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Parent-child interaction therapy informed by applied behavior analysis for developmental delay: parent and sibling coaching with setting generalization

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Parent-Child Interaction Therapy Informed by Applied Behavior Analysis for
Developmental Delay: Parent and Sibling Coaching with Setting Generalization

Mariel Smith Cannady

A dissertation submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

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Abstract

Parent-Child Interaction Therapy (PCIT) is a well-established, empirically-supported treatment for young children with disruptive behaviors. PCIT was initially designed for treatment of typically-developing children with oppositional and disruptive behaviors. There is emerging support for PCIT as a treatment for behavior challenges seen in children with developmental delays. However, some modifications may be needed to respond to the severity of delay, parent treatment goals, and the function of the challenging behavior. Using a non-concurrent multiple-baseline experimental design, the current study examined the effectiveness of a modified PCIT approach for a preschool child with global developmental delay and co-occurring behavior problems. Modifications were informed by empirically-supported procedures from applied behavior analysis (ABA). Meaningful, observable changes were shown in parent behaviors across home and clinic settings. Positive changes in the child's cooperative play with the parent and a slightly older sibling were observed in generalization probes. A reduction in parent perception of problem behavior frequency and parent- and sibling-reported satisfaction with the treatment goals, procedures, and outcomes supported clinically meaningful outcomes.

Keywords: parent-child interaction therapy, developmental delay, generalization, sibling interaction, applied behavior analysis, child psychotherapy integration

INTRODUCTION

Developmental disabilities (DDs) diagnosed in childhood typically persist throughout a person's lifetime. DDs are a heterogeneous group of conditions characterized by delays that can affect learning, communication, language, adaptive behavior skills, physical development, and sensory functions (Centers for Disease Control and Prevention, 2015). The Centers for Disease Control and Prevention (CDC) estimates that 1 in 6 children have a DD (CDC, 2015). Developmental delays can be caused by prenatal factors (e.g., exposures to toxins during the gestational period) or postnatal events (e.g., injury after birth). However, prematurity and low birth weight, infections during pregnancy, and multiple births increase the risk for developmental delay (CDC, 2015).

Within models of health service, "developmental delay" is a generic identifier often used as a chief presenting problem, rather than as specific diagnosis or reference to etiology (Peterson, Kube, & Palmer, 1998). Peterson and colleagues (1998) report that a single classification may not describe the heterogeneous needs of individuals with developmental delays. For example, some delays may be best classified by functional level such as degree of language or cognitive impairment while others may be best characterized by etiology (e.g., Trisomy 21, traumatic brain injury, meningitis), pathophysiology (e.g., specific brain region affected), societal constraints, or disability status. The classification of global developmental delay (GDD), for example, poses difficulty to health service providers due to the myriad causes and degree of functional impact. Specifically, GDD can be diagnosed if there are deficits in two major developmental domains or all developmental domains (Shevell, 1998). Shevell (1998)

speculated that health services may address feeding problems, sleep disturbance, behavioral difficulties and cognitive delay, which often makes it difficult for professionals to determine priorities in treatments. Behavior problems, in particular, are common among preschool children with cognitive and social delays (Emerson & Einfeld, 2010). Furthermore, challenging behaviors are often the foremost concern in the treatment of children with developmental delays as these behaviors often interfere with skill acquisition (Masse, McNeil, Wagoner, & Chorney, 2007). As a result, it is important to consider evidence-based approaches to meet the unique presenting concerns of a child with developmental delay.

LITERATURE REVIEW

Behavior Problems and Co-Occurring Developmental Delays in Preschoolers

A phenomenon known as diagnostic overshadowing made it difficult to ascertain prevalence rates for comorbid psychiatric and cognitive delays more than two decades ago (Handen & Gilchrist, 2006). Diagnostic overshadowing describes a clinician's bias toward underestimating the impact of comorbid psychological disorders in individuals with developmental disabilities (Reiss, Levitan, & Szyskzo, 1982; Borthwick-Duffy, 1994; Jopp & Keys, 2001). Furthermore, diagnostic overshadowing not only occurs at the clinician level but also at the systemic level with disagreement about service delivery. Community agencies that serve individuals with a DD and those that serve persons with psychiatric illness may argue that the other agency should fund services. As a result, families of children with dual diagnoses are caught in the middle regarding service delivery (Borthwick-Duffy, 1994).

A large school-based Dutch study comparing youth with cognitive delays ($n = 1041$) to randomly selected youth in the general population ($n = 1855$), found parents and teachers of children with cognitive delays endorsed significantly more aggressive behaviors such as the child being mean, destroying items, and attacking others on the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000) compared to non-delayed youth (Dekker, Koot, van der Ende, & Verhulst, 2002). Likewise, a longitudinal study of preschool children ($n = 99$) showed children with intelligence quotients (IQs) less than 85 and delayed language scores ($n = 56$) showed greater behavioral problems on parent assessment measures at age 4 and 8 years old compared to non-delayed peers

(Benasich, Curtiss, & Tallal, 1993). More specifically, Benasich and colleagues found at age 8, children with continued language impairments were perceived to have significantly more total behavior problems on the CBCL ($p < .01$) and also demonstrated significant declines in nonverbal IQ on the Leiter International Performance Scale compared to non-delayed peers ($p < .001$).

Dual Diagnosis

Children with dual diagnoses are among the most underserved and least understood (Baker, Blacher, Crnic, & Edelbrock, 2002). Approximately thirty years ago “dual diagnosis” became a catchphrase in the DD community to acknowledge the coexistence of DDs and other psychiatric disorders (Borthwick-Duffy, 1994). As a result, the treatment of comorbid psychological disorders in children with DDs has become a recent focus for clinicians (Crnic, Hoffman, Gaze, & Edelbrock, 2004; Didden, Korzilius, van Oorsouw, & Sturmey, 2006). Comorbid DDs and other psychological disorders were often overlooked due to a number of factors including limited diagnostic tools to validly assess maladaptive behaviors in the DD population, clinicians’ failure to consider comorbid diagnoses, and sensory or physical impairments that complicated the diagnostic picture (Handen & Gilchrist, 2006).

Scholars have disagreed about the validity of diagnosis in preschool children because psychiatric classifications are generally insensitive to developmental contexts (Egger & Angold, 2006; Merikangas, Nakamura, and Kessler, 2009). As a result, a developmentally sensitive classification system, the *Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood* (DC: 0-3) was

developed in 1994 for classification of children birth to 3 years old. In 2005 a revision was completed, the DC:0-3, which is under another revision to include children up to age 5 years old. A developmentally sensitive classification system for children with DDs helps facilitate treatment and research of young children with attention to contextual variables such as caregiver-child reciprocity and other environmental factors for infant, toddler and preschool children. However, developmentally sensitive systems such as the DC:0-3 do not translate into billable diagnoses, which means clinicians who diagnosis and treat young children continue to use the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) published by the American Psychiatric Association and the *International Classification of Diseases* (ICD) published by the World Health Organization (WHO) (DC: 0-3R Revision Task Force, 2015). Although preschool children may not receive an official dual diagnosis, delays in cognitive development and behavioral differences are clinically noticeable and are significantly different from typically-developing peers by age 3 years old (Baker, Blacher, Crnic, & Edelbrock, 2002).

Neurodevelopmental Disorders

The *DSM-Fifth edition* (DSM-5) recognizes DDs under the category neurodevelopmental disorders. Neurodevelopmental disorders are disorders of the central nervous system typically diagnosed in childhood and affect acquisition of adaptive, social/communication, and basic academic skills (American Psychiatric Association, 2015; Dedrick, Grissom, Farmer, 2009). Neurodevelopmental disorders include intellectual disabilities such as intellectual disability (ID; also known as intellectual developmental disorder in the medical community), GDD, and unspecified

intellectual disability, which are all characterized by deficits in cognitive and adaptive skills. ID is diagnosed, usually after age 5, when a child has significant delays in general cognitive functioning (approximately two standard deviations below the mean) and co-occurring delays in adaptive functioning. GDD is reserved for young children, under age 5 years, when the clinical severity cannot be determined and when there are delays in several areas of functioning (American Psychiatric Association, 2013). Intellectual disabilities occur across cultures with an estimated prevalence of 1 in 77 in the general population (CDC, 2015).

Other neurodevelopmental disorders outlined in the DSM-5 include attention-deficit/hyperactivity disorder (ADHD), communication disorders, autism spectrum disorder (ASD), specific learning disorders (SLD), and motor disorders but do not require a delays in general cognitive functioning as part of the diagnostic criteria (American Psychiatric Association, 2013). The World Health Organization classifies neurodevelopmental disabilities within the *ICD, tenth revision* (ICD-10) based on the period of time the neurodevelopmental disorder originated (prenatal, perinatal, postnatal), etiology (e.g. genetic/metabolic disorders, infection, environmental cause, and/or disruption of normal brain development), and affected systems (e.g., eyes, musculoskeletal, nervous system, etc.) (WHO, 2010).

Disruptive Behavior Disorders

Most young children will likely have challenging behavior such as tantrums, non-compliance, and mild aggression during the early developmental period. However, disruptive behaviors that persist for an extended period of time and substantially impact a

child's functioning may be diagnosed as a disruptive behavior disorder (DBD). The most current median prevalence rate for DBDs is 6% (range = 5% - 14%) in epidemiological studies using diagnostic interviews and criteria from the DSM-IV (Merikangas, Nakamura, & Kessler, 2009). However, impairment rates are a separate functional indicator. In an epidemiological study of children age 2-5 from low income families, impairment rates for behavior disorders was at 100% compared to 85% for an internalizing disorder (Keenan, Shaw, Delliquadri, & Giovannelli, 1997; Egger & Angold, 2006). Keenan et al. (1997) determined diagnoses via a semi-structured psychiatric interview with parents and scores from the CBCL while impairment levels were based on clinician-rated DSM-III- Revised Global Assessment of Functioning (GAF) scores less than 60.

Disruptive behaviors in childhood and adolescence are diagnostically subsumed under the category disruptive, impulse-control, and conduct disorders in the DSM-5 (American Psychiatric Association, 2013). Oppositional defiant disorder (ODD) falls within this spectrum of disorders and is characterized by difficulties with emotion and behavior regulation. In the U.S., point prevalence rates (i.e., the number of cases documented at the time of the survey) ranged from 2.8% to 5.5% for ODD (Merikangas, Nakamura, & Kessler, 2009). A classic presentation of ODD includes a preschool child with a persistent pattern of disobedience and hostile behaviors (McMahon, Wells, & Kotler, 2006). Core diagnostic features of ODD include irritability, anger/temper tantrums, argumentativeness, or maliciousness lasting six months or more (American Psychiatric Association, 2013). To account for developmental differences, children under age 5 years old must show the ODD symptoms on most days over a 6-month

period. In comparison, children over 5 years old only have to show ODD symptoms at least once per week. Severity of ODD is characterized by the number of settings the disruptive behavior patterns occur. Specifically, problematic behaviors that occur in only one setting constitute mild severity while problematic behaviors in two settings represent moderate severity. A severe classification would indicate oppositional behaviors occur in three or more settings. Oppositional defiance in the context of sibling interactions alone does not meet criteria for ODD (American Psychiatric Association, 2013).

Conduct disorder (CD), another disruptive behavior disorder, is characterized by serious violence towards others or animals, deliberate destruction of property, theft, and violation of others' rights. Emotional "specifiers" are used to describe youth with conduct disorder: lack of remorse/guilt, callousness/lack of empathy, indifference about performance, or shallow/deficient affect. Young children, particularly those with DDs, may not meet criteria for CD because symptoms require serious violations that are typically outside their developmental scope (McMahon, Wells, & Kotler, 2006).

Kimonis, Bagner, Linares, Blake & Rodriguez (2014) found that parents of preschool children with cognitive delays endorsed more callous-unemotional traits (i.e., child seems unaffected by punishment, does not show guilt for misbehavior, shows reduced affection towards others, and does not seem to have fear of getting hurt) compared to non-delayed peers. However, Kimonis and colleagues noted the difference between the delayed and non-delayed preschool groups was not statistically significant ($p = .076$).

