with DD from predominantly minoritized backgrounds. Despite research supporting associations between different components of caregiver mental health symptoms and behavior problems in children with DD (Baker et al., 2003; Rodas et al., 2016; West & Newman, 2003), as well as the impact of behavioral parenting interventions on child behavior problems and on caregiver stress (Agazzi et al., 2017; Chase & Eyberg, 2008), little empirical work has examined the bidirectional associations between caregiver distress and behavior problems in children with DD.

Consistent with our hypotheses, findings supported bidirectional associations between caregiver depressive symptoms and child internalizing problems within the control group, with more caregiver depressive symptoms predicting higher levels of child internalizing problems and vice versa. Furthermore, results supported numerous child-

driven associations between child internalizing and externalizing problems and caregiver distress, primarily from Time 2 to Time 3. Overall, the results highlight positive associations across time, primarily during ages 3.5 to 4-years-old for children, with higher between caregiver distress and child behavior problems among young children with DD. However, findings also provided support for the caregiver-driven negative association between caregiver stress and lower levels of subsequent child internalizing problems.

The large number of significant child-driven paths from child behavior problems at age 3.5 to caregiver distress at age 4 years suggest potentially unique factors that make the 3.5- to 4-year-old range for children with DD particularly salient. Past research has demonstrated an increase in behavior problems in children with DD from 3 to 4 years (Baker et al., 2003), so it may be that increases in behavior problems during this time period accounted for the associations with increases in caregiver distress. Additionally, behavior problems within children with DD increase as children become more reliant on, and continue to struggle with, communication with peers and parents (Feldman et al., 2007). Thus, it is possible that parents were increasingly concerned about their child's language and behavior as their children transitioned from daycare to prekindergarten classrooms. However, future research is needed to assess why associations between child behavior problems and caregiver distress are more salient during this age range for children with DD. Nevertheless, findings highlight the need to address family concerns more broadly rather than targeting caregiver distress or child behavior problems independently.

Findings examining the moderating role of treatment indicated that associations between caregiver symptoms and child behavior problems function differently between children who received iPCIT and children who did not receive treatment. Across both groups, child externalizing problems at Time 2 significantly predicted higher levels of caregiver depressive symptoms at Time 2, suggesting child externalizing problems are particularly salient in predicting higher levels of caregiver depressive symptoms during the transition to prekindergarten. Within the iPCIT group, child externalizing problems at Time 2 also predicted higher caregiver anxiety symptoms at Time 3, which was the only significant path in the iPCIT group that was not significant in the control group. Results suggest within the context of treatment, addressing child externalizing problems specifically may be key in targeting associated subsequent caregiver symptoms of distress. No other significant paths in the control group were present in the iPCIT group.

The present findings suggest the potential utility of internet-delivered behavioral parenting programs in weakening associations between child behavior problems and caregiver distress overall, though behavioral parenting programs may impact child-driven pathways less. Research has shown that parenting skills taught in behavioral parenting programs may increase parenting self-efficacy (Bloomfield & Kendall, 2012; Hohlfeld et al., 2018; Mouton et al., 2018), which may alleviate caregiver symptoms of distress and buffer against the development of subsequent child behavior problems. However, future research is needed to further clarify the mechanisms through which iPCIT or other behavioral parenting programs impact how caregiver symptoms interact with child behavior problems.

Moreover, the present findings with a diverse sample of families from predominantly marginalized backgrounds underscore how the associations between caregiver distress and child behavior problems are not uniform across varying levels of caregiver acculturation and enculturation. Despite research showing the impact of cultural processes, such as acculturation and enculturation, on caregiver distress and child internalizing and externalizing problems individually (Loukas et al., 2008), no study to our knowledge has examined the moderating effects of acculturation and enculturation on these associations. Consistent with our hypotheses, findings within the control group suggest that enculturation moderated various pathways such that families with higher levels of identity with their origin culture displayed weaker associations between child behavior problems and caregiver distress. Conversely, acculturation moderated various pathways such that families with higher levels of acculturation experienced greater associations between child behavior problems and caregiver symptoms. Findings are consistent with the previous literature, which suggests that acculturation and enculturation serve distinct roles as risk and protective factors, respectively (Loukas et al., 2008; Vega & Sribney, 2008; Yoon et al., 2013). Results of the current study emphasize the importance of considering acculturative processes as dynamic factors that may impact how caregiver distress and child behavior problems affect one another.

In contrast, within the treatment group, enculturation moderated caregiver-driven pathways such that higher levels of caregiver depressive and stress symptoms before treatment predicted subsequently higher levels of externalizing behavior problems immediately after treatment among caregivers with higher levels of enculturation. The present findings highlight the value in addressing family values within the context of

treatment, as it is possible that caregivers completing treatment who do not identify as part of the majority culture may experience unique stressors that impact the associations between caregiver depressive and stress symptoms and child externalizing problems. Research examining behavioral parenting programs for ethnic minorities highlights that behavioral parenting programs with cultural adaptations and incorporated cultural sensitivity are more effective in improving parent behavior (van Mourik et al., 2017). Thus, it is possible that behavioral parenting programs without cultural adaptations may be less effective in targeting the interplay between caregiver distress and child behavior problems for families that hold strong values that are different than the majority culture values for which behavioral parenting programs were developed. Future research should examine the role of cultural adaptations or the incorporation of cultural conversations within the context of behavioral parenting programs. Treatment components aligned with non-majority culture values may impact associations between caregiver distress and child behavior problems within behavioral parenting programs.

Strengths and Limitations

The current study utilized a longitudinal design to examine associations between caregiver distress and child behavior problems during early childhood for children with DD, which allowed for examination of differences over time during early childhood. Specifically, the longitudinal design allowed for examination of associations at 4 item points over a 2-year period during early childhood. Furthermore, the relatively large sample size (n = 150, 75 iPCIT, 75 RAU) allowed for examination of differences in associations in the treatment and control groups. Additionally, caregiver distress captured caregiver-report of symptoms falling into different diagnostic areas (i.e., depression,

anxiety and stress), which added to the existing literature as it provides a more comprehensive and nuanced examination of caregiver distress. Examination of differences across caregiver distress domains allowed for a more thorough understanding of how symptoms impact child behavior problems differentially.

Furthermore, the current study utilized caregiver report of their own symptomatology and of their child's behaviors. Given that research has documented that utilization of parent-report questionnaires when assessing child behavior problems can be biased based on caregiver symptomatology (Garstein et al., 2009; Krain & Kendall, 2000), future research should examine whether caregiver distress is associated with child behavior problems using observational coding methods, such as those discussed in subsequent Chapter V. Furthermore, caregiver distress was based on caregiver-report of current symptoms rather than current or prior mental health diagnoses, and caregivers did not need to have clinically significant symptoms in order to participate in the study. It is possible that the interplay between child behavior problems and caregiver distress function differently among caregivers with mental health diagnoses and should be addressed in future research. Additionally, parenting quality or skill acquisition over the course of treatment may be potential mechanisms through which treatment impacts associations between caregiver symptoms and child behavior problems in young children with DD and externalizing behavior problems.

The current study included a sample of families from predominantly marginalized backgrounds living in a predominantly ethnic minority majority city, which was both a strength and a limitation. The included participants represent an underrepresented and understudied population, however, the nature of the sample limits generalizability to

families from minoritized backgrounds in other regions of the country. More specifically, it is possible that acculturation and enculturation constructs function differently depending on where families live (Miller et al., 2009). Furthermore, it is possible that other measures of acculturation, such as acculturative stress, or measures assessing congruency between treatment modalities and families' cultural values may illuminate mechanisms through which acculturation and enculturation impact associations between child behavior problems and caregiver distress. Acculturative stress, which measures psychological distress individuals may feel in relation to their own level of acculturation, provides a more nuanced view of the interplay between cultural norms and societal pressures as it pertains to families' experiences (Alegría, 2009). Lastly, individual cultures or subgroups within cultures experience acculturation and enculturation processes differently due to differing cultural norms and values specific to the culture or subgroup within a culture (Alegría et al., 2017). The present study did not have sufficient power to assess possible differences between cultures or subgroups within a culture, but examining individual cultures or subgroups within cultures should be explored in future research.

Conclusion

Despite these limitations, the current study fills a critical gap in the literature by showing significant associations between caregiver symptoms and child behavior problems in young children with DD from predominantly minoritized backgrounds. Findings highlight the need to consider the possible impact of families' sense of identity within the majority and native cultures on the associations between caregiver distress and behavior problems for children with DD. Overall, findings highlight the potential benefit

of internet-delivered early intervention services in targeting caregiver and child outcomes in families with children with DD from minoritized backgrounds, particularly when working with more highly acculturated and less enculturated families.

Table 4.1. Participant Baseline Demographic Variables, by Initial Treatment Assignment

	Total (*n* = 150)		**PCIT group (*n* = 75)**		**RAU group (*n* = 75)**		
	%	***n***	**%**	***n***	**%**	***n***	***p* value**
Child sex (male)	74	111	72	54	76	57	.58
Child ethnicity/race							.14
Hispanic/Latinx	70.5	105	78.4	58	62.7	47	
Black/African American	23.5	35	18.9	14	28.0	21	
White/Non-Hispanic/Latinx	6.7	10	4.1	3	9.3	7	
Asian	3.4	5	1.4	1	5.3	4	
Other (e.g., biracial)	1.4	2	0	0	2.6	2	
Primary Caregiver[a] ethnicity/race							.25
Hispanic/Latinx	66.0	99	70.6	53	61.3	46	
Black/African American	13.3	35	18.6	14	28.0	21	
White/Non-Hispanic/Latinx	10.0	15	9.3	7	10.7	8	
Asian	3.3	5	1.3	1	5.3	4	
Other (e.g., biracial)	2.7	4	1.3	1	4.0	3	
Primary Caregiver Language[b]							.32
English and Spanish	40.0	58	34.7	25	45.2	33	
English only	28.3	41	27.8	20	28.8	21	
Spanish only	24.1	35	30.6	22	45.2	33	

English and other (e.g., Creole)	7.6	11	6.9	5	8.2	6	
High school graduate[c] or less	25.4	37	29.1	21	21.7	16	.72
Income to needs ratio[d]							.14
Extreme poverty/poor	30.7	42	33.8	23	27.5	19	
Low income	26.3	36	30.9	21	21.7	15	
Adequate income	23.4	32	17.6	12	29.0	20	
Affluent	19.7	27	17.6	12	21.7	15	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	***p* value**
Child age (months)	36.20	1.03	36.30	1.30	36.10	.63	.23
Primary Caregiver age (years)	34.49	6.32	34.30	6.13	34.68	6.54	.71
CBCL Externalizing T-Score (Time 1)	62.61	10.54	60.85	10.04	64.36	10.80	.04
CBCL Internalizing T-Score (Time 1)	58.13	10.79	57.35	10.53	58.92	11.06	.37
BDI Developmental Quotient	74.74	10.00	75.23	9.57	74.26	10.43	.57
Depressive Symptoms T1	5.03	7.44	4.53	7.12	5.52	7.76	.42
Anxiety Symptoms T1	3.95	6.26	3.73	5.37	4.16	7.07	.68

Stress Symptoms T1	9.07	8.93	8.05	8.55	10.08	9.23	.17
Acculturation	3.15	.71	3.05	.75	3.25	.68	.10
Enculturation	3.21	.62	3.24	.64	3.18	.60	.54

Note:

a. Based on n = 149 families who reported racial/ethnic identity in contact form.
b. Based on n = 145 of primary caregivers who reported language(s) spoken.
c. Based on n = 146 of primary caregivers who reported education level.
d. Based on n = 137 who reported income and dependents in the household to calculate the income to needs ratio based on Federal Poverty Threshold from 2017.

Table 4.2. Pathways in Control Group

RAU Group

	Outcome: Child Internalizing Problems		*Outcome: Child Externalizing Problems*		*Outcome: Caregiver Depressive Symptoms*		*Outcome: Caregiver Anxiety Symptoms*		*Outcome: Caregiver Stress Symptoms*	
	B (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*
Outcomes at T2										
Dep. T1	-.06 (.11)	.59	-.03 (.11)	.81	-	-	-	-	-	-
Anx. T1	-.06 (.13)	.62	-.07 (.12)	.56	-	-	-	-	-	-
Stress T1	-.20 (.09)	.03*	-.14 (.10)	.15	-	-	-	-	-	-
Int. T1	-	-	-	-	.02 (.08)	.86	.10 (.07)	.16	.02 (.08)	.88
Ext. T1	-	-	-	-	.02 (.08)	.81	.04 (.07)	.55	.01 (.08)	.90
Outcomes at T3										
Dep. T2	.29 (.12)	.02*	.11 (.13)	.41	-	-	-	-	-	-
Anx. T2	-.004 (.15)	.98	-.07 (.15)	.65	-	-	-	-	-	-
Stress T2	-.06 (.12)	.60	-.11 (.13)	.41	-	-	-	-	-	-
Int. T2	-	-	-	-	.22 (.08)	.01*	.22 (.08)	.01*	.34 (.08)	<.001*
Ext. T2	-	-	-	-	.18 (.08)	.02*	.14 (.08)	.07	.19 (.08)	.01*
Outcomes at T4										
Dep. T3	.32 (.15)	.04*	.37 (.17)	.03*	-	-	-	-	-	-
Anx. T3	-.13 (.15)	.37	.10 (.17)	.56	-	-	-	-	-	-
Stress T3	-.07 (.17)	.68	.20 (.18)	.29	-	-	-	-	-	-
Int. T3	-	-	-	-	-.06 (.09)	.54	-.04 (.09)	.62	.09 (.10)	.36
Ext. T3	-	-	-	-	.05 (.08)	.54	.07 (.08)	.37	.20 (.08)	.02*

Note. *Indicates significant pathway.
Dep. = Caregiver Depressive Symptoms; Anx. = Caregiver Anxiety Symptoms; Stress = Caregiver Stress Symptoms; Int. = Child Internalizing Problems; Ext = Child Externalizing Problems

Table 4.3. Pathways in iPCIT Group

	iPCIT Group									
	Outcome: Child Internalizing Problems		*Outcome: Child Externalizing Problems*		*Outcome: Caregiver Depressive Symptoms*		*Outcome: Caregiver Anxiety Symptoms*		*Outcome: Caregiver Stress Symptoms*	
	B (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*
Outcomes at T2										
Dep. T1	-.03 (.10)	.77	.21 (.11)	.051	-	-	-	-	-	-
Anx. T1	.06 (.13)	.62	.23 (.14)	.10	-	-	-	-	-	-
Stress T1	-.02 (.09)	.82	.12 (.10)	.21	-	-	-	-	-	-
Int. T1	-	-	-	-	-.04 (.08)	.64	.04 (.06)	.55	.17 (.09)	.051
Ext. T1	-	-	-	-	-.01 (.08)	.93	.07 (.06)	.30	.13 (.10)	.16
Outcomes at T3										
Dep. T2	-.08 (.10)	.42	-.13 (.12)	.27	-	-	-	-	-	-
Anx. T2	-.08 (.13)	.54	-.18 (.15)	.23	-	-	-	-	-	-
Stress T2	.03 (.10)	.78	-.10 (.11)	.36	-	- -	-	-	-	-
Int. T2	-	-	-	-	.10 (.06)	.10	.06 (.08)	.39	-.05 (.12)	.72
Ext. T2	-	-	-	-	.14 (.06)	.01*	.13 (.07)	.05*	.16 (.10)	.12
Outcomes at T4										
Dep. T3	.24 (.22)	.26	-.06 (.24)	.82	-	-	-	-	-	-
Anx. T3	-.24 (.18)	.19	.002 (.21)	.99	-	-	-	-	-	-
Stress T3	-.08 (.11)	.49	-.09 (.13)	.50	-	-	-	-	-	-
Int. T3	-	-	-	-	.08 (.09)	.38	.10 (.08)	.20	.14 (.11)	.23
Ext. T3	-	-	-	-	.05 (.07)	.53	-.01 (.06)	.89	.10 (.09)	.30

Note. *Indicates significant pathway.
Dep. = Caregiver Depressive Symptoms; Anx. = Caregiver Anxiety Symptoms; Stress = Caregiver Stress Symptoms; Int. = Child Internalizing Problems; Ext = Child Externalizing Problems

Table 4.4. Acculturation and Enculturation Moderation Analyses for Caregiver-Driven Pathways by Group.