Topography of Disruptive Behavior

Loeber and Schmalting's (1985) meta-analysis proposed the use of a spectrum to describe chronic behavior problems that included "overt" (outwardly hostile behaviors) on one end of the spectrum and "covert" (concealed behaviors) on the opposite end (Frick et al., 1993; Loeber & Schmalting, 1985; Loeber & Lahey, 1989). The work of Frick and colleagues (1993) extended Loeber et al.'s work and added to the description and dimensional classification of behavior problems. Frick and colleagues (1993) analyzed teacher and parent behavior ratings from 44 studies of over 28,000 children. Frick et al.'s meta-analysis showed chronic behavior problems in children statistically covary in four behavior clusters: overt, covert, destructive, and non-destructive behavior dimensions. Therefore, Frick et al. proposed adding "destructive" and "non-destructive" behavior dimensions to Loeber and Schmalting's overt-covert behavior continuum. When both continuums are intersected, a multidimensional matrix is created. The matrix is divided into four quadrants and describes disruptive behavior in four primary groups: a) property violations (fire setting, stealing, cruelty to animals, vandalism; b) aggression (e.g., blaming others, fighting, bullying, spitefulness); c) status violations (running away, swearing, rule-breaking, substance use; and d) oppositional behavior (Frick et al. 1993; McMahon, Wells, & Kotler, 2006). The topography of behaviors on the right side of Frick et al.'s matrix (covert behaviors) include oppositional and aggressive behaviors that may best characterize problem behaviors of young children. The "oppositional" quadrant includes tantrums, irritability, defiance, anger, stubbornness, argumentativeness, and annoying behaviors. The "aggression" quadrant includes blaming others, bullying, fighting, cruelty to animals, and spiteful behaviors.

The downside to Frick et al.'s matrix is twofold. First, Frick et al.'s meta-analysis excluded children with cognitive delays with IQs measuring at or below 70. Secondly, studies including preschool-only samples were excluded from the meta-analysis. Frick and colleagues proposed future research should include a separate meta-analysis of preschool disruptive behaviors. As a result, the most widely used theoretical and statistical model of behavior problems in youth may not generalize to behaviors of preschool children or youth with DDs.

Topography of Disruptive Behavior in Young Children with Cognitive Delays

Youth with cognitive delays are shown to have heightened behavior problems compared to peers without delays (Emerson et al., 2001; Baker, Blacher, Crnic, & Edelbrock, 2002; Petrenko, 2013). Emerson et al. (2001) conducted a total population study in England in 1988 and 1995 to understand the prevalence of challenging behaviors among individuals with cognitive delays. In the total sample that included children and adults ($N = 168$), aggression and non-compliance were more likely demonstrated in individuals with less severe delays while self-injurious behavior such as biting was significantly associated with more severe cognitive delays. The most demanding challenging behaviors among children were classified as behaviors that occurred more than once per day, interfered with access to services, resulted in injury to the child or others, or required physical intervention. The most commonly reported challenging behaviors for youth under 19 years old included non-compliance, temper tantrums, aggression, running away, biting self, and destructive behavior. The topography of aggressive behavior included hitting others with their hands (78% of sample), verbal abuse (43% of sample), and hitting others with objects (46% of sample).

Baker et al. (2002) conducted a longitudinal study of 225 preschoolers. They found that mothers and fathers of children with cognitive delays ($N = 92$) were three times more likely to endorse clinical levels of externalizing behavior on the CBCL, Parent Form. On CBCL subscales, mothers and fathers also endorsed more social withdrawal and attention problems compared to typically-developing preschoolers. Fathers rated significant levels of aggression on the CBCL; however, mothers did not. Clinicians rated children with delays as having increased difficulties with orientation/engagement and emotion regulation during the cognitive evaluation (Baker, Blancher, Crnic, & Edelbrock, 2002).

Merrell and Holland (1997) compared 198 preschool children (ages 3-5 years old) with developmental delays to 198 typically-developing preschool children and found that teachers and parents rated significantly more social skills deficits and behavior problems in children with DDs on the Preschool and Kindergarten Behavior Rating Scale. Children in the DD group received special education services under the designation “developmental delay,” which encompassed delays in physical, cognitive, communication, social/emotional, or adaptive development. Parents and teachers of children with DDs rated significantly more difficulties in social cooperation (toy sharing and rule-following), social interaction (conversation and inviting peers to play), social independence (completing tasks independently), social withdrawal (avoiding other children and reduced response to affection), and antisocial/aggressive behaviors (e.g., bullying, physical aggression, and intimidation). Medium to large effect sizes were shown in the differences between the groups with the exception of a small effect size for antisocial/aggressive behaviors.

In summary, the most prevalent problems reported by parents and other caregivers of children with cognitive delays across studies include physical/verbal aggression, non-compliance, and reduced social/play skills. These behaviors can interfere with access to services and skill acquisition and further hinder the learning and development of the child. As a result, these behaviors may be top problems to target in parent-child intervention.

Social Skills Repertoire

Social skills are the foundation children draw upon in their development of social competence. Children who are socially pleasant, cooperative, and compliant (i.e., demonstrate social competence skills) are more resilient and fare better behaviorally, academically and psychologically in childhood and adolescence (Najaka, Gottfredson, & Wilson, 2001; Vahedi, Farrokhi, & Farajian, 2012). Through statistical modeling of large samples of children, developmental researchers have identified that social competence progresses in step-wise fashion. On average, there is a significant, linear progression of social competence skills that increase with age alongside a decrease in problem behavior for children ages 2-5 years old (Howes, 1987; Chen & Jiang, 2002; Vahedi Farrokhi, & Farajian, 2012). By definition, a developmental disability is the result of an interrupted developmental process typically identified in childhood. Therefore, it makes sense that preschool children with mild cognitive delays often have difficulties with social skills such as social initiation (Guralnick & Groom, 1987; Merrell & Holland, 1997), social/cooperative play (Guralnick & Groom, 1987; Kopp, Baker and Brown, 1992; Guralnick 1999), and social engagement with peers (Merrell and Holland, 1997). Additionally, children with mild cognitive delays tend to present with disruptive

behaviors that interfere with play (Merrell and Holland, 1997; Kopp, Baker and Brown, 1992).

Disruptive behaviors that interfere with social interactions can impact the capacity for children with DDs to benefit from the learning environment. In fact, preschool teachers have reported disruptive behaviors as the biggest barrier in the classroom (Vahedi, Farrokhi, & Farajian, 2012). Chen and Jiang (2001) found a negative correlation between social competence with problem behaviors, withdrawal and aggression, as rated by teachers of over 300 preschool children. Similarly, Vahedi et al. (2012) also found a significant negative correlation ($p < .05$) between teacher reported social competence and problem behaviors in a sample of over 400 preschool children.

Social competence is a complex skill repertoire that starts to develop in infancy, continues to develop through late toddlerhood (ages 25-36 months), and sets the stage for complex prosocial peer interactions (Howes, 1987). Productive play with peers involves joint attention, sharing, and cooperating. Social play skills can serve as a “behavioral cusp” for children with DDs that facilitates access to new reinforcers such as attention from others and escape from boredom or social isolation. Rosales-Ruiz and Baer (1997) define a behavioral cusp as, “...a behavior change that has consequences for the organism beyond the change itself, some of which may be considered important.” (p. 534). It is the culmination of joint attention, sharing and cooperating as well as its importance to the parents and educators that makes cooperative play skills a “behavioral cusp.” For example, when a child learns to play cooperatively, they have an increased chance of positive interactions with others that can shape adaptive interactions with peers and enhance learning. Koegel, Carter, and Koegel (2003) suggest that teaching a “pivotal

behavior” such as social initiation improves the outcomes of children with DDs, particularly those with autism. Cooper, Heron, and Heward (2007) describe a pivotal behavior as a learned adaptive behavior that increases similar, untaught adaptive behaviors. Using this logic to address the reduced social repertoires of children with DDs, early interventions should focus on teaching pivotal behaviors that can evolve into behavioral cusps.

Non-Compliance and Defiance

Addressing non-compliance in individuals with cognitive delays is a common problem among clinicians and educators (Walker, 1993; Killu, et al., 1998). Schoen (1983) points out that non-compliance is a large response class that describes the absence of acting on a demand as well as behavioral excesses such as tantrums and aggression. Non-compliance has been described as failing to act in a timely manner, such as 5-10 s, after an adult request (Schoen, 1983; Forehand, Gardner, & Roberts, 1978; Wilder, Allison, Nicholson, Abellon, & Saulnier, 2010; Barkley, 2013), completing a non-requested behavior in response to a specific command (Schoen, 1983), failing to follow previously taught rules, and failing to sustain compliance to a command until all requirements outlined by an adult are met (Barkley, 2013). Barkley further asserts that non-compliance can describe an avoidance of commands (e.g., ignoring) while defiance is an avoidance plus an active protest to the adult request.

Non-compliance in preschoolers is normal (Stephenson & Hanley, 2010; Wilder, et al., 2010) and has been measured to occur in 8-54% of young children (Wilder et al., 2010). However, children identified as “defiant” demonstrate non-compliance 60-80% of

the time (Forehand and King, 1977; Killu, et al., 1998). Higher rates of non-compliance have been shown when young children are asked to terminate a preferred task such as play with toys or complete a non-preferred task such as handing an adult a preferred toy (Walker, 1993; Wilder, et al., 2010). The topography of non-compliant, defiant, uncooperative, and negativistic behavior runs the gamut and includes yelling, whining, arguing, tantrums, property destruction, and aggression. Tantrums that last one to five minutes are considered normative for preschool children overall (Tourian et al., 2015). However, diagnosis and treatment should be considered when non-compliant behaviors are developmentally inappropriate in terms of intensity, duration, more frequent than the normative expectation (e.g., greater than 84th percentile), cause emotional distress for the child/family, or impede skill development, (Kazdin, 2005; American Psychiatric Association, 2012; Barkley 2013).

It is often unhelpful to view non-compliance as just a trait of the child because it often occurs in a socially-mediated context to access a reinforcer or terminate an aversive situation (Cipani & Schock, 2011). Defiant behaviors such as aggression, in particular, can be viewed as reactive, occurring in response to frustration produced by a stimulus, or proactive serving to access a tangible item from an individual (Kempes, Matthys, de Vries & van Engeland, 2005). Contextual factors such as the instructional control of the learning/therapeutic environment and consequent adult responses to adaptive versus maladaptive behavior should be considered in program development for children with DDs (Schoen, 1983). It is not uncommon for preschoolers to show non-compliant behaviors such as hitting. In fact, 70% of preschoolers age 2-3 years old engage in hitting and this behavior starts to decline around ages 4-5 years old (Nelson &

Finch, 2008). Specifically, treatments that address social contingencies modifying “coercive” family interactions can result in positive changes in child behavior (Patterson, 2005). Likewise, interventions performed in the context in which they occur, such as at home or school, show improved effectiveness over clinic-only interventions (Scotti, Evans, Meyer, & Walker, 1991).

Non-compliant behaviors can interfere with adaptive growth and development in children with DDs who are already at a disadvantage in some areas of skill acquisition. In terms of habilitation, adequate instructional control can reduce non-compliance (Schoen, 1983). Therefore, it is particularly important to help facilitate compliance as a foundational skill for learning (Killu, et al., 1998). Killu and colleagues found that non-compliant behavior in preschool children with DDs such as screaming verbal protests, tantrumming, physical aggression, running away, and ignoring requests can be reinforced by escape from instructional demands (negative reinforcement) or attention from teachers (positive reinforcement). Using a multiple baseline design across participants, Killu et al. (1998) demonstrated that embedding high-probability instructional requests in typical preschool activities facilitated later compliance with low-probability instructional requests and reduced disruptive behavior in three children with DDs. Furthermore, following intervention, the participants in Killu et al.’s study showed continued compliance across instructors, decreased non-compliant behavior in response to low-probability instruction in follow up probes and improved compliance after high-probability requests were faded. The authors’ antecedent intervention of requesting high-probability behaviors before requesting low-probability behaviors served as a discriminative stimulus for continued compliant responding. In behavior analysis this

phenomenon is also known as behavioral momentum (Cooper, Heron, & Heward, 2007). Likewise, Killu et al., noted advantages for loosely training compliance by including a variety of requests in the child's natural environment, as well as reinforcing compliant responses with different trainers to facilitate generalization (see Stokes & Baer, 1977; Stokes & Osnes, 1989).

Prior to entering kindergarten children with DDs may access instruction more easily if they are able to follow directions and inhibit disruptive behaviors. In a multi-site early childhood longitudinal study, over 75% of kindergarten teachers ($N = 3,305$) rated compliance and non-disruptive behavior as highly important and "essential" while only 20% of the sample rated alphabet and number knowledge was rated as essential (Lin, Lawrence, & Gorrell, 2003). Therefore, decreasing disruptive behaviors and increasing the social skills repertoire of young children with DDs should be a priority for interventionists.

Variables Contributing to Disruptive Behaviors

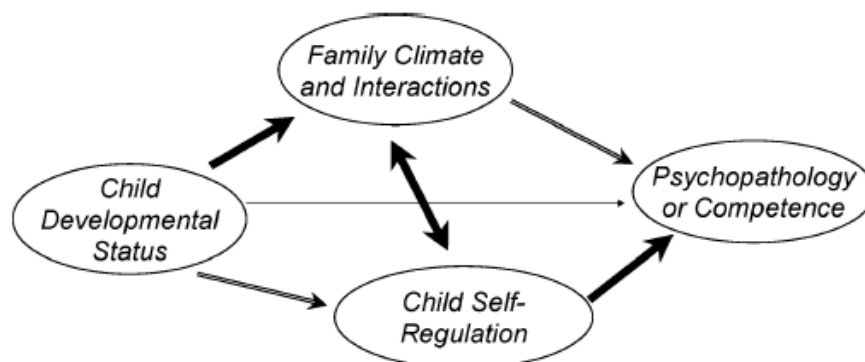
Many children with persistent behavior problems demonstrate difficult temperaments as infants, exhibit below average intelligence, and have poor peer relations (American Psychiatric Association, 2013). Likewise, parent perception of the child as a problem, low socioeconomic status, male gender, and ineffective parenting strategies together predict child conduct problems in young children (McMahon, Wells, & Kotler, 2006). Parent attributions about behavior are important to consider when attempting to treat behavior problems. Miller and Prinz (2003) found that parents who entered treatment with expectations that the focus of treatment would be to change the child (i.e.,

parents had higher externalizing motivation) terminated treatment prematurely ($p < .01$) compared to parents with higher internalizing motivation (i.e., treatment would address the family and parenting). Moreover, parents who participated in parent-only treatment had significantly higher rates of termination compared to child-focused interventions ($p < .01$). Therefore, parent engagement processes and conceptual models of behavior problems in children that outline multiple factors contributing to early childhood misbehavior are important to consider for effective treatment.

Conceptual Model of Problem Behavior in Children with DDs

Crnic, Hoffman, Gaze, and Edelbrock's (2004) conceptual model of dual diagnosis and behavior competence is helpful in understanding the complex interaction among family relations and a child's developmental status, self-regulation and developing social and behavioral competence (Figure 1). Crnic et al.'s model brings to light the reciprocal interaction among variables contributing to the emergence of problem behaviors in children with DDs.

Figure 1.



Model of dual diagnosis and behavioral competence. Used with permission from "Understanding the emergence of behavior problems in young children with developmental delays," by K. Crnic, C. Hoffman, K. Gaze, and C. Edelbrock, 2004, *Infants and Young Children*, 17, p. 228. 2004 Copyright Lippincott, Williams, & Wilkins, Inc.

Crnic and colleagues (2004) investigated factors associated with the comorbidity of DDs and disruptive behaviors. Their review of the literature indicated that it has become increasingly popular for researchers to conclude that problem behaviors are characteristic of specific neurodevelopmental syndromes without reference to contextual factors such as family interactions. Crnic et al.'s model represents "endogenous factors" (the biopathology of the delay and the child's self-regulation skills) as well as "exogenous factors" (parent-child interactions and family stress).

Child Factors

Endogenous factors in Crnic et al.'s model refers to the biological nature of the child's delay such as chromosomal abnormalities or cerebral injury. Additional endogenous factors include the child's temperament and self-regulation, which may be categorized as "easy" (i.e., adaptable and happy) or "difficult" (i.e., fussy, socially withdrawn, or difficulties adapting to changes). Exposure to toxins, chronic maternal

stress, birth complications, and heredity may increase neuropsychological differences (McMahon, Wells, & Kotler, 2006). Behavioral difficulties are often magnified in children with neurodevelopmental disabilities whose behaviors may be secondary to underlying biological differences (Eyberg, 1988; Herschell, Calzada, Eyberg, & McNeil, 2002). Poor communication, delayed problem-solving, and low adaptive skills are additional risk factors for problem behaviors (Didden, Korzilius, van Oorsouw, & Sturmey, 2006).

Chadwick, Piroth, Walker, Bernard, and Taylor (2000) investigated differences among children with specific, biologically-based neurodevelopmental disorders and comorbid behavior problems. Parents and teachers of 139 children with developmental delays (M age = 7.11; range = 4.1-11.1 years) completed rating scales and interviews about the child's functioning. The sample included children with Down syndrome (13%), cerebral palsy (17.5%), autism (16%), and genetic disorders such as Cri du Chat syndrome, Fragile X syndrome, and Angelman syndrome (13%). Chadwick et al. found that children with lower daily living skills tended to show significantly more self-injury, sleep problems, destructiveness, and hyperactivity. Additionally, younger children showed more destructive behavior. Children with Down syndrome showed less severe problem behaviors and less irritability compared to other DD groups. Chadwick et al.'s findings suggest that certain child temperamental factors, possibly influenced by specific genetic conditions, younger age and underdeveloped adaptive skills may give rise to greater behavioral difficulties.

Environmental Factors

The exogenous (contextual) factors in Crnic et al.'s model include the parent-child interaction. Specifically, a child learns to regulate their emotions and behaviors through interaction with their parents. However, if parenting resources are limited, the parent may not be as responsive to a child with a difficult temperament who may need increased support in self-regulation. Moreover, a dyadic interaction between a child with a delay and difficult temperament, coupled with a parent with poor parenting skills, may produce a coercive interaction cycle or feelings of ineffectiveness in the parent.

Families of children with DDs tend to have more stress than other families, which can contribute to behavioral outcomes (Crnic, et al. 2004). Likewise, in a one-year comparison study of preschool children with and without cognitive delays, significant behavior problems impacted family involvement in social activities, were positively correlated with caregiver stress, and did not spontaneously resolve over a time without intervention (Baker, McIntyre, Blacher, Crnic, Edelbrock, & Low, 2003). Interestingly, the child's cognitive delays were not significant predictors of family stress in a hierarchical regression using the parents' behavioral ratings on the CBCL, perceptions of family stress on the Family Impact Questionnaire (FIQ; Donenberg, & Baker, 1993) and mental development scores on the Bayley Scales of Infant Development, Second Edition (Bayley-II). Overall, Baker et al.'s findings suggest targeting problem behaviors may be particularly important for improved family functioning and enhancing behavioral outcomes. Furthermore, because parents rated family social engagement was affected by the child's problematic behaviors, it is important that clinicians facilitate generality of treatment outcomes across situations and settings (Stokes and Baer, 1977).

Lecavalier, Leone, and Wiltz (2006) also examined the relationship between behavioral severity and caregiver stress over time among parents and teachers of 293 children ages 3-18 with ASD. Lecavalier et al. found that co-occurring conduct problems such as aggression, defiance, and oppositional behaviors were a significant predictor of caregiver stress on the Parenting Stress Index- Short Form (PSI-SF) and also exacerbated parental stress over a one-year period. Teachers experienced similar caregiver stress associated with behaviors problems. Deficits in child adaptive skills measured by the Scales of Independent Behavior-Revised (SIB-R) were not associated with parental stress ($r = .16$), providing additional evidence that challenging behaviors were the main source of stress. Additionally, behavior difficulties remained problematic over a year's time demonstrating the chronicity of disruptive behaviors.

Stress unrelated to the child's delays or disruptive behaviors is an important dimension to consider when intervening with families because extraneous stress can intensify maladaptive parent-child interactions. In a randomized controlled trial (RCT), Kazdin and Whitley (2003) examined the effects of a stress management program, Parent Problem-Solving (PPS), when it was added to a multi-component cognitive-behavioral program for parents and children without DDs. PPS was designed to help caregivers develop coping strategies for family stressors (work, financial, and medical stressors as well as balancing extended family, the relationship with their partner, and agency involvement) that were not directly associated with the child. One part of the multi-component, cognitive-behavioral program was Parent Management Training (PMT), an evidence-based treatment for non-compliant, aggressive and defiant behaviors (Kazdin, 2005). The second component, Problem-Solving Skills Training Program (PSST), is a

cognitive problem-solving program designed for children with behavior problems.

Kazdin and Whitley found that the multi-component treatment (PSST + PMT) significantly reduced the child's problem behaviors measured by the CBCL Behavioral Problems Score, parent stress on the PSI and parent depression symptoms on the Beck Depression Inventory (BDI). Likewise, improved family functioning and social support were reported. Notably, there was also a significant difference between families who received the additional stress-reduction component (PSST + PMT + PPS group) and those who did not (PSST + PMT group). In other words, the additional stress management component for parents improve the impact of the program. It is important to note that Kazdin and Whitley's approach may require modifications for children with DDs. Specifically, the problem-solving component may not be as effective for children with cognitive delays, particularly young children. However, the notion of assisting parents will extraneous stress is a point of consideration for parent-child treatments.

Overall, there is a paucity of research examining the effectiveness of multi-component treatment programs for children to address contributing factors in challenging behaviors. Multi-component programs for DD populations with disruptive behaviors are even more rare. Therefore, multi-component research is needed to focus on enhancement of protective factors that promote resilience (e.g., social and play skills in the children and positive parenting behaviors) and utilize various therapeutic agents (parents and siblings) to address problem behaviors (Petrenko, 2013).

Evidence-Based Practice in Treatment of Disruptive Behaviors

The empirically-supported treatments movement started with two physicians, Archie Cochrane and David Sackett (Claridge & Fabian, 2005). Cochrane was a Scottish physician who pushed for dissemination of evidence-based health practices in his 1972 publication, *Effectiveness and efficiency: Random reflections on health services*, which touted RCTs as the “gold-standard” for empirical support of health practices. Cochrane Centres, formed in England in the 1970s, were established in his honor to review empirically-supported medical practices. Sackett, a Canadian physician, is credited with defining the term “evidence-based medicine.” Currently, pharmacological, psychosocial, and behavioral treatments represent a range of evidence-based approaches utilized for individuals with DDs and challenging behaviors. (Heyvaert, Maes, Van den Noortgate, Kuppens, & Onghena, 2012).

Pharmacological Interventions

There has been concern about an increase of second-generation anti-psychotic medications to treat children with conduct problems (Olfson, Blanco, Liu, Moreno, & Laje, 2006). Olfson et al. (2006) analyzed data of child outpatient visits from 1993 to 2000 from the National Ambulatory Medical Care Survey (NAMCS). This analysis showed that outpatient visits for children increased approximately 600% from 1993 to 2000. Children with DBDs accounted for 37% of mental health visits and were the most frequently seen in outpatient offices that resulted in a second-generation antipsychotic medication treatment. Children with DDs such as ID and ASD accounted for 18% of mental health office visits resulting in a prescription for a second generation anti-

psychotic. Interestingly, second-generation anti-psychotic medications were not indicated in children under age 18 at that time.

In 2006 the Food and Drug Administration (FDA) approved the use of the second-generation anti-psychotic, risperidone, as treatment for irritability, aggression, self-injury and tantrums in children with ASD (FDA, 2006). Aman, Binder, and Turgay, (2004) found that risperidone was effective in reducing parent report of conduct problems, hyperactivity, and irritability in children with below average intelligence (IQs between 36 and 84). Ten percent of the children treated with risperidone had side effects such as drowsiness, indigestion, headache, and irritation of the nasal membranes.