	RAU Group				**I-PCIT Group**			
	Outcome: Child Internalizing Problems		*Outcome: Child Externalizing Problems*		*Outcome: Child Internalizing Problems*		*Outcome: Child Externalizing Problems*	
	B (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*
Caregiver-Driven Pathways								
Outcomes at T2								
Accult. x Dep. T1	.35 (.26)	.19	.06 (.28)	.84	-.02 (.19)	.91	-.22 (.21)	.30
Accult. x Anx. T1	.45 (.30)	.13	.45 (.31)	.16	-.23 (.26)	.39	-.36 (.29)	.22
Accult. x Stress T1	.18 (.16)	.27	.09 (.17)	.62	-.21 (.16)	.21	-.32 (.18)	.08
Encult. x Dep. T1	-.30 (.16)	.07	-.27 (.17)	.12	.31 (.21)	.14	.49 (.23)	.04*
Encult. x Anx.T1	-.18 (.19)	.33	-.22 (.20)	.27	.11 (.16)	.49	.27 (.18)	.13
Encult. x Stress T1	-.07 (.14)	.61	-.14 (.15)	.37	.26 (.14)	.07	.43 (.16)	.01*
Outcomes at T3								
Accult. x Dep. T2	.43 (.18)	.02*	.21 (.21)	.31	.26 (.24)	.27	.13 (.30)	.66
Accult. x Anx. T2	.25 (.24)	.30	.32 (.26)	.21	.46 (.32)	.16	.27 (.40)	.51
Accult. x Stress T2	.20 (.15)	.19	.17 (.16)	.28	.16 (.14)	.28	.19 (.18)	.31
Encult. x Dep. T2	-.16 (.13)	.25	.002 (.15)	.99	.12 (.20)	.56	.01 (.26)	.97
Encult. x Anx. T2	-.29 (.13)	.04*	-.04 (.15)	.82	.16 (.23)	.49	.08 (.29)	.79
Encult. x Stress T2	-.14 (.14)	.34	.12 (.16)	.45	-.08 (.16)	.59	-.22 (.20)	.26
Outcomes at T4								
Accult. x Dep. T3	.25 (.23)	.28	.29 (.27)	.29	.28 (.27)	.30	.30 (.32)	.25
Accult. x Anx. T3	-.42 (.32)	.19	-.48 (.38)	.21	.40 (.25)	.12	-.003 (.28)	.99
Accult. x Stress T3	-.12 (.14)	.42	-.02 (.18)	.91	.16 (.12)	.18	-.06 (.14)	.69
Encult. x Dep. T3	.06 (.16)	.72	.13 (.17)	.44	.25 (.28)	.38	.44 (.33)	.20
Encult. x Anx. T3	-.09 (.19)	.63	.17 (.21)	.43	.11 (.18)	.54	.17 (.21)	.40
Encult. x Stress T3	.12 (.11)	.29	.16 (.14)	.25	.19 (.14)	.18	.25 (.17)	.14

Note. Dep. = Caregiver Depressive Symptoms; Anx. = Caregiver Anxiety Symptoms; Stress = Caregiver Stress Symptoms; Int. = Child Internalizing Problems; Ext = Child Externalizing Problems; Accult. = Acculturation Levels; Encult. = Enculturation Levels

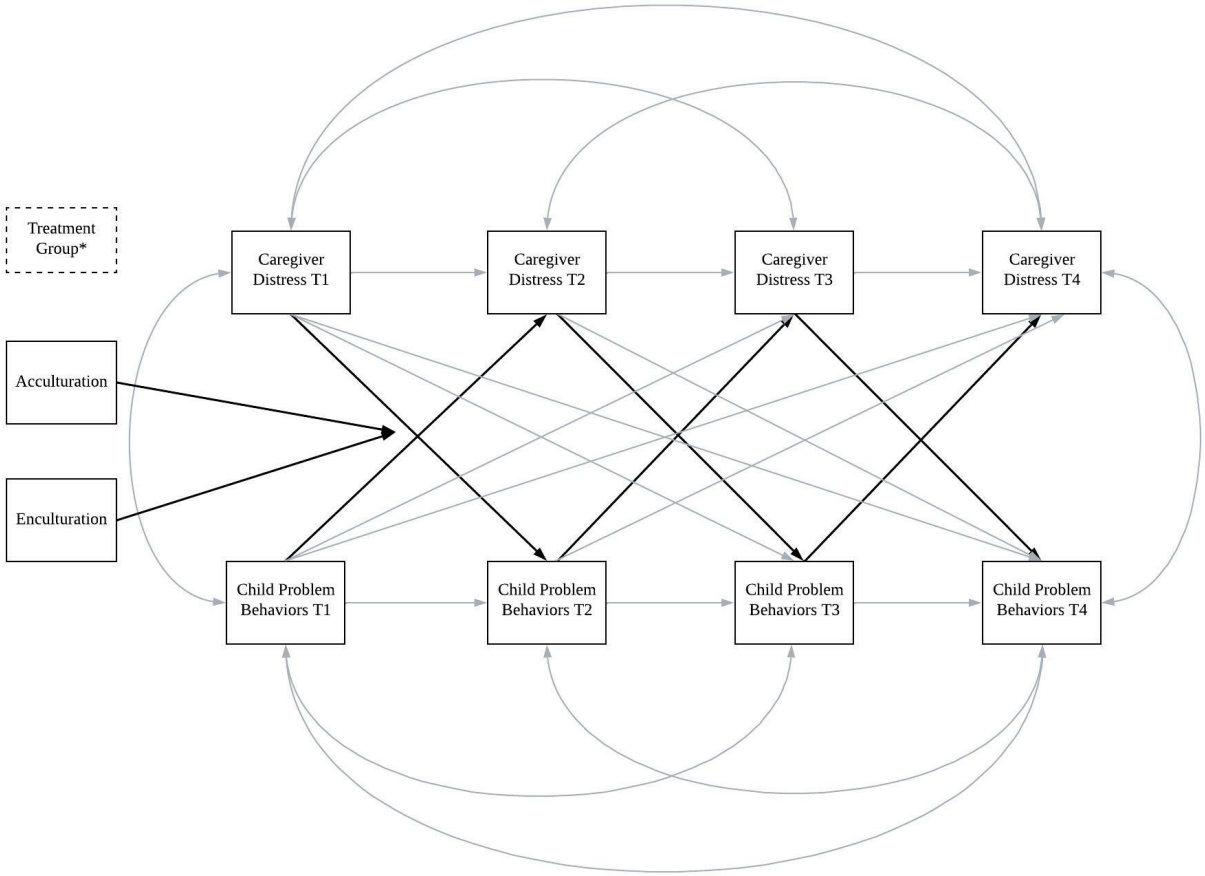
Table 4.5. Acculturation and Enculturation Moderation Analyses for Child-Driven Pathways by Group

	RAU Group						**I-PCIT Group**					
	Outcome: Caregiver Depression		*Outcome: Caregiver Anxiety*		*Outcome: Caregiver Stress*		*Outcome: Caregiver Depression*		*Outcome: Caregiver Anxiety*		*Outcome: Caregiver Stress*	
	B (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*
Child-Driven Pathways												
Outcomes at T2												
Accult.x Int. T1	.19 (.16)	.24	.37 (.13)	.01*	.22 (.16)	.18	.09 (.13)	.48	.10 (.11)	.36	.17 (.14)	.24
Accult.x Ext T1	.26 (.16)	.10	.29 (.13)	.04*	.34 (.16)	.04*	.02 (.14)	.90	.01 (.11)	.94	.16 (.15)	.30
Encult.x Int T1	-.44 (.12)	.001*	-.10 (.12)	.42	-.15 (.14)	.29	.04 (.15)	.80	.01 (.12)	.91	-.01 (.16)	.97
Encult.x Ext T1	-.50 (.15)	.001*	-.35 (.14)	.01*	-.20 (.17)	.24	.02 (.17)	.91	.004 (.13)	.98	.01 (.18)	.95
Outcomes at T3												
Accult.x Int T2	-.003 (.11)	.98	.03 (.11)	.78	-.09 (.10)	.36	-.05 (.06)	.43	-.002 (.09)	.97	-.20 (.13)	.15
Accult.x Ext T2	-.05 (.11)	.62	.02 (.11)	.86	-.01 (.11)	.96	-.06 (.06)	.33	-.01 (.08)	.92	-.07 (.13)	.62
Encult.x Int T2	-.11 (.09)	.26	-.13 (.10)	.20	.06 (.10)	.57	.04 (.07)	.56	.003 (.09)	.92	.001 (.15)	.99
Encult.x Ext T2	-.11 (.12)	.39	-.19 (.13)	.14	-.07 (.13)	.62	.04 (.07)	.61	-.11 (.08)	.21	-.06 (.14)	.68
Outcomes at T4												
Accult.x Int T3	.04 (.11)	.72	.13 (.12)	.26	-.06 (.12)	.64	.11 (.10)	.25	.10 (.08)	.25	.20 (.11)	.08