The efficacy of second-generation anti-psychotics for children with delayed cognitive functioning is an area of continued research (Aman, Smedt, Derivan, Lyons, & Findling, 2002; Aman, Binder, & Turgay, 2004). In a meta-analysis of interventions used to address problem behaviors in children with DDs, medication showed the lowest effectiveness compared to behavioral treatments such as differential reinforcement of other behavior (DRO), extinction, environmental changes, time out, overcorrection, and brief restraint/re-direction (Scotti, Evans, Meyer, & Walker, 1991). For aggression specifically, psychosocial and educational interventions are recommended before introducing anti-psychotic medications to children (Substance Abuse and Mental Health Services Administration, 2011).

Psychosocial and Behavioral Interventions

Psychologists are tasked with practicing from an evidence-based perspective that consists of utilizing empirically-supported principles in assessment and treatment. The

American Psychological Association (APA) defines evidence based practice in professional psychology as, " ...the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences." (APA, 2005; p. 5). Evidence-based practice in psychology grew out of the evidence-based medicine movement (APA, 2005). In 1993, the APA developed the Division 12 Clinical Psychology Task Force on the Promotion and Dissemination of Psychological Procedures, chaired by Dianne Chambless. In 1995 a list of empirically-validated psychological treatments was published to inform the public, funding sources, and clinical psychologists. In 1998 The Task Force for Effective Psychosocial Interventions: A Lifespan Perspective reported on individual childhood treatments (Chambless et al., 1998). Since the 1995 list of empirically-validated treatments, other disorder-specific lists for empirically-supported child treatments have emerged (see Honer, Carr, Halle, McGee, Odom & Wolery, 2005; Nathan and Gorman, 2002; and Rogers and Vismara, 2008). Eyberg, Nelson, and Boggs (2008) identified 17 empirically-supported interventions for youth with DBDs based on the literature from 1996 to 2007.

In 2011 the Substance Abuse and Mental Health Services Administration (SAMHSA) of the U.S. Department of Health and Human Services released a document outlining evidence-based psychosocial treatments for children with DBDs. SAMHSA (2011) utilized the Hawaii's Department of Health, Child, and Adolescent Mental Health system of rating evidence-based treatments. Hawaii adopted the Chambless et al. (1998) criteria and produced additional categories of support described as "best support," "good support," "moderate support," "minimal support," and "known risks." The SAMHSA report outlines 18 evidence-based interventions with "good" empirical support for

children with DBDs. SAMHSA interventions are divided into “prevention” programs (universal programs for school/community implementation) and “interventions” designed for psychological treatment.

SAMHSA also produced a six-step evidence-based practice decision-making flow chart for behavioral health practitioners. Based on Hawaii’s modified Chambless et al. (1998) criteria, the first step it is to identify an evidence-based intervention with the “best” or “good” support. Interventions are determined to have the “best” support if they have at least two group design studies or 10 single-case research studies by different research teams that show the intervention is better than placebo or an alternative treatment. Interventions proposed to have “good” support have at least two group design studies by the same researcher, at least two studies showing that the treatment was better than no treatment, or at least four single-case research studies with supporting evidence. Behavioral health practitioners are then encouraged to consider whether the intervention meets five idiographic criteria: (1) whether the population in the studies included a population similar to the clinician’s client (2) whether the treatment produced clinically meaningful results, (3) whether the treatment consistent with the clinician’s organizational system, (4) whether the treatment practical for the staff within the clinician’s system, and (5) whether the treatment practical for the client. A list of evidence-based psychosocial treatments for the prevention and treatment of young children with disruptive behaviors is available in Appendix A.

Several empirically-supported family-based treatments exist for young children with a primary concern of disruptive, defiant, and oppositional behaviors (Eyberg, et al. 2008; SAMHSA, 2011). This is likely due to research that psychological disorders of

early childhood are influenced by several interacting factors such as heredity, environmental, and contextual factors (Merikanagas, Nakamura, & Kessler, 2009). Specifically, family treatments can address the transactional process among parenting practices, family stressors, and parent mental health (Mash & Barkley, 2006). Kazdin and Whitley (2003) assert that treatment of behavioral difficulties is best conceptualized as a family problem. Family-based behavioral interventions fall under the umbrella of “parent training.” Parent training is typically based on operant and social learning theories and applies to treatment of children age 2-12 years old (Barkley, 2013; Kazdin, 2005). Parent training based on operant and social-learning theories is one of the most researched treatments of childhood problems such as aggression, tantrums, and non-compliance (Kaat & Lecavalier, 2013; Kazdin, 2005; McMahon, Wells, & Kotler, 2006).

Treatment of Disruptive Behaviors and Co-occurring Developmental Delays

Behavioral and cognitive-behavioral treatments have the most empirical support in the treatment of childhood behavior problems in children with mild cognitive delays (Didden, Korzilius, van Oorsouw, & Sturmey, 2006). In the 1960s operant behavior treatments were extensively researched in the treatment of individuals with DDs (Scotti, Evans, Meyer, & Walker, 1991). Currently applied behavior analysis (ABA) is one of the most researched, empirically-supported approaches for children with DDs to facilitate skill development as well as diminish behavioral excesses such as non-compliance, aggression and property destruction (Handen & Gilchrist, 2006; Kazdin, 2005; Scotti, Evans, Meyer, & Walker, 1991). The seven dimensions of ABA outlined in Baer, Wolf and Risley (1968) are frequently addressed in treatment of challenging behavior in children with and without DDs (Kazdin, 2005). Baer et al.’s seven dimensions of ABA

include: 1) use of applied applications (interventions deal with socially important issues rather than basic research only); 2) use of behavioral applications (procedures address measurable behaviors); 3) technological programming (procedures are adequately described); 4) use of analytic procedures (specific techniques are shown to cause the change in behavior); 5) conceptually systematic applications (procedures are based on operant principles); 6) effective procedures (programs result in meaningful, socially important changes) and 7) promotion of generality (procedures are designed to spread across environments, people, and time).

Operant behavior procedures have been helpful in addressing behavior problems in children who demonstrate difficulties with expressive and receptive language, low frustration tolerance, or general learning difficulties. Skill-building through practice, direct instruction, and antecedent interventions are examples of general behavioral approaches that have been effective (Deidrick, Grissom, & Farmer, 2009). For example, differential social attention (attention and verbal praise for appropriate behaviors while extinguishing inappropriate behaviors by providing decreased attention) and prompting have been particularly successful for children with neuropsychological differences and challenging behaviors such as yelling, non-compliance, physical aggression (Warschausky, Newman, & Kay, 1999). Differential social attention and prompting have also been used to address inattention, elopement, and verbal refusals (Slifer, et al., 1996).

Research in Eliminating Disruptive Behavior

Single-case research designs are most prominent in the behavior analysis literature and provide details of individual participants, similar to a case study, while

utilizing an experimental approach to demonstrate the relationship between independent and dependent variables (Kratochwill, et al., 2010). As a result, single-case designs rely on visual graphic analysis as opposed to quantitative tests to determine treatment effect. Two meta-analytic studies of single-case designs show operant behavior procedures are effective in eliminating disruptive behaviors in children with mild cognitive delays (Scotti, Evans, Meyer, & Walker, 1991; Didden, Korzilius, van Oorsouw, & Sturney, 2006). Effect sizes in single-case meta-analytic studies are communicated using calculations from graphs known as percentage of non-overlapping data (PND) and percentage of zero data (PZD) (Scotti et al., 1991; Campbell, 2004; Didden et al., 2006).

Didden et. al. 2006 describe PND as "...the proportion of data points in one phase that overlap with data points in a comparison phase" (p. 292). PND scores $\geq 90\%$ are considered highly effective interventions; PND scores of 50% to 70% reflect questionable effects while PNDs $< 50\%$ are considered ineffective or unreliable (Scotti et al., 1991). The PZD determines the degree to which the treatment is able to eliminate excess behaviors after the initial data point reaching zero. As a result, PZDs can range from 0% to 100%. Scotti et al. (1991), described the PZD this way, "...in an intervention phase containing 10 data points, if the 3rd, 5th, and 7th points fell at zero, the PZD would be calculated at $3/8 = 37\%$ " (p. 238).

PZD is regarded as a more conservative measure of treatment effectiveness for suppressing problem behavior whereas PND is a more liberal measure (see review in Campbell, 2004). Two weaknesses of the PZD and PND calculations are that they are affected by outliers and data path trends (Campbell, 2004). Likewise, the PND and PZD calculations are only helpful when looking to eliminate problem behavior (e.g.,

eradicating self-injury) rather than decreasing behavior (e.g. anxiety as measured by heart rate).

Campbell's (2004) meta-analysis of studies examining the elimination of problem behavior in persons with autism found that PND and PZD calculations were correlated with Mean Baseline Level Reduction (MBLR), another measure of effect size in single-case meta-analyses ($r = .77$; $p < .01$; $r = .46$; $p < .01$, respectively). In contrast, a regression-based effect size, d , failed to detect moderating variables. As a result, Campbell (2004) surmised that a regression-based effect size calculation does not show advantage over simple PND and PZD calculations for single-case studies with less than five baseline points.

Scotti and colleagues (1991) reviewed single-case studies from 1976 and 1987 that addressed behavior problems in individuals with DDs across the lifespan. Individuals in the study were mostly school-age and older (67% of participants were 6-21 years old; 9% were < 5 years old; and 24% were adults). Scotti and colleagues divided intervention procedures into three levels depending on treatment intrusiveness: 1) Level I: environmental changes, reinforcement procedures, token economies, teaching/modeling and redirection; 2) Level II: extinction, interruption using brief manual restraint, simple restitution (e.g. correcting response/apologizing), social disapproval, time out from positive reinforcement, token economy with response cost, overcorrection and exercise; 3) Level III = visual/facial screening, response cost with temporary delay of meal, time out in containment room, mechanical/physical restraint, and introduction of noxious stimuli such as water mist or slapping/pinching. Likewise, Scotti and colleagues divided behavioral severity into three levels: 1) "normal deviance"

of excessive behaviors, 2) “serious behaviors” that impede skill acquisition, and 3) behaviors that are dangerous to self or others. Highly effective procedures (i.e., PNDs \geq 90%) included environmental changes for physically aggressive/tantrum behaviors; brief restraint/re-direction for self-injurious behavior (SIB) and stereotypic behaviors; contingent aversive stimulation for destructive/disruptive behavior; restitution/positive practice for physically aggressive/tantrum behavior; and physical/mechanical restraint, social disapproval and visual screening for SIB. Many of the procedures included DRO, which when combined with other interventions, produced significant decreases in problem behavior ($p = .004$). Interestingly, prosocial behavior was largely untargeted or was often poorly monitored in the reviewed studies. However, 83% of the studies reported improvement in collateral behaviors such as social skills, self-help, and leisure/play after elimination of disruptive behaviors. All intrusive levels were used across behavior severity levels indicating that treatments were administered based on specific client characteristics rather than sole reliance on level of behavioral severity. Generalization programming (i.e., generalization across settings and people) was most often completed in Level III interventions, the most intrusive treatments ($p < .001$). Also, setting made a difference in effectiveness. Interventions that took place where problematic occurred, were shown to be significantly more effective ($p < .03$).

Didden et al. (2006) conducted a meta-analysis of 80 single-case studies from 1980 to 2005. Studies were included if they had adequate baseline data (more than one data point) and if behavioral or cognitive-behavioral treatments were used to reduce problem behavior in individuals 2 to 42 years old with IQs between 55 and 75. Seventy-four percent of participants in the meta-analysis were male and the mean age was 14.5

years. Behavioral psychologists with backgrounds in the treatment of behavior problems in children with DDs independently categorized behaviors into three categories: 1) socially disruptive behavior (e.g., leaving designated area, stealing, and non-compliance), 2) externally maladaptive behaviors (e.g., verbal or physical aggression and destructive behavior), and 3) internalizing maladaptive behaviors (e.g., sleep difficulties, extreme smoking behavior, self-injurious behaviors, refusal of food, stereotypic behavior, and “depressive behavior”). Physical aggression and disruptive behavior were the most frequently identified behaviors targeted for reduction ($n = 32$ and 31 , respectively). In general, Didden et al. found that studies had higher effect sizes, as measured by PZD calculations, when interventions were based on pre-treatment functional analysis, when reliable recording procedures were used (i.e., interobserver agreement was formally assessed), when generalization was actively programmed, and when direct observations of behavior occurred. Differential reinforcement of alternate, incompatible or other behavior ($n = 25$), differential reinforcement combined with other procedures ($n = 35$), and antecedent control ($n = 13$) were the most frequently used behavioral procedures. Functional communication training (FCT), positive practice, and antecedent control strategies were associated with higher mean effect sizes. Studies that used pretreatment experimental functional analysis ($n = 31$) compared to descriptive analysis (rating scales and narrative recording) were associated with increased intervention effectiveness ($p < .01$). Multiple baseline designs were also associated with improved treatment effectiveness ($p < .001$).

Walker (1993) reviewed the literature for behavioral interventions for persons with cognitive delays and co-morbid non-compliance. Walker found behavioral studies

indicated individuals with DDs were more likely to comply when directives were direct rather than vague (see Breiner and Forehand, 1982), when parents reduced commands and questions while simultaneously increasing play interactions (see Mash & Terdal, 1993), and when behavioral momentum was utilized (i.e., high probability requests before low-probability requests) (see Singer, Singer, and Horner, 1987). Research in the use of timeout was inconsistent for children with DDs. For example, time out combined with paced instruction increased non-compliance in preschoolers with autism and cognitive delays but modifying instructional pace alone reduced non-compliance (see Plummer, Baer, & LeBlanc, 1977). Likewise, Walker noted other researchers found that time out had no effect for children with DDs (see Doleys, Wells, Hobbs, Roberts, & Cartelli, 1976). On the other hand, Walker cited a 2-min time out decreased non-compliance with parent requests in one child with cognitive delays (see Budd, Green, & Baer, 1976). Walker noted that effort-based interventions such as physical guidance were also inconsistent for children with DDs and non-compliance. Specifically, physical guidance reduced non-compliance in one child with cognitive delays after there was no response within 10 s of a command (see Aduabato, Adams, & Budd, 1981) and inconsistently reduced non-compliance in other children with DDs (see Foxx, 1977).

As referenced in Walker (1993), negative as well as positive reinforcement may maintain defiant behaviors in children with DDs. Specifically, non-compliance may be reinforced by temporary escape from the requested action (i.e., aggression allows individual to get out of doing the request and aggression increases as a result) or non-compliance might be positively reinforced (i.e., adult attention or touch is provided when

child is non-compliant and behavior increases as a result). Therefore, Walker recommended using consequences that are tailored to the function of behavior.

Conclusion

Differential reinforcement and antecedent interventions were the most frequently used behavioral procedures for eliminating disruptive behaviors in individuals with DDs. The most effective procedures identified through meta-analyses are environmental changes for physical aggression and tantrums, contingent aversive stimulation for destructive behavior, restitution/positive practice for physically aggressive/tantrum behavior, and social disapproval for inappropriate social behavior. Many of the above-mentioned effective procedures included DRO. Time out and physical guidance for non-compliance has shown inconsistent effectiveness in individual single-case studies. Additionally, pre-treatment functional assessment, reliable recording procedures, programmed generalization, and direct observations of behavior improve the effectiveness of interventions.

Meta-analytic studies are helpful in demonstrating that separate operant behavioral procedures such as differential reinforcement, extinction, and brief restraint are highly effective in decreasing problem behaviors in children with DDs and comorbid behavior problems. Individual, empirically-supported operant procedures have been combined with other procedures to form treatment packages such PMT + PSST (Kazdin & Whitley, 2003), Helping the Non-Compliant Child (Forehand & McMahon, 1983), Parent Management Training-Oregon Model (PMTO; Patterson, Reid, Jones, & Conger, 1975), the Conduct module in the Modular Approach to Therapy of Children with

Anxiety, Depression, Trauma and Conduct problems (MATCH-ADTC; Chorpita & Weisz, 2009) and Parent-Child Interaction Therapy (PCIT; Eyberg, 1988; Eyberg & Funderburk, 2011). Overall, there seems to be empirical support for the use of individual operant procedures to inform adaptations to manualized treatments for children without delays when treating children with comorbid DDs and disruptive behaviors.

Parent-Child Interaction Therapy (PCIT)

In the 1970s Sheila Eyberg developed PCIT as a behavioral family approach for the treatment of disruptive behaviors in young children. PCIT is designed to treat behavior problems in children ages 2-7 and is one of the most researched, empirically-supported parent training programs for children. PCIT is a two-phase therapy that focuses on parent-child relationship enhancement in the first phase (child-directed interaction) integrates predictable, consistent discipline (parent-directed interaction) in the second phase. The integration of cognitive, behavioral, and play therapies was seen as early as the 1960s for treatment of childhood anxiety (Goldfried, 1998). In a commentary on integrative psychotherapies for children, Marvin Goldfried, co-founder of the Society of Psychotherapy Integration (SEPI), reviewed PCIT as an example of a treatment that merges non-directive and directive approaches into a single program (Goldfried, 1998). Goldfried (1998) described the two-phase treatment of PCIT as “seemingly incompatible approaches...used in a complementary way” (p. 52).

Theoretical Underpinnings

Sheila Eyberg received her graduate training during the zeitgeist of combining psychological theories to treat childhood problems. Eyberg drew from her background in

parent training using operant procedures as well as her experience in traditional child psychotherapy and play therapy to develop PCIT (Eyberg, 1988). Attachment, social learning, and operant learning theories informed the PCIT treatment protocol (Herschell, Calzada, Eyberg, & McNeil, 2002). Operant principles teach parents to differentially reinforce desirable behaviors and extinguish undesirable behaviors. Attachment theory principles in PCIT focus on helping the parent facilitate a warm, supportive relationship as a basis for future social skills development and emotion regulation. From a social learning perspective, PCIT addresses behavioral problems by having the parent model calm, respectful behaviors during parent-child interactions (Herschell, Calzada, Eyberg, & McNeil, 2002). PCIT draws from Diana Baumrind's (1966) work on parenting styles and outlines practices consistent with authoritative child-rearing - appropriate adult control balanced with nurturance and appropriate limit-setting (McNeil & Hembree-Kigin, 2010).

Two stage model. In the mid-1960s Constance Hanf developed a two-stage operant treatment model at the University of Oregon during her work with parents of children with behavior problems (Reitman & McMahon, 2013). The two-stage Hanf-model was a major influence on the treatment development of PCIT (Reitman & McMahon, 2013). During the first stage of the Hanf-model (Child's Game), parents were taught to allow the child to lead during the play interaction. During these interactions they were instructed to use differential attention by attending to positive behaviors using descriptive statements, verbal and physical praise while ignoring inappropriate behavior. During the second stage (Mother's Game) the mother was taught to lead the play, give specific task directions then praise the child for compliance or use a time out for non-

compliance. Hanf coached the parents during these interactions providing immediate feedback on the use of the procedures (Eyberg, 1988; Reitman & McMahon, 2013).

Child-centered play therapy. During Eyberg's work at the University of Oregon, she taught parents traditional play therapy skills in addition to the operant strategies observed in the Hanf-model (Eyberg, 1988). The idea of teaching parents play therapy skills in the treatment of children was popularized by child-centered play therapist Bernard Guerney who developed filial therapy in the 1960's (Landreth & Bratton, 2006). PCIT is most like filial therapy in that it uses the parent as a therapeutic agent.

Filial therapy. Filial therapy is based on the client-centered teachings of Carl Rogers and was developed to teach parents play therapy techniques to address difficulties observed in their children (Guerney, 1964). In filial therapy, parents learned concepts consistent with the Rogerian tradition of unconditional positive regard. Parents learn reflective listening, sensitivity to and appropriate responding to the child's feelings, ways to build their child's self-esteem, and setting therapeutic limits in play (Landreth & Bratton, 2006). Parents learn filial therapy concepts and techniques in didactic groups with other parents via role play, video observations, and supervision by a trained therapist. PCIT shares features with filial therapy such as a focus on enhancing the parent-child relationship through the modality of play and teaching parents skills to respond to inappropriate behavior through consistent limit setting.

Although PCIT uses concepts from child-centered play therapy, there are some major differences between PCIT and child-centered therapy. In PCIT, parents are taught

to use praise, which is not promoted in child-centered or filial therapy. The second phase of PCIT, parent-directed interaction, has the most contrast to play /filial therapy. PCIT teaches parents to set limits via time-out from positive reinforcement, which is not used in play therapy.

Operant procedures. B.F. Skinner 's operant theory has made an extensive impression on the development of parent management training programs, including PCIT (Kazdin, 2005). Direct observation of behavior and continuous assessment frequently used in parent training are cornerstones of operant research and treatment programs (Baer, Wolf, & Risley, 1968; Cooper, Heron, & Heward, 2007). PCIT also relies on direct observation via operational definitions outlined in the Dyadic Parent-Child Interaction System (DPICS) to assess changes in parent and child behaviors. Direct observation of behaviors is synonymous with the conceptually systematic and behavioral dimensions of ABA. Likewise, pre- and post-assessment parent report of stress and child behavior problems are used to assess changes in behaviors meaningful to parents and society, which is consistent with the applied dimension of ABA (Eyberg, 1988; Masse, McNeil, Wagner, & Chorney, 2007; Reitman & McMahon, 2013). Likewise, the crux of parenting skills taught and reinforced in PCIT are based on operant principles of socially-mediated reinforcement (Cipani & Schock, 2011; Masse, McNeil, Wagner, & Chorney, 2007).

Treatment Protocol

PCIT unfolds as a two-phase treatment that is dependent upon the parent's mastery of core skills. In the first phase, child-directed interaction (CDI), clinicians teach

parents to use specific “Do” skills to enhance the parent-child relationship (Eyberg & Funderburk, 2011). The CDI phase was designed to make the parent and play interactions more reinforcing for the child. The acronym for CDI “Do” skills is P.R.I.D.E: praise appropriate behaviors, reflect appropriate verbal content, imitate appropriate play, describe the child’s appropriate play actions, and show enjoyment during play. In addition to teaching parents the “Do” skills, parents are taught “Don’t skills” that include: no criticism, questions, or commands (Eyberg & Funderburk, 2011). Also during the CDI phase, parents are taught to use selective attention to extinguish certain behaviors by ignoring non-aggressive/non-destructive behaviors and enthusiastically attending to appropriate behaviors. To help parents master the CDI skills, parents are coached in real-time while they are playing with their child. The coach verbally praises and comments on positive parenting skills during coaching by differentially attending to the correct use of skills while paying less attention to incorrect use of CDI skills (McNeil and Hembree-Kigin, 2010). The coach’s comments and style are modeled after the CDI skills the parent is utilizing with the child - quick, enthusiastic praise for more adaptive parent behavior.

The second phase of PCIT is parent-directed interaction (PDI). In the PDI phase parents are taught to use effective instructions - direct, positively-stated, developmentally-appropriate single commands. In operant research, direct instructions have been consistently shown to decrease non-compliance (Walker, 1993). In PCIT children are given ample opportunity to comply with the command based on an empirically-derived compliance latency of 5 s (Wruble, Sheeber, Sorenson, Boggs, Eyberg, 1991). Additionally, parents are taught to give the child a warning (verbal

prompt) if they do not comply with the initial command. If the child does not comply after a prompt and an additional 5 s latency, a time out from positive reinforcement procedure is used. If the child gets off the time out chair after a warning, a separate time-out room is used. A back up time-out room has been shown as an effective consequence for non-compliance in typically-developing children (Roberts and Powers, 1990; Walker, 1993). If no time out room is available, the parent is taught to use “Swoop and Go” where the parent removes all toys from the room and the clinic room becomes the time out room. From an operant perspective, stimulus control is achieved with commands after parents consistently use predictable antecedents and consequences over the course of treatment. At home parents are encouraged to consider a safe back-up time out room because Swoop and Go is likely ineffective in the home setting.

Parents are also asked to practice using PCIT skills at home during specific times at home and throughout out the day after they have mastered PDI (Eyberg & Funderburk, 2011). Homework is documented on designated homework sheets where parents can also write down any questions or comments to discuss with the therapist. Practice outside the clinic setting can promote generalization of skills across settings (Stokes & Baer, 1977; Stokes & Osnes, 1989).