Accult.x Ext T3	.04 (.08)	.64	.02 (.09)	.85	-.03 (.09)	.71	.08 (.07)	.29	-.002 (.06)	.97	.06 (.08)	.49
Encult.x Int T3	-.11 (.11)	.33	.02 (.11)	.86	-.02 (.10)	.86	.03 (.10)	.75	.06 (.09)	.48	.15 (.12)	.24
Encult.x Ext T3	-.01 (.09)	.92	.04 (.10)	.67	<.01 (.09)	.99	.01 (.09)	.94	.06 (.09)	.50	.14 (.11)	.23

Note. Dep. = Caregiver Depressive Symptoms; Anx. = Caregiver Anxiety Symptoms; Stress = Caregiver Stress Symptoms; Int. = Child Internalizing Problems; Ext = Child Externalizing Problems; Accult. = Acculturation Levels; Encult. = Enculturation Levels

Figure 4.1. Conceptual Model for Analyses



Note. Caregiver Symptoms refers to caregiver depressive, anxiety, and stress symptoms. Child Behavior Problems refers to child internalizing and externalizing problems. SEM models examining associations between caregiver symptoms and child behavior problems were run individually, resulting in 6 separate SEM models utilizing multiple group SEM modeling comparing RAU and iPCIT groups. Follow-up analyses examining acculturation and enculturation as moderators were run at each time lag.

Figure 4.2. Impact of Caregiver Depressive Symptoms T2 on Child Internalizing Problems at T3, Moderated by Acculturation, within the control group

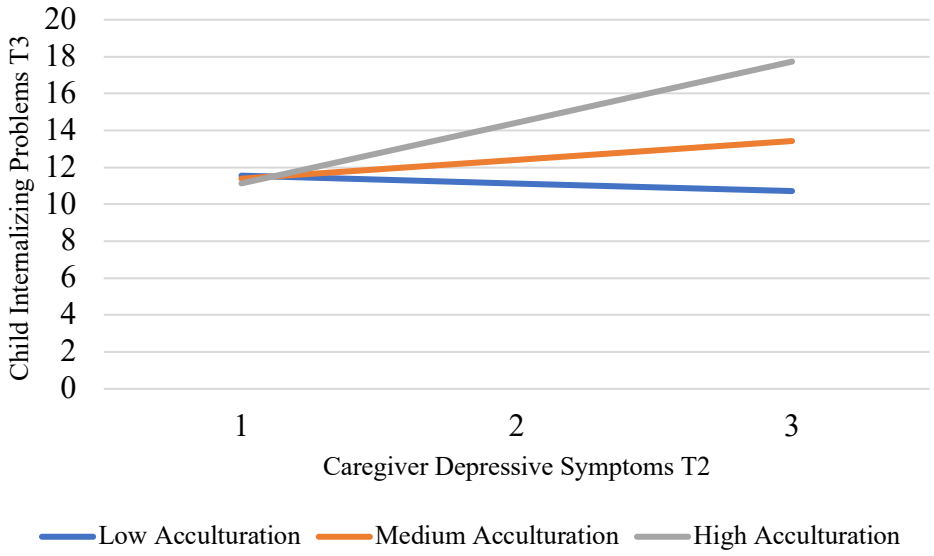


Figure 4.3. Impact of Child Internalizing Problems T1 on Caregiver Depressive Symptoms T2, Moderated by Enculturation, within the control group

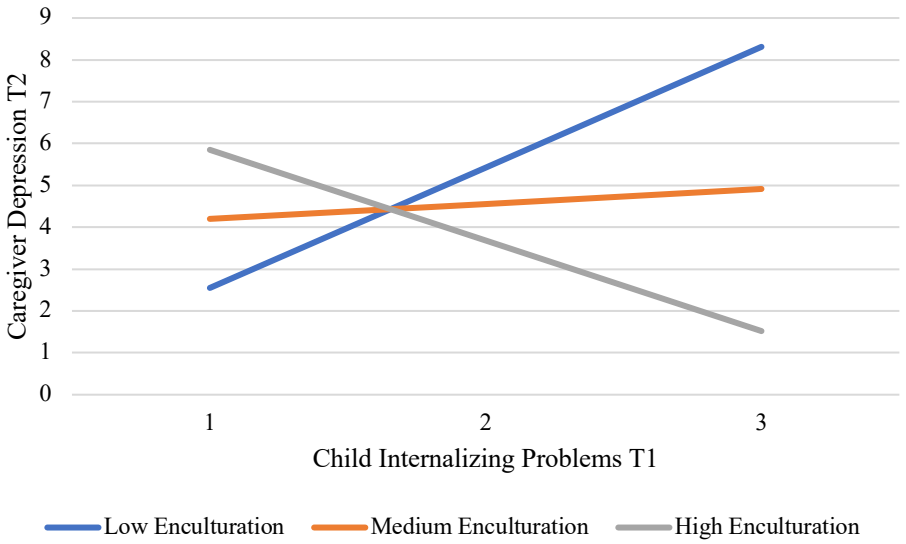


Figure 4.4. Impact of Child Externalizing Problems T1 on Caregiver Depressive Symptoms T2, Moderated by Enculturation, within the control group

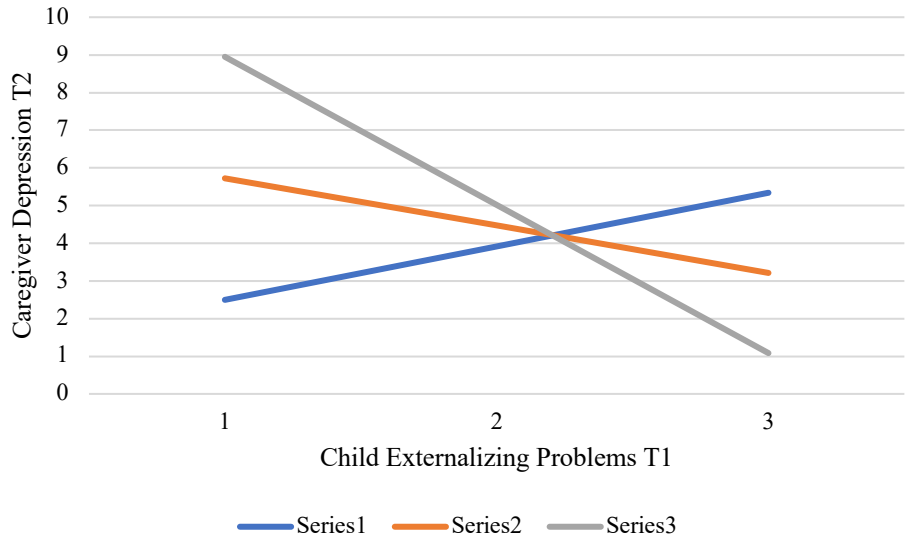


Figure 4.5. Impact of Child Internalizing Problems T1 on Caregiver Anxiety Symptoms T2, Moderated by Acculturation, within the control group

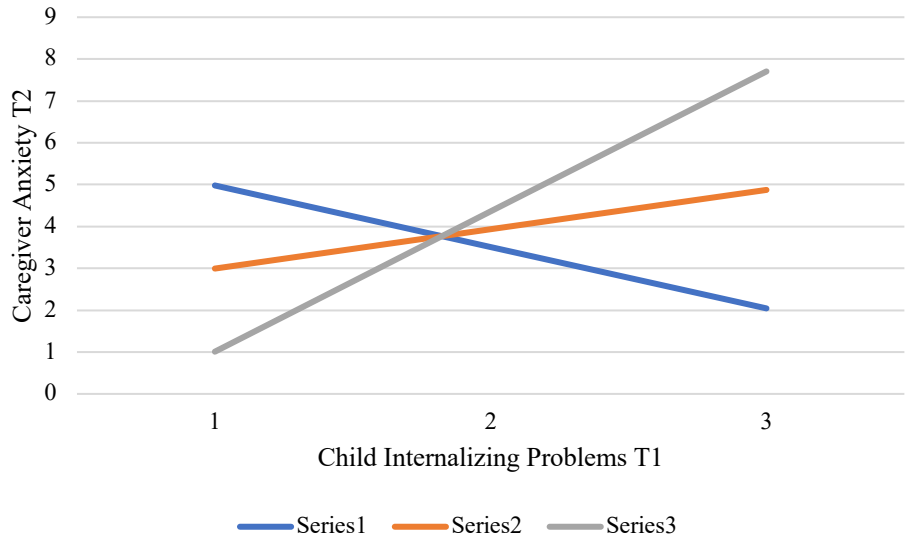


Figure 4.6. Impact of Child Externalizing Problems T1 on Caregiver Anxiety T2, Moderated by Acculturation, within the control group