Efficacy of PCIT

The efficacy of PCIT has been established in studies of 2-to 7-year old children with disruptive behaviors in well-controlled conditions. In RCTs, PCIT has been shown to significantly reduce externalizing behavior problems in young children while increasing positive parenting behaviors (Eisenstadt, Eyberg, McNeil, Newcomb, &

Funderburk, 1993; Eyberg, Nelson, & Boggs, 2008; Schuhmann, Foote, Eyberg, Boggs, Algina, 1998). After participating in PCIT, parents also reported a decrease in stress and an increase in confidence as the child's problematic behaviors decrease (Schuhmann, et al., 1998).

Herschell, Calzada, Eyberg, and McNeil (2002) asserted that although PCIT is efficacious for children with disruptive behaviors, the principles and techniques can be applied to the treatment of children with dual diagnoses. Since then, the efficacy of PCIT has been shown in young children with co-occurring disruptive behaviors and a history of abuse (Chaffin, et al., 2004), cancer (Bagner, Fernandez, & Eyberg, 2004), intellectual delays (Bagner & Eyberg, 2007), anxiety disorders (Chase & Eyberg, 2008; Pincus, Santucci, Ehrenreich, & Eyberg, 2008), high-functioning ASD in boys age 5-12 (Solomon, Ono, Timmer, & Goodlin-Jones, 2008), and children with a history of preterm birth (Rodríguez, Bagner, & Graziano, 2014).

Maintenance and Durability. Maintenance of PCIT treatment effects and durability of positive parent behaviors have been observed in short-term and long-term follow-up studies. Significant durability of treatment effects has been shown in 4-month follow-ups for decreased problem behavior in children and continued parent CDI skills (Bagner, Sheinkopf, Vohr, & Lester, 2010; Schuhmann, Foote, Eyberg, Boggs, & Algina, 1998), and two-years post-treatment follow-up (Eyberg, et al., 2011). Maintenance of treatment effects have also been shown for an abbreviated PCIT treatment (Nixon, Sweeney, & Erickson, 2004).

Short-term maintenance of PCIT treatment effects have been shown in children at-risk for developmental delay. In a four-month follow-up, Bagner, et al. (2010) found large post-treatment effects with preschool children born prematurely. All children in the treatment group ($n = 11$) showed significant decreases in externalizing scores using a Reliable Change Index. Compared to baseline, parent ratings on the CBCL showed significantly lowered aggressive behaviors ($p = .000$; $d = 1.1$), externalizing problems ($p = .000$; $d = 2.3$), and internalizing problems ($p = .000$ $d = 1.4$). Large effects were also noted in decreased problem behavior intensity scores on the Eyberg Child Behavior Inventory (ECBI) compared to baseline ($p = .000$; $d = 2.3$). Furthermore, direct observations using the DPICS, revealed significant increases in child compliance during the clean-up situation ($p = .039$, $d = .9$) and increased parent CDI “Do” skills ($p = .003$; $d = 1.3$) compared to baseline. A large effect size was indicated for lowered scores on the parental distress scale of the PSI – Short Form compared to baseline, but it was not clinically significant ($p = .078$; $d = .8$).

Generalization. PCIT treatment effects have been shown to generalize to the school setting and potentially to siblings who were not involved in treatment. Without direct intervention in the school setting, PCIT treatment effects were shown to generalize to the classroom shortly after the completion of treatment based on teacher report and direct observation of the children’s behavior (McNeil, Eyberg, Eisenstadt, Newcomb, & Funderburk, 1991). The durability of compliance to adult commands was shown in the classroom twelve-months post-treatment, but not at eighteen months post-treatment (Funderburk, et al., 1998). Parents who completed a trial of PCIT also rated less severe problem behaviors in non-treated siblings on the ECBI compared to a control group of

siblings in one study that included siblings who were more than 7 years old (Brestan, Eyberg, Boggs, & Algina, 1997).

PCIT for Children with Developmental Delays

To date there are no maintenance data examining PCIT's effectiveness in children with DDs or whether skills learned in the clinic setting generalize across settings.

However, conceptual papers have guided scholars and practitioners who use PCIT for children with co-occurring DDs (Masse, McNeil, Wagner, & Chorney, 2007;

McDiarmin & Bagner, 2004). McDiarmin and Bagner (2004) asserted that PCIT needs little modification for children with DDs based on their clinical observations. However, they recommend additional considerations when implementing PCIT with children with DDs. For example, the authors noted that children with DDs often present with language delay and therefore may not respond to verbal interactions such as praise. Practitioners may consider coaching parents to use nonverbal methods of approval such as positive touch coupled with verbalizations to show approval to children with language delays.

Additionally, to improve social skills in children with DDs, specific praise for adaptive skills, manners, and use of appropriate expressive language could be implemented.

Examples of specific, short, praise statements using concrete words include, "I like when you use your words," "Thank you for sharing," and "I love how you are sitting."

McDiarmin and Bagner (2004) also recommend the use of gestures with behavior descriptions in play to build the child's vocabulary. Specifically, parents may be coached to verbalize statements such as, "You have the blue block [pointing to the blue block]" and "You are rolling it [imitating the child rolling a toy]" during special play time. Once parents have entered the second phase of PCIT, the PDI phase, parents are coached to

provide clear commands consistent with the child's cognitive level. Gestures, such as pointing in addition to commands or the parent holding their hand out for an object they have requested will provide an additional prompt for compliance for children with cognitive or language delays.

Masse, McNeil, Wagner, and Chorney (2007) provided a conceptual overview of PCIT as a treatment for disruptive behavior often seen in high-functioning children with ASD. Masse et al. (2007) reviewed established treatments of ASD such as ABA, the UCLA Young Autism Project (Lovaas, 1987), pivotal response training (PRT; Koegel, Carter, & Koegel, 2003), positive behavior supports (PBS; Horner, et al. 1990), the Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH Method; see Ozonoff & Cathcart, 1998), and the Developmental, Individual-difference, Relationship-based model (DIR/Floortime; Greenspan & Wieder, 1999). Masse et al. attested that PCIT is comprised of techniques similar to those utilized in the aforementioned interventions. Masse et al. reported PCIT is similar to DIR/Floortime and TEACCH in that it focuses on building the quality of the parent-child interaction by using parents as therapeutic agents. Similarities between PRT and PCIT were noted in the use of environmental items such as toys to promote appropriate behaviors that can more easily generalize to other settings. Masse et al. also pointed out that PCIT utilizes conceptually-similar procedures from ABA: ongoing progress monitoring, antecedent and consequent procedures to teach parents to use effective commands, differentially rewarding compliance through labeled praise, and providing differential attention to extinguish inappropriate behaviors (turning away or ignoring certain behaviors while attending to adaptive behaviors). Additionally, Masse et al. indicated PCIT can help

children with DDs by coaching parents to use play as a means to increase appropriate language and play skills.

Case Studies

There is evidence that PCIT is effective for addressing behavior problems in children with developmental delays. Case studies have been published investigating the standard PCIT protocol for young boys with high-functioning ASD (Agazzi, Tan, & Tan, 2013; Armstrong & Kimonis, 2013) and an 11-year old boy with a severe traumatic brain injury (Cohen, Heaton, Ginn, & Eyberg, 2012).

Case studies have also described the use of PCIT protocols that have been modified. Lesack, Bearss, Celano, and Sharp (2014) utilized PCIT for a 5-year old boy with ASD and severe language delays (i.e., no clear single words, sign language or compensatory strategies). Diagnostic assessments of the child's language functions on the Preschool Language Scale, Fourth Edition (PLS-4) assessed the child's receptive language functions at approximately the 3-year old level and expressive language at the 10-month old level. Parents were taught and coached to reflect child verbalizations that approximated words (e.g. "ba" for "ball") and ignoring stereotyped or non-functional vocalizations. In the PDI phase, Lesack and colleagues used the child's name as an additional prompt before a command, used a three-step prompt procedure for commands (verbal, model, then physical prompt), coached parents to use a gesture with all verbal commands, used time out after the child failed to comply with three consecutive prompts. Time out was modified by reducing the PCIT protocol time from 3 min + 5 s of quiet to 1 min + 2 s of quiet. Time out was only used for non-compliance with safety-related

commands such as aggression and severe disruption. A holding chair was used as a backup time out procedure instead of a time out room. Lesack and colleagues reported a significant decrease in parent-reported behavior problems on the ECBI Intensity score from the clinical range at baseline to the typical range at the end of treatment. Likewise, positive parent behaviors were noteworthy in increased labeled praise, behavior descriptions, and reflections and decreased negative talk and commands.

Armstrong, DeLoatche, Preece, and Agazzi (2015) added visual supports to the PCIT protocol for a 5-year-old girl diagnosed with comorbid ASD, ID, and epilepsy. To address one presenting problem, screaming at bedtime, the authors noted they created a visual schedule of the child's bedtime routine and encouraged parents to use labeled praise when the child followed the routine. Additionally, a social story was developed to teach the child the discipline sequence in PDI before it was implemented and during the PDI phase. Pictures of the child "making good choices" within the story was created to prime compliance with parent commands. After treatment, significant decreases were noted in parent-reported behavior problems on the ECBI (baseline Intensity $T = 69$; post-treatment Intensity $T = 47$). Teacher reported decreases in problem behavior were also noted on the Sutter Eyberg Student Behavior Inventory (SESBI) (baseline Intensity $T = 75$; post-treatment $T = 63$). The authors noted changes in the child's functional play skills and increased shared attention during parent-child play; however, direct measures of these prosocial skills were not tracked. Due to changes in the child's insurance, the authors noted difficulties in consistent contact with parents to facilitate durability of skills. Therefore, in a five-month follow-up, parent-reported problem behaviors returned

to an elevated, but sub-clinical level on the ECBI (Intensity $T = 63$) while teacher reported problem behaviors fell at the clinical cut-off (SESBI Intensity $T = 65$).

Case studies provide rich data to inform future treatment development and often mirrors what clinicians see in treatment settings. However, it is difficult to draw conclusions from case studies because there are no experimental conditions that show a direct relationship between treatment and behavioral outcomes. Currently there are very few published experimental studies investigating PCIT in young children with developmental delays.

Experimental Studies

To the author's knowledge, Bagner and Eyberg (2007) is the only experimental study that has evaluated the standard PCIT protocol with a sample of 3-6 year olds with intellectual disability (ID). In a randomized control trial, Bagner and Eyberg included child participants who demonstrated IQs ≤ 75 ($M = 57.53$; $SD = 11.01$) on the Wechsler Preschool and Primary Scale of Intelligence, Third Edition (WPPSI-III), adaptive skills at least two standard deviations below the mean on two domains of the Adaptive Behavior Scale-School, Second Edition (ABS-S: 2), and had a comorbid diagnosis of ODD as defined by meeting criteria on the Diagnostic Interview Schedule for Children Version-IV Parent Version (DISC-IV-P) and aggression behavior subscale (T score ≥ 64) of the CBCL. Children with characteristics of autism, defined by a raw score ≥ 30 on the Childhood Autism Rating Scale (CARS), were excluded. Additionally, parents with standard scores < 75 on the Wonderlic Personnel Test (WPT), an adult screening measure of cognitive abilities, were excluded. Ten families in the immediate treatment group

completed the study and there were 12 families in the waitlist control group. Bagner and Eyberg found that mothers in the treatment group reported decreased stress, were more positive towards their child and reported increased child compliance following treatment. Specifically, treatment group mothers showed significant increases in relationship-enhancement behaviors (i.e., labeled praise, reflective statements, and behavior descriptions) that produced a large effect size ($d = 2.06$) and significant decreases in CDI “Don’t” skills (i.e., negative talk, commands, and questions) that also produced a large effect size ($d = 1.32$). Additionally, there was a large effect size for increase in child compliance percentage ($d = 1.53$). Likewise, large effects sizes were obtained for outcome measures with decreases in CBCL Externalizing scores ($d = 1.08$), Total scores ($d = .97$), and ECBI Intensity scores ($d = 1.50$). Moderate effect sizes were observed with a decrease in ECBI Problem behavior ($d = .66$), Parent-Child Dysfunctional Interaction, and Difficult Child subscales from the Parenting Stress Index ($d = .59$ and $.52$, respectively). Parents also noted a high level of satisfaction as reported on the Therapy Attitude Inventory (TAI; Eyberg, 1993).

Another published experimental study evaluated the effectiveness of PCIT in a sample of 6 to 10-year-old boys (M age = 8.2) with without intellectual delays (Solomon, Ono, Timmer, & Goodlin-Jones, 2008). Solomon and colleagues found that PCIT significantly increased observed positive parent affect from baseline to post treatment ($p = .01$), decreased parent reported Problem scores on the ECBI ($p = .035$), increased parent reported adaptability scores ($p = .007$) on the Behavior Assessment System for Children, Second Edition (BASC-2) and decreased hyperactivity scores on the BASC-2 ($p = .012$) compared to a waitlist control group. Unfortunately, there were no significant changes in

child positive affect, no significant decrease in ECBI Intensity scores and no significant decrease in parent stress observed. A strength of this study was the inclusion of direct observation of variables (i.e., parent positive affect and child positive affect) relevant to social communication delays typically seen in children with autism.

PURPOSE OF THE CURRENT STUDY

The current study is relevant for informing treatment of young children with DDs characterized by cognitive, communication, or social skills impairments with co-occurring disruptive behaviors. The current study utilized PCIT, an empirically-supported parent training program, to address oppositional behaviors. Technologies from ABA informed modifications to PCIT to address the specific challenges of a child with GDD, physical aggression, non-compliance, and underdeveloped play skills. In addition to decreasing disruptive behaviors, there was a focus on prosocial skill development to increase adaptive functioning. Indirect measures (parent report on norm-referenced rating scales) and direct measures of parent-child and sibling-child interactions were used. Direct measurement of behavior increased validity and understanding of parent-child and sibling-child interactions that impacted the referred child's behaviors. Attention to coaching the parent across settings and facilitating play among family members was embedded within the study to promote generalization.

Expected Outcomes

Parent behaviors

1. There will be an increase in the mean level of positive, verbal parent behaviors as measured by CDI "Do" skills (labeled praise, unlabeled praise, reflections, and behavior descriptions) during the CDI phase.
2. There will be a decrease in the mean level of CDI "Don't" skills (negative talk, questions, and commands) during the CDI phase.

3. The parent will use more effective commands as measured by a mean increase in direct commands (versus indirect commands) during the PDI phase.
4. The parent will generalize skills to the home setting.

Sibling behaviors

1. The sibling will demonstrate an increase in the use of select CDI skills after coaching.

Collateral behaviors

1. The child will show an increase in initiation of joint attention behaviors, after CDI is introduced, and initiation of joint attention will generalize to sibling-child interactions.
2. There will be an increase in the mean level of cooperative play between the parent and child after CDI is introduced and cooperative play will generalize to sibling-child interactions.
3. There will be a decrease in negative physical interactions between parent-child interactions as a result of parent CDI skills.
4. There will be a decrease in negative physical interactions between sibling-child interactions as a result of sibling CDI skills.

METHODOLOGY

The study methods and procedures were approved through the James Madison University Institutional Review Board (IRB) under protocol number 12-0188.

Participants

Child. The referred child was a 3.8-year-old European-American male. The child's reported birth history was unremarkable and he was born full-term. He was described as a happy infant. There were no delays reported in crawling, walking, eye contact, cooing, or babbling. Expressive language was reportedly delayed. The child's mother described difficulties with sleeping and feeding as a toddler. Around age 1.5 years old the mother reported "anger issues" and a difficult temperament (fussiness and tactile sensitivity). He was identified as a child with developmental delay at age 1.6 years under Part C of the Individuals with Disabilities Education Act (IDEA, 2004). The child's mother reported the family and child inconsistently participated in early intervention services due to relocation. The Infant and Toddler Family Support Plan (IFSP) indicated developmental, speech, and occupational services related to increasing the child's attention to play activities, tolerating tactile sensory stimulation, and enhancing oral-motor feeding skills to reduce mouth stuffing. The child required pressure equalization tubes at age 2.5 years old. After his tubes were placed his mother reported a slight increase in verbalizations but spontaneous speech was infrequent.

At age 3.2 years, a multidisciplinary evaluation was completed at an outpatient child development center, six months before the study intake. The multidisciplinary team included a licensed school psychologist, nurse practitioner, and licensed social worker.

The referred child was diagnosed with global developmental delay according to the DSM-IV-TR and a medical history of unspecified hearing loss. Audiology records indicated hearing was within normal limits after placement of pressure equalizing tubes. The child showed significant delays in the following areas on the Bayley Scales of Infant Development, Third Edition (Bayley-III; Bayley, 2006): cognitive domain (standard score = 60; <1st percentile), communication domain (standard score = 61; < 1st percentile) as well as parent-reported adaptive behavior (standard score = 64; < 1st percentile) and social-emotional skills (standard score = 73; 3rd percentile). The child demonstrated a relative strength in motor skills (standard score = 87; 19th percentile). The Bayley-III is often used to assess the cognitive development of young children with DDs and co-morbid conduct problems (Kimonis, et al., 2014) and was determined to be a suitable measure to estimate the child's developmental level for participation in the current study. Parent ratings on the BASC-2 (Reynolds & Kamphaus, 2004) were "clinically significant" for hyperactivity, atypicality, and attention problems. Aggression, depression, social skills, activities of daily living, and functional communication fell in the "at-risk" range on the BASC-2. Intervention recommendations from the evaluation included parent training to address behavior problems and ABA to address skill deficits.

A school-based speech and language evaluation indicated the child's expressive and receptive language skills were two standard deviations below the mean on the Preschool Language Scales, Fifth Edition (PLS-5; Zimmerman, Steiner, Pond, 2011). Receptive and expressive language were within the 2-year-old range. At 3.7 years old the child qualified for special education services under Part B of IDEA as a child with developmental delay and speech/language impairment. His Individualized Education

Plan (IEP) included half-day preschool for the upcoming school year and language services.

The child was involved in a car accident with an adult family member two months before the study intake and sustained lacerations to the face but no serious injury. Due to expressive language delays the child's mother was uncertain about the child's experience of the accident. No other trauma history was reported.

The child lived with his mother, his mother's spouse, 8-month-old typically-developing half-brother, and the spouse's 5-year-old son in a rural community within 30 miles from the university-based clinic.

Parent. The biological mother of the referred child was a 23-year-old woman of European-American descent. The mother endorsed a childhood history of ADHD and behavior problems. No other maternal mental health diagnoses were reported. The mother endorsed some college education and previous employment as a health paraprofessional.

Sibling. The sibling was the 5-year-old European-American biological son of the mother's co-habitation spouse. The older sibling's biological father provided informed consent for the sibling's participation in the study. The older sibling was a general education kindergarten student with no reported history of behavioral, psychological, or learning problems.

Setting

The study was conducted at the Alvin V. Baird Attention and Learning Disabilities Center (Baird Center), a university-based assessment and intervention clinic from Fall 2014 to Summer 2015. Generalization probes were conducted in the child's home.

Play room. The clinic play room was a 3 m x 4 m play area with a one-way mirror for observation. The room included a child-size table and four child-size chairs. A love seat was placed against an adjacent wall. The playroom was equipped with a consumer-brand video camera mounted in the corner of the room just below the ceiling to capture family interactions. Play room video recordings were saved to a secure external hard drive and locked in a separate room according to approved IRB standards.

Observation room. The observation room consisted of a large table and five chairs for clinic research assistants. A table was placed against the one-way mirror that contained a computer monitor displaying the video recording, behavioral coding sheets, cleaning wipes for equipment, writing utensils, and electronic devices to keep track of observation intervals. A large closet containing therapy toys was also kept in the observation room. A small consumer-brand camera, mounted on a tripod, was used behind the one-way mirror to capture the coach's comments, audio recording of time intervals for data collection, and to obtain a wider visual range of the play room. Video recordings were downloaded to a secure external hard drive and locked in a separate room according to approved IRB standards.

Waiting room. The waiting room consisted of a large conference room table and six adult-size chairs. Blocks and other toys are available in the waiting room to facilitate entertainment of siblings as well as practice and role play with the parent to solidify intervention skills. Pre-session discussion of parent concerns and weekly behavior rating measures were completed in the waiting room prior to coaching. During intervention phases, child care was provided for the siblings in the waiting room with two research assistants. During sibling-child interactions for baseline and intervention phases, the parent remained in the waiting room.

Materials

Toys. PCIT recommended toys such as Lincoln Logs®, Tinker Toys®, Lego Duplo Bricks®, Mega Blocks®, paper, crayons, and other creative toy sets for young children without rules were used. Clinic play materials varied from session to session and at least three types of play materials were available (Eyberg & Funderburk, 2011; McNeil & Hembree-Kigin, 2010). Two types of play materials were placed on the table, while the remaining play materials were placed on the floor or on an additional chair at the child-sized table (Eyberg & Funderburk, 2011). In the home, the child was allowed to choose from the PCIT-approved toys the parent used for special play time homework sessions.

Apparatus. Live coaching was accomplished via a bug-in-the ear (BIE) device. The PCIT therapist wore a wireless Phonak Roger inspiro™ digital transmitter and the parent wearing a Phonak iSense Micro™ receiver that resembled a hearing aid.

Experimental Design

The current study utilized a non-concurrent multiple baseline across participants (parent and sibling) and settings (clinic and home). Probe assessments were conducted in the home and clinic to assess generalization (Stokes and Baer, 1977).

Multiple-baseline designs were introduced in the Baer, Wolf and Risley (1968) seminal paper outlining the seven dimensions of ABA. Multiple baseline designs are “single-case” or “small *N*” research designs that examine changes in data paths across baselines in two or more participants, behaviors, settings, or time periods (Kazdin, 2011). At least two baselines are required for the design, but three are recommended to add strength to the demonstration of experimental control (Kazdin, 2011). Changes in the data paths demonstrate a causal relationship between the independent variable and dependent variable. Multiple-baseline designs show experimental control through three basic elements: prediction, verification, and replication (Carr, 2005; Cooper, Heron, and Heward, 2007; Kazdin, 2011). Through the use of repeated observations, the researcher compares whether there is a change in the predicted data path from the baseline phase to the intervention phase. Next, for verification, the researcher determines whether a change occurs only in the “case” (subject, setting, or behavior) that was targeted and not in other “cases” awaiting the intervention. Lastly, for replication, the researcher shows that when the intervention is introduced in another case, a change in the data path happens again.

Multiple baselines across participants can be considered concurrent or non-concurrent (Watson & Workman, 1981). In a concurrent design, participants’ baselines

are examined around the same period of time. In a non-concurrent design participants' baselines are examined consecutively, but at different points in time such as different seasons or school years (Carr, 2005; Watson & Workman, 1981). Non-concurrent designs are often useful for practitioners, in applied research settings, and when a reversal (A-B) design is not feasible (Carr, 2005; Kazdin, 2011; Watson & Workman, 1981).

Multiple-baselines across behaviors can be conducted with two or more behaviors but typically do not include over six behaviors (Kazdin, 2011). However, Kazdin (2011) explained an intervention can target more than one behavior at once when utilizing a multiple-baseline design. Additionally, when daily or frequent observations are cumbersome, occasional assessments of behavior (probes) can be used to assess generality across settings or other behaviors.

Procedures

Families were recruited from local consumer groups such as the local autism partnership group, treatment providers such as psychologists, behavior analysts, speech and language therapists, occupational therapists, and local agencies that serve children with developmental disabilities from Spring 2014 to Fall 2014. See Appendix B for the recruitment flyer. A child could qualify for participation in the study if they: 1) had a diagnosis of a neurodevelopmental disorder documented by a qualified clinician (e.g., a licensed psychologist who specializes in children, a pediatric psychiatrist, a developmental pediatrician, or through a multidisciplinary child evaluation team) and 2) demonstrated behavior problems that were troubling to the parent and the behaviors were beyond normative expectations. To be included in the study, participants also needed to

understand simple verbal commands such as "Sit down" or "Give me five" at a level \geq 24 months in order to benefit from PCIT (Masse, McNeil, Wagner, & Chorney, 2007; McDiarmid & Bagner, 2005). Exclusions included children and parents with major sensory impairments such as deafness or blindness and children on medication who were not stabilized on their medication at least four weeks prior to the start of study.

One family replied to recruitment. A screening interview was conducted with the parent over the phone to determine whether the child met inclusion criteria. The mother reported no sensory impairments or medication and endorsed the child was diagnosed with a developmental disorder with a co-occurring history of behavior issues including aggression and difficulties attending to play activities at an age-appropriate level. The mother endorsed the child understood simple commands such as "Sit down" and occasionally expressed two word utterances such as "I want" and "Give me."

Intake and informed consent. The purpose of the study intake was to determine the appropriateness of the intervention for the family, to obtain informed consent, explore presenting concerns, review diagnostic reports, establish rapport, and collect baseline data (Eyberg, et.al., 2011). An interview was conducted using the PCIT Research Intake Questionnaire previously developed for treatment intakes at the Baird Center (see Appendix C). The intake was also used to assess whether there were any major barriers that would prohibit participation in the study.

Informed consent was reviewed with the parent and a signature was obtained for participation of the referred child (see Appendix D). The mother was provided with a copy of the informed consent for future review. The biological parent of the sibling also

provided a signature for informed consent. The parent also agreed to allow observation and treatment in the home. The sibling verbally assented to participate in the study. The parent endorsed barriers to treatment such as reduced social support and current stressors (i.e., child care for baby sibling, financial constraints, and parent disagreement about parenting) that could potentially impact treatment participation. Problem-solving was accomplished to reduce barriers and the mother agreed to contact the researchers for further problem-solving in the future.

During the intake, the mother reported the child's strengths as his ability to adapt to changes, his liveliness, and his personality. Top problems for intervention included physical aggression such as hitting of mother and siblings, noncompliance with parent directions, and limited play skills. Additional concerns that were not directly targeted in the current study included parent concern about the child's anger, reduced fear (i.e., elopement from the family home and walking up to strangers in public), inattention, and delayed language.

Assessment

Autism Diagnostic Observation Schedule- Second Edition (ADOS-2; Lord, et al., 2012). The ADOS-2 was administered to assess potential characteristics of ASD with the referred child. The ADOS-2 is a semi-structured, standardized test of social and communication skills used to assess characteristics of autism. The ADOS has been considered a "gold standard" autism assessment since its first edition (Oosterling, et al., 2010). The ADOS-2 was developed to provide updated algorithms for diagnostic challenges such as valid assessment of individuals with mild intellectual disabilities,

assessment of toddlers, and assessment of individuals with severe language impairments (Lord, et al., 2012). The ADOS-2 is divided into five modules: Toddler Module - for children ages 12-30 months who do not use phrase speech consistently; Module 1 - for children > 31 months who do not consistently use phrase speech; Module 2 - for children with phrase speech but are not verbally fluent; Module 3 - for children and young adolescents who are verbally fluent; and Module 4 - for older adolescents and adults who are verbally fluent (Lord, et al., 2012). Each module contains a number of interactive activities that are used as “presses” for social interaction. Notes are recorded about the examinee’s performance on each item and a diagnostic algorithm allows the examiner to convert qualitative observations to numerical scores. In general, algorithm items are scored from 0 (“not abnormal”) to 2 or 3 (“most abnormal”). Some items may be scored as “not applicable” due to inadequate responses or physical disability.

Validity of the ADOS-2 was established through three separate studies across populations of individuals from large developmental disabilities clinics. The ADOS-2 was validated on a sample of 1,139 individuals and replicated in a sample of 1, 259 individuals. The final replication sample included 970 individuals with a clinical diagnosis of autistic disorder (76% of the sample), 98 with an ASD-spectrum diagnosis that did not meet criteria for autistic disorder (7% of the sample), and 214 with no diagnosis of autistic disorder or autism spectrum diagnosis (17% of the sample). Individuals with other developmental disorders (ID, language disorders, fragile X) were also included.

Inter-rater reliability coefficients ranged from .94 to .97 for Total scores on Modules 1 through 3. Test-retest correlation coefficients were .83 to .87 for the Total

score. Validity of ADOS-2 items was established through correlation matrices and factor analyses. Test Items correlated $\geq .70$, suggesting the items are psychometrically measuring a similar construct. Confirmatory factor analyses showed that a two-factor model (“Social Affect” and “Restricted and Repetitive Behavior”) explained separate domain loadings for the diagnostic algorithm.

The current researcher was clinically-trained by an independent ADOS trainer in Modules 1 through 4 of the ADOS and the ADOS-2 according to the author’s recommendations (Lord, Rutter, DiLavore, & Risi, 2012). Module 1 of the ADOS-2 was administered to the referred child due to his developmental level and limited spontaneous use of phrase speech as obtained parent report and previous diagnostic evaluations. The child participated in a cooperative manner and his diagnostic algorithm score was not consistent with ASD. The assessment provided collateral information of parent report and no diagnosis of ASD from prior evaluations.

Dependent Variables

Social Responsiveness Scale- Second Edition (SRS-2; Constantino & Gruber, 2012). The SRS-2- Preschool form is a 65-item behavior rating scale for children ages 2.5 to 4.5 years to assess social weaknesses and possible symptoms of ASD. The Preschool form takes approximately 15 min to complete. Items are rated on a 4-point Likert scale ranging from “not true (1)” to “almost always true (4).” The scales on the SRS-2 include a Total score and two empirically derived DSM-5 symptom domains, the Social Communication and Interaction Scale and the Restricted Interests and Repetitive Behavior Scale. Five treatment subscales were determined by expert consensus for

research or clinical purposes: social awareness, social cognition, social communication, social motivation and restricted interests and repetitive behaviors. Raw scores from each domain are converted to age- and gender-based T-scores ($M = 50$; $SD = 10$).

The SRS-2 was standardized on a nationally representative sample of individuals with and without diagnoses of ASD. The Preschool form was based on a sample of 247 preschool children with a combined total of 474 rating forms. A total raw score of 70 was associated with a sensitivity value of .78 and specificity value of .94 for ASD. Test-retest reliability at a 137-day interval produced was high ($r = .88$). The internal consistency of items in parent report produced an alpha of .94. Convergent validity was good with established autism screening measures, ranging from r coefficients of .50 to .68. Correlations between parent report with the ADOS domain scores were low to medium ($r = .37$ to .58). SRS-2 Total scores and ADOS total scores produced a correlation of .48 (Constantino & Gruber, 2012).

Child Behavior Checklist for Ages 1 ½ -5 (CBCL; Achenbach & Rescorla, 2000). The CBCL 1 ½ -5 is a behavior rating form designed to assess adaptive and maladaptive behaviors of preschool children. The CBCL 1 ½ -5 is a 99-item scale that takes approximately 15 min to complete. The form contains ratings of problems, disabilities, parental concerns, and open-ended questions about the child's strengths. Parents rate each statement on a 3-point Likert scale from “not at all true (0)” to “very true or often true (3).” Raw scores are converted to age and gender-based T-scores ($M = 50$; $SD = 10$). The CBCL 1 ½ -5 was standardized on a nationally representative sample and content scales were empirically-derived. There are three main scales (Internalizing Problems, Externalizing Problems, and Total Problems) and seven Syndrome Scales

(Emotionally Reactive, Anxious/Depressed, Somatic Complaints, Withdrawn, Sleep Problems, Attention Problems, and Aggressive Behavior (Achenbach & Rescorla, 2001).

The CBCL discriminates between referred and non-referred children at a significant level ($p \leq .01$) indicating high criterion validity. The CBCL demonstrated correlation coefficients ranging from .56 to .77 with other measures of preschool child behavior problems, supporting convergent validity for the Total score. Convergent validity for the Internalizing Scale was reported between .48 and .62 with other measures of social-emotional functioning. Externalizing Scale correlations were .49 with DSM diagnostic interview categories of ODD and CD symptoms. Test-retest reliability of the CBCL in an 8-day period ranged from .87 (Externalizing Problems Scale) to .90 for the Internalizing Problems and Total Problems Scales (Achenbach & Rescorla, 2001).

Parenting Stress Index, Fourth Edition (PSI-4; Abidin, 2012). The PSI-4 is a 120-item inventory used to evaluate the magnitude of stress in the parent-child system for parents of children aged 1-month to 12-years. The PSI-4 is commonly used in medical centers for children, outpatient therapy settings, pediatric practices, and for treatment outcome monitoring. The scale takes approximately 20 min to complete. PSI-4 Items 1 through 101 are rated on a 5-point Likert scale with ratings of “strongly agree” to “strongly disagree.” Items 102 through 120 are considered Life Stress items that require a “yes” or “no” response. Raw scores from each domain are converted to age-based T-scores ($M = 50$; $SD = 10$).

The PSI-4 contains three major domains of stress: (1) child characteristics, (2) parent characteristics, (3) and situational/demographic life stress. This measure also

contains three scales: Child Domain, Parent Domain, and Total Stress. The Child Domain contains six subscales: 1) *Distractibility/Hyperactivity*: assesses the child's activity level; 2) *Adaptability*: measures the child's adaptation to changes; 3) *Reinforces Parent*: assesses the extent to which the parent feels the interactions with the child are positively reinforcing; 4) *Mood*: describes the child's affective status; 5) *Acceptability*: assesses the extent to which the child meets parental expectations and 6) *Demandingness*: measures the extent to which the parent experiences the child as demanding. The Parent Domain has seven subdomains: 1) *Competence*: measures the extent the parent feels capable in their role; 2) *Isolation*: assesses the parent's social support; 3) *Attachment*: measures the perception of parent-child closeness and the parent's view of their response to their child's needs; 4) *Health*: describes the extent to which the parent's health status contributes to stress; 5) *Role Restriction*: measures the parent's personal identity in the parenting role and the extent to which freedom is restricted; 6) *Depression*: measures the parent's affective experiences; and 7) *Spouse/Parenting Partner Relationship*: the parent's experience of emotional and physical support from a parenting partner (Abidin, 2012).

The PSI-4 was normed on a nationally-representative sample of mothers and fathers. Total Stress alpha coefficient was .98. Internal consistency alpha coefficients for Child Domain subscales range from .78 to .96. Internal consistency for the Parent Domain subscales ranged from .75 to .96. Validity was established by evaluating the variance explained by the parent and child domains. Seventy-two percent of the variance for the PSI-4 is explained by both domains (Johnson, 2015).

Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999). The ECBI is a 36-item behavior rating scale that assesses the frequency and severity of disruptive behaviors in youth ages 2-16. This assessment is frequently used in PCIT research and was used to determine the severity of problem behaviors before treatment and parent perception of behavior change throughout the study. The ECBI takes approximately 5 minutes to complete and has two scales, an Intensity Scale and a Problem Scale. The Intensity Scale utilizes a 7-point Likert scale that assesses the frequency of the child's behavior from "never (1)" to "always (7)." On the Problem Scale, parents also endorse whether the reported behaviors are a problem using a "yes" or "no" format. The Intensity raw score can range from 36 to 252 and the Problem raw score can range from 0 to 36. A clinical cutoff raw score is provided for the two scales: 131 for the Intensity Scale and 15 for the Problem Scale. All scores can be converted to T-scores based on the total ECBI sample, which is not divided by age categories.

The ECBI norms were originally based on a 1980 sample of mostly European-American youth drawn from a medical school outpatient clinic. The ECBI was re-standardized in 1992 (Eyberg & Pincus, 1999). Sixty-one percent of the sample were from an urban setting and 39% were from rural communities. The 1992 sample consisted of 798 children drawn from a pediatric setting in Florida. The sample was 74% European-American, 19% African-American, 3% Hispanic, 1% Asian, 1% Native American and 2% mixed or other ethnicity. Children with chronic special health care needs were excluded from the 1992 re-standardization.

The ECBI has been shown to discriminate between clinic-referred children ages 3 to 6 who met criteria for ODD and non-referred children (Rich & Eyberg, 2001). In a

pre-school sample the test-retest value for the Intensity and Problem scale over a 10-month period was .75. Concurrent validity was high for the Intensity Scale when correlated with other measures of preschool problem behavior ($r = .53$). Concurrent validity for the Problem Scale was medium ($r = .34$) (Funderburk, Eyberg, Rich, & Behar, 2003).

The ECBI has been sensitive to the effects of treatment in samples