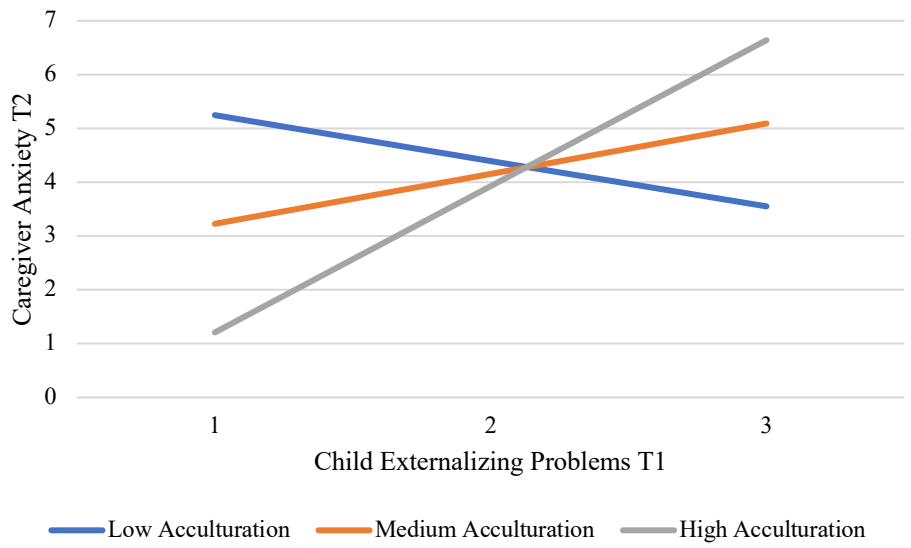


Figure 4.7. Impact of Caregiver Depression T1 on Child Externalizing Problems T2, Moderated by Enculturation Levels, within the iPCIT group

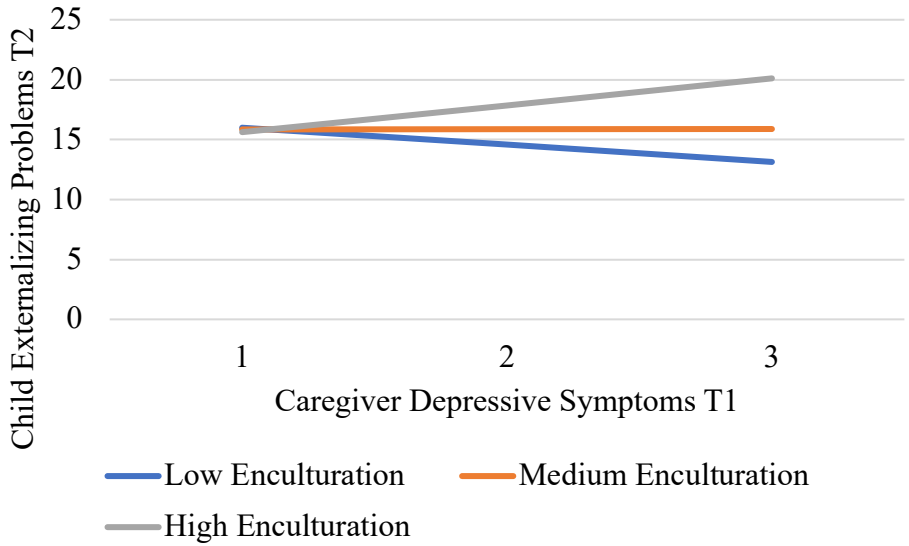
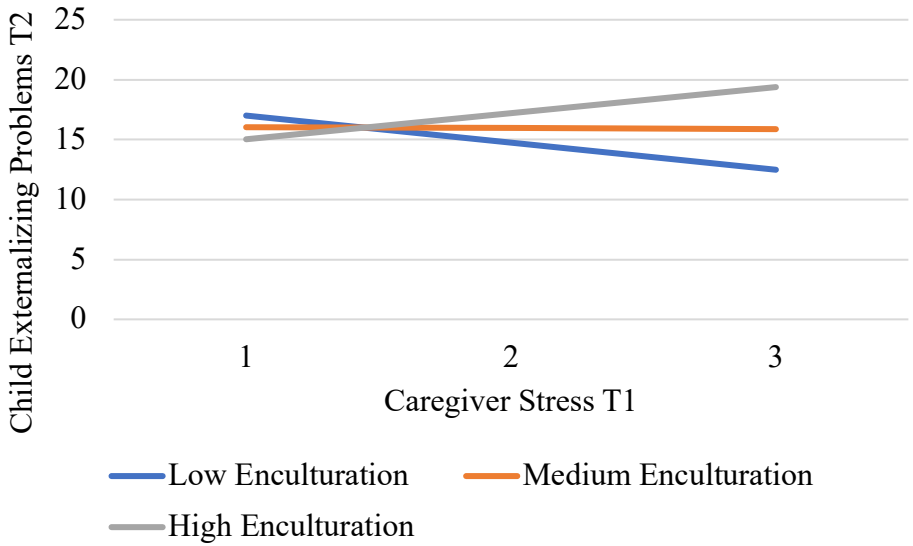


Figure 4.8. Impact of Caregiver Stress at T1 on Child Externalizing Problems at T2, Moderated by Enculturation, within the iPCIT group



Chapter V

Observed Aggressive Behaviors in Early Childhood for Children with DD and Caregiver Distress

Observed Aggressive Behaviors in Young Children with DD and Caregiver Distress

Despite prior research showing elevated levels of behavior problems in children with developmental delay, few studies, including those with typically developing children, include multi-method assessment of behavior problems. Given discrepancies between parent report and observational coding (Brotman et al., 2008; Webster-Stratton et al., 2001), examining child behavior problems with a multimethod approach would enhance scientific rigor. Prior research has showed high reliability of observations of child aggressive behaviors during child-directed play and demonstrated the effect of a parenting intervention on decreasing observed levels of child aggressive behaviors among 58 parent-child dyads (Heflin et al., 2020). Furthermore, as discussed by Heflin and colleagues (2020) and noted in Chapter II of the current dissertation portfolio, observational coding can provide a more objective measure of aggressive behaviors.

Prior research examining both parent report of behaviors and observational coding of aggressive behaviors has found discrepancies between reports (Brotman et al., 2008; Webster-Stratton, Reid, & Hammond, 2001). Specifically, Brotman and colleagues (2008) found no significant impact of treatment intervention on reduction of parent-report of child aggressive behaviors, though they found demonstrated decreases in the frequency of observed physical aggression using observational coding. The current study is the first study to our knowledge to utilize a multimethod approach using both parent report and observational coding, to assess behavior problems in children with developmental delay and its association with parental distress. The current chapter utilizes the System for

Coding Early Physical Aggression (SCEPA; Keenan & Shaw, 1994), as a measurement tool for coding observed aggression in early childhood.

While the initial proposal included examination of bidirectional associations between caregiver distress and child behavior problems with latent factor constructs, confirmatory factor analysis indicated that the latent factors of child behavior problems (i.e., child internalizing behavior problems on the CBCL, child externalizing behavior problems on the CBCL, and child observed aggressive behaviors utilizing the SCEPA) or caregiver distress (i.e., depression, anxiety and stress as one factor) did not demonstrate appropriate fit. Thus, the prior chapter (Chapter IV) reported on examination of associations between individual measures of caregiver distress and caregiver report of child behavior problems, and the current chapter presents examination of associations between observed aggression codes and caregiver distress. We hypothesized that there would be support for both child-driven and parent-driven relations between caregiver depression, anxiety, and stress symptoms and observed child aggressive behaviors across the two-year period. Specifically, we hypothesized that higher levels of observed child aggressive behaviors would predict higher subsequent levels of caregiver distress and vice versa.

Method

Participants and Procedure

Study information, participant demographic information, and inclusion/exclusion criteria are included in Chapter III. Participants were 3-year-old children aging out of EI services for DD and their primary caregiver. Families were initially screened during their child's exit evaluation for EI Services, which occurred within 3 months of the child's 3rd

birthday, and then participated in a home-based baseline assessment once the child turned 3-years-old and EI services were terminated. The study includes assessments of children and their parents at four time points from age 3 years to age 4 years and 6 months (i.e., Time 1, Time 2, Time 3, Time 4). Time 1 refers to assessments completed at week 0, when children were on average 36 months (3 years) old. Time 2 assessments occurred at week 20. Time 3 occurred 6-months following Time 2 assessment. Time 4 assessments were completed 12-months after the Time 2 assessment. Analyses included the sample from the larger study (n = 150), across both the control (n = 75) and internet-delivered Parent Child Interaction Therapy (iPCIT; n = 75) conditions. Treatment sessions occurred over the 20-week period between T1 and T2 assessments, during which time the control group received referrals for services in the community. The present chapter presents results from the examination of models containing frequency of observational aggression coding and the bidirectional associations with caregiver symptomatology (i.e., referring to the depression, anxiety and stress subscales of the DASS-21 as discussed in more detail in Chapter IV). Details about the observational coding scheme and procedures involved with coding are provided below. Figure 5.1 illustrates the models examined in the current chapter.

Coding Measures

The *System for Coding Early Physical Aggression* (SCEPA; Keenan & Shaw, 1994) is an observational measure of aggressive behaviors in young children and includes codes for five aggressive behaviors: socially appropriate aggression (SAA; usually directed at objects, but fulfills the goals of the task), aggressive force (AF; must have visible force, but with no evaluation of intent to harm), game playing (GP; actions, such

as knocking over a tower of blocks), temper tantrums (TT; forceful contact with ground), and banging toys together (BTT; repetitive banging with force). Individual frequency counts were coded for each of the five aggressive behaviors and a total aggressive behavior frequency variable was created (sum of the frequency of all aggressive behaviors), which was used in all analyses and consistent with prior research (Mesman et al., 2008; Heflin et al., 2020). Furthermore, aggressive force and socially appropriate aggression codes were examined independently. The intent to hurt or harm someone or something is not taken into consideration because intentions can be difficult to reliably measure (Hartup, 2005), especially in young children. In the current study, aggressive behaviors were coded during a clean-up task, which may elicit more frustration and aggressive behaviors in the child than during other parent-child play interactions (Mesman et al., 2008).

Coders in the current study completed training videos and coded 25% of the baseline videos for interrater reliability. Consistent with past research utilizing the SCEPA, interrater reliability was computed utilizing Cronbach's alpha correlation coefficient (Heflin et al., 2020 – Chapter III; Mesman et al., 2008). In the present study, reliability ranged from good to excellent (socially appropriate aggression $\alpha = .87$, aggressive force $\alpha = .95$, and total aggressive behavior frequency $\alpha = .87$).

Data Analysis

Analyses were conducted in MPlus v8.2 using structural equation modeling (SEM framework), consisting of a four-wave, cross-panel design with two sets of paths in the sample. The originally proposed analyses involved structural equation modeling with use

of latent factors for caregiver distress and child behavior problems. However, confirmatory factor analysis of a latent construct of parental distress suggests that caregiver distress factors do not form a single "caregiver distress" factor, and thus we evaluated each subscale for caregiver distress individually in transactional models. Confirmatory factor analysis of a latent construct of child behavior problems also suggests that child behavior problems do not form a single "child behavior problems" factor. Additionally, confirmatory factor analysis of observed aggressive behaviors (i.e., across individual aggression codes), suggests that observed aggressive behaviors do not form a single "observed aggression" factor, and thus the current chapter reports individual model results for aggressive behaviors (i.e., total aggression, aggressive force, and socially appropriate aggression frequency codes) coded by the author and additional trained graduate students with caregiver symptomatology. Models examining caregiver-report of child behavior problems are presented in Chapter IV. Separate SEM models were run for depression, anxiety, and stress with observed total frequency of child aggressive behaviors, observed aggressive force child aggressive behaviors, and observed socially appropriate child aggressive behaviors, resulting in 9 multigroup SEM models. Models were not run utilizing the other subtypes of aggressive behavior (i.e., game playing, temper tantrums, and banging toys together) given the low instances of occurrence of these behaviors (see Table 5.1).

Descriptive statistics were conducted to examine the distribution of the frequency of aggressive behaviors (i.e., aggressive force, socially appropriate aggression and total frequency), person-directed aggression, and global aggression rating scores at baseline. We conducted tests to examine the normality and homoscedasticity of the residuals,

which indicated that assumptions were met. Table 5.1 presents means and standard deviations for the observed frequency (i.e., aggressive force, socially appropriate aggression, game playing, temper tantrums, banging toys together, and total frequency), person-directed aggression, and global rating of aggressive behavior by group (standard care vs. intervention) at each time point. Table 5.2 presents correlations between the observed aggression codes (i.e., aggressive force, socially appropriate aggression, and overall aggression frequency total) and caregiver distress at baseline (Time 1). No correlations between observed aggression codes and caregiver distress were significant, though observed aggression codes (i.e., aggressive force, socially appropriate aggression and overall aggression frequency total) were significantly positively correlated with one another.

The maximum likelihood estimation was used to handle missing values. Model fit information was assessed, and the model fit information is based on all cases. We performed nine, four-wave cross-lagged panel models to address the bidirectional effects between caregiver distress (i.e., depression, anxiety and stress symptoms in separate models) and observational coding of child aggressive behaviors (i.e., total frequency, aggressive force frequency, and socially appropriate aggression frequency separately), with maximum likelihood missing values estimation across groups. Cross-lagged panel model analyses were conducted in MPlus8 utilizing Multiple-Group SEM framework (MG-SEM).

Results

Descriptive Analyses

Descriptive analyses examined the distribution of caregiver symptoms and child behavior problems. Table 5.1 includes the means and standard deviations for categories of aggressive behaviors with sufficiently variability and frequency (i.e., aggressive force, socially appropriate aggression), as well as overall frequency codes, aggression directed towards people, and global rating of aggressive behaviors. The minimum total frequency of aggressive behaviors was 0 and the maximum was 75. Socially appropriate aggression ranged from 0 to 71. Aggressive force codes ranged from 0 to 23. The minimum global aggression rating item was 1 and the maximum was 4 for all children at all time points. The modal rating for global aggression was 2 at baseline.

Bidirectional Transactional Relations between Caregiver Distress and Observational Coding of Child Aggressive Behaviors

The base models consisted of a four-wave, cross-panel design (Figure 5.1). Initially, model fit was tested with constraints on parent to child lags, and the child to parent lags were freed to vary. Additionally, model fit was tested with constraints on child to parent lags, and the parent to child lags were freed to vary. Constrained models exhibited poor fit, as demonstrated by Tucker-Lewis Index (TLI) values < .95 and Root Mean Square Error of Approximation (RMSEA) < .05. Specifically, fit indices ranged across models to demonstrate poor fit (TLI: .52 – .86; RMSEA: .09 – .18). Furthermore, placing or removing constraints on some of the cross-lagged paths across time points did not significantly impact model fit. To address the poor fit of the models, we allowed residuals of child behavior problems and caregiver distress to correlate freely, allowing

for shared variance between time points. Thus, models estimating each pathway were utilized as fully saturated models, demonstrating perfect fit. All cross-lagged models were estimated using MPlus8.

All paths in the models were entered (Hayes & Preacher, 2013), including pathways from earlier symptomatology and observational codes of aggressive behaviors to later. Associations between caregiver distress and observational coding of aggressive behaviors were examined utilizing multiple-group structural equation modeling (MG-SEM) (see Chapter IV for additional information). Each pathway within the control group and treatment group are presented in Tables 5.3 (control group) and 5.4 (iPCIT group). Within the group receiving iPCIT, findings showed that caregiver anxiety symptoms at Time 1 predicted child aggressive force behaviors at Time 2, with higher levels of caregiver anxiety predicting subsequent higher frequency of child aggressive force behaviors following iPCIT. No other pathways (caregiver-driven, child-driven, or bidirectional) within the control or treatment groups were significant.

Discussion

The current results provided an examination of the associations between observed child aggressive behaviors and caregiver distress across control and treatment groups, among families with young children with DD from predominantly minoritized backgrounds. Despite research supporting the utility of observational coding of early childhood aggressive behaviors (Heflin et al., 2020 – Chapter II; Mesman et al., 2008), intervention research has seldom included observational coding measures of child behavior alongside caregiver report of child behavior problems (Brotman et al., 2008; Webster-Stratton et al., 2001). While the initial proposal included examination of

bidirectional associations between caregiver distress and child behavior problems with latent factor constructs, confirmatory factor analysis indicated that the latent factors did not demonstrate appropriate fit. Thus, the current chapter presented findings from individual examination of the bidirectional associations between observed aggression codes and caregiver distress.

Findings did not support significant associations between observational aggression coding and caregiver distress measures, indicating differences in the functioning of caregiver reported child behavior problems (Chapter IV) and observational coding of child aggressive behaviors related to caregiver distress. Given the low overall frequencies of observable aggressive behaviors, it is possible that the present sample did not exhibit sufficient variability in aggressive behaviors to detect effects. Additionally, it is possible that while caregiver distress is associated with caregiver-report of child behavior problems (Chapter IV), use of observational coding of child behavior problems measures a different part of child behavior than caregiver-report of child behavior problems (Brotman et al., 2008). Future research should examine the use of observational coding of aggressive behaviors in early childhood, specifically examining how observational coding measures correspond to specific factors within caregiver-report measures of child behaviors. Additionally, it is possible that parenting behaviors, rather than caregiver distress, is associated with observed aggressive behaviors. While it was beyond the scope of the current dissertation project, future research should how examine how parenting behaviors impact and are affect by observed aggressive behaviors in young children with DD over time.

Table 5.1. Observed Aggressive Behavior Codes Means and Standard Deviations by Over Time by Group

	Time 1		Time 2		Time 3		Time 4	
	I-PCIT M(SD)	**RAU M(SD)**	**I-PCIT M(SD)**	**RAU M(SD)**	**I-PCIT M(SD)**	**RAU M(SD)**	**I-PCIT M(SD)**	**RAU M(SD)**
AF	1.43 (2.11)	2.47 (4.41)	.97 (1.95)	.87 (1.34)	.31 (.73)	1.03 (2.05)	.69 (1.68)	1.42 (3.08)
SAA	5.20 (10.60)	4.60 (7.69)	6.09 (9.95)	5.72 (7.78)	4.63 (8.82)	5.94 (8.99)	5.52 (10.64)	7.28 (12.98)
GP	.01 (.12)	.01 (.12)	.02 (.12)	.09 (.51)	.00 (.00)	.00 (.00)	.00 (.00)	.09 (.54)
TT	.19 (.63)	.08 (.28)	.05 (.27)	.04 (.21)	.00 (.00)	.01 (.12)	.03 (.18)	.00 (.00)
BTT	.42 (2.35)	.03 (.17)	.14 (.43)	.12 (.56)	.05 (.29)	.18 (.65)	.06 (.40)	.18 (.80)
PD	.21 (.64)	.40 (1.10)	.24 (1.05)	.25 (.72)	.02 (.13)	.09 (.42)	.18 (.93)	.30 (1.43)
OAT	7.37 (10.99)	6.99 (8.45)	7.08 (10.12)	6.84 (7.89)	5.04 (8.92)	7.16 (9.29)	6.41 (10.92)	9.05 (12.92)
GSR	1.97 (.76)	2.14 (.88)	1.98 (.77)	2.12 (.76)	1.76 (.63)	2.00 (.80)	1.74 (.83)	2.04 (.81)

Note. AF = frequency of aggressive force codes
SAA = frequency of socially appropriate aggression codes
GP = frequency of game-playing aggression codes
TT = frequency of temper tantrum aggression codes
BTT = frequency of banging toys together aggression codes
PD = frequency of person-directed aggression codes
OAT = overall observed aggressive frequency codes total
GSR = global scale rating of aggression

Table 5.2. Correlations among variables at baseline

Variables	**2**	**3**	**4**	**5**	**6**	**7**
1 Group	-.15	.03	.003	-.07	-.03	-.11
2 AF T1	--	-.04	.32**	.06	.03	.11
3 SAA T1	--	--	.92**	-.13	-.06	-.06
4 OAT T1	--	--	--	-.11	-.05	-.03
5 Dep T1	--	--	--	--	.64**	.70**
6 Anx T1	--	--	--	--	--	.73**
7 Stress T1	--	--	--	--	--	--

Note.
*p<.05;
**p<.01

Group = RAU (0) or iPCIT (1); AF T1 = Aggression Frequency Total at Time 1; SAA T1 = Socially Appropriate Aggression Frequency Total at Time 1; OAT T1 = Overall Frequency Total of Aggressive Behaviors at Time 1; Dep T1 = Caregiver Depressive Symptoms at Time 1; Anx T1 = Caregiver Anxiety Symptoms at Time 1; Stress = Caregiver Stress at Time 1

Table 5.3. Parameter Estimates for the Cross-Lagged Models with Observational Coding of Child Aggressive Behaviors within RAU Group

RAU Group

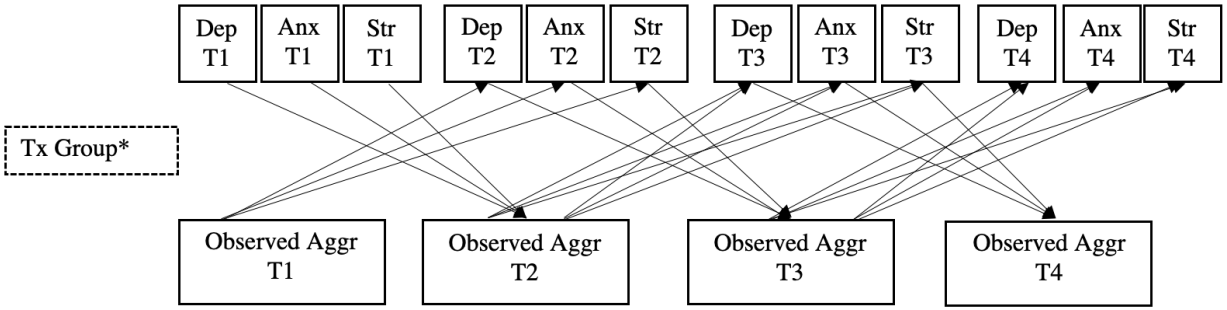
	Outcome: Aggressive Force Frequency		*Outcome: Socially Appropriate Aggression Frequency*		*Outcome: Total Aggression Frequency*		*Outcome: Caregiver Depressive Symptoms*		*Outcome: Caregiver Anxiety Symptoms*		*Outcome: Caregiver Stress Symptoms*	
	B (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*
Outcomes at T2												
Dep. T1	-.01 (.01)	.46	-.02 (.04)	.56	-.03 (.04)	.42	-	-	-	-	-	-
Anx. T1	.01 (.02)	.52	-.20 (.12)	.10	-.23 (.13)	.07	-	-	-	-	-	-
Stress T1	.04 (.02)	.08	.04 (.02)	.08	-.09 (.13)	.50	-	-	-	-	-	-
AF T1	-	-	-	-	-	-	.72 (.56)	.19	.01 (.17)	.95	.01 (.14)	.94
SAA T1	-	-	-	-	-	-	-.16 (.32)	.62	-.06 (.10)	.52	-.14 (.08)	.09
OAT T1	-	-	-	-	-	-	.05 (.29)	.86	-.04 (.09)	.62	-.07 (.07)	.27
Outcomes at T3												
Dep. T2	.01 (.01)	.65	.04 (.05)	.48	.04 (.06)	.47	-	-	-	-	-	-
Anx. T2	.03 (.04)	.42	-.09 (.17)	.60	-.10 (.18)	.60	-	-	-	-	-	-
Stress T2	.06 (.04)	.19	-.11 (.21)	.60	-.22 (.21)	.44	-	-	-	-	-	-
AF T2	-	-	-	-	-	-	-2.74 (1.37)	.053	.03 (.50)	.055	-.58 (.50)	.25
SAA T2	-	-	-	-	-	-	.16 (.24)	.52	.15 (.08)	.052	-.68 (.51)	.18
OAT T2	-	-	-	-	-	-	.04 (.24)	.88	.14 (.07)	.054	-.05 (.07)	.46
Outcomes at T4												
Dep. T3	-.02 (.02)	.51	-.03 (.10)	.75	-.06 (.10)	.55	-	-	-	-	-	-
Anx. T3	.01 (.08)	.91	-.30 (.36)	.40	-.29 (.36)	.41	-	-	-	-	-	-
Stress T3	-.08 (.09)	.36	-.01 (.01)	.53	-.01 (.36)	.98	-	-	-	-	-	-
AF T3	-	-	-	-	-	-	-.17 (.78)	.83	.26 (.28)	.35	-.20 (.28)	.47
SAA T3	-	-	-	-	-	-	.27 (.16)	.11	-.08 (.07)	.23	.00 (.06)	.99
OAT T3	-	-	-	-	-	-	.22 (.16)	.17	-.04 (.06)	.51	.02 (.06)	.76

Table 5.4. Parameter Estimates for the Cross-Lagged Models with Observational Coding of Child Aggressive Behaviors within iPCIT Group

iPCIT Group

	Outcome: Aggressive Force Frequency		*Outcome: Socially Appropriate Aggression Frequency*		*Outcome: Total Aggression Frequency*		*Outcome: Caregiver Depressive Symptoms*		*Outcome: Caregiver Anxiety Symptoms*		*Outcome: Caregiver Stress Symptoms*	
	B (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*	*B* (*SE*)	*p*
Outcomes at T2												
Dep. T1	-.01 (.01)	.56	-.04 (.04)	.32	-.04 (.04)	.37	-	-	-	-	-	-
Anx. T1	.07 (.04)	.05*	-.13 (.15)	.39	-.02 (.15)	.89	-	-	-	-	-	-
Stress T1	-.06 (.05)	.19	-.11 (.21)	.62	-.19 (.20)	.35		-	-	-	-	-
AF T1	-	-	-	-			-.80 (1.04)	.44	-.20 (.37)	.59	-.15 (.33)	.66
SAA T1	-	-	-	-			-.16 (.20)	.43	-.02 (.07)	.74	-.03 (.06)	.55
OAT T1	-	-	-				-.20 (.19)	.30	-.02 (.07)	.76	-.05 (.05)	.33
Outcomes at T3												
Dep. T2	.004 (.01)	.45	-.01 (.06)	.85	-.01 (.06)	.90	-	-	-	-	-	-
Anx. T2	-.003 (.02)	.85	-.22 (.20)	.28	-.24 (.20)	.24	-	-	-	-	-	-
Stress T2	.003 (.02)	.87	-.21 (.25)	.40	-.24 (.25)	.34	-	-	-	-	-	-
AF T2	-	-	-	-			-.60 (.97)	.54	-.22 (.19)	.24	-.12 (.22)	.59
SAA T2	-	-	-	-			-.05 (.24)	.84	-.01 (.04)	.88	-.002 (.05)	.97
OAT T2	-	-	-	-			-.07 (.24)	.75	-.01 (.04)	.77	.004 (.05)	.93
Outcomes at T4												
Dep. T3	-.01 (.01)	.43	-.10 (.08)	.19	-.11 (.08)	.16	-	-	-	-	-	-
Anx. T3	.00 (.09)	.99	.03 (.43)	.94	.06 (.45)	.89	-	-	-	-	-	-
Stress T3	-.05 (.07)	.44	-.13 (.35)	.71	-.24 (.36)	.51	-	-	-	-	-	-
AF T3	-	-	-	-			2.90 (1.79)	.11	-.49 (.72)	.49	.12 (.68)	.86
SAA T3	-	-	-	-			-.16 (.14)	.27	-.01 (.05)	.85	-.03 (.05)	.50
OAT T3	-	-	-	-			-.13 (.14)	.36	-.01 (.05)	.79	-.04 (.05)	.46

Figure 5.1. Conceptual Model for Analyses



Note. Dep = Depression; Anx = Anxiety; Str = Stress; Aggr = Observed Aggression Coding
Estimated pathways and parameters were not included in conceptual model. All estimated pathways were included in analysis.

Chapter VI

Conclusion

The work enclosed in the present dissertation includes three full-length manuscripts and an additional chapter focused on the early identification of child behavior problems and factors that impact these problems in children with DD, including caregiver distress and early parenting interventions, as well as acculturation and enculturation. Given the significantly higher levels of externalizing and internalizing problems in children with DD than their typically developing peers (Baker et al., 2002; Crnic et al., 2004; de Ruiter et al., 2007), as well as the significant negative outcomes associated with early childhood behavior problems in children with DD (Chan & Sigafoos, 2000; Pears et al., 2014), this work is critical in examining possible mechanisms by which interventions can effectively target child behavior outcomes in high-risk children.

In the first manuscript (Chapter II), I assessed the impact of an early parenting intervention on aggressive behaviors in infants at-risk for behavior problems (n =60) utilizing an observational coding scheme to code early childhood aggressive behaviors. Specifically, I found that infants randomized to an in-home adaptation of Parent-Child Interaction Therapy (PCIT) for infants, the Infant Behavior Program (IBP), displayed decreases in observed aggressive behavior over time compared to peers randomized to the control group. I also found that parents' decreased use of directive and negative parenting statements was a mechanism through which treatment decreased the frequency of observed aggressive behaviors in early childhood. The study highlights the importance

of targeting negative parenting practices to decrease subsequent aggressive behaviors in early childhood.

In the second paper (Chapter III), I reviewed the existing literature examining associations between childhood behavior problems in young children with DD and caregiver distress (n = 19 peer-reviewed articles). Findings showed that behavior problems in children with DD were consistently associated with caregiver distress, with mixed results regarding bidirectional associations between caregiver distress and behavior problems in early childhood. Furthermore, little variability was found in associations across different measures of caregiver distress and child behavior problems, and studies largely relied on caregiver-report of child behavior problems rather than more objective measures of child behavior such as observational coding of behavior. No studies examined the impact of child or caregiver demographic characteristics or cultural factors on the associations between child behavior problems and caregiver distress. Thus, findings from the review of the literature in Chapter III highlighted the need for future research to examine associations within more diverse samples as well as the need to assess for cultural that may impact associations between caregiver distress and child behavior problems in children with DD.

As a result of prior work demonstrating both the impact of an early parenting intervention on observed aggressive behaviors in infants (Heflin et al., 2020; Chapter II), as well as the existing literature showing associations between caregiver distress and behavior problems in children with DD, Chapters IV and V examined the gaps in the current literature pertaining to examining: 1) the bidirectional associations among caregivers of children with DD; 2) the role of treatment in associations between child

behavior problems and caregiver distress; 3) the role of acculturation processes in associations between child behavior problems and caregiver distress; and 4) the utility of observational coding measures of early childhood aggression in exploring the association between caregiver distress and child behavior problems. In Chapter IV, I found support for associations between caregiver distress and caregiver-report of child behavior problems for children with DD, as well as support for decreased associations for families randomized to receive iPCIT compared to those randomized to the control group (n = 150 families across groups). Additionally, moderation analyses highlighted the need to consider families' acculturation and enculturation levels in the associations between caregiver symptoms and child behavior problems in children with DD. Findings highlight the potential benefit of internet-delivered early intervention services in targeting family-wide outcomes in families with children with DD from minoritized backgrounds, particularly when working with more highly acculturated and less enculturated families.

The final paper, Chapter V examined the utility of using observational coding of early behavior problems in children with DD and the examination of associations with caregiver distress, as well as the impact of a parenting intervention on these associations. The findings presented in Chapter V further emphasize the need for future research to assess both caregiver-report and observational assessment of early childhood behavior problems, particularly when examining associations with caregiver distress, which may influence caregiver report of child behaviors.

Taken together, the present dissertation fills prior gaps in the literature through the assessment of multiple facets of caregiver distress and the assessment of child behavior problems, with both caregiver-report measures and observational coding of

child behaviors. Findings from these studies will inform future research examining the point at which we can best intervene in order to promote positive child outcomes in the context of ongoing caregiver distress.

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VITA

BRYNNA HOPE HEFLIN

2011 – 2015	B.A., Psychology, Spanish University of Virginia
2015 – 2017	Research Analyst Vanderbilt University Medical Center, Psychiatric Hospital Laboratory on Autism Sensory Research
2017 – 2019	M.S., Psychology Clinical Science in Child and Adolescent Psychology Florida International University
2019 – Present	Doctoral Candidate, Psychology Clinical Science in Child and Adolescent Psychology Florida International University
2018	FIU Graduate and Professional Student Committee Travel Award
2018	Student Poster Award Finalist
2020 – 2022	NICHD National Research Service Award (NRSA; F31HD104336-01)
2021	FIU Provost Award for Outstanding Paper

PUBLICATIONS

Failla, M., Bryant, L., Heflin, B. H, Mash, L., Schauder, K., Davis, S., Gerdes, M., Weitlauf, A., Rogers, B., & Cascio, C. (2020). Neural correlates of cardiac interoceptive accuracy across development: Implications for social symptoms in autism spectrum disorders. *Autism Research, 13*(4). https://doi.org/10.1002/aur.2289

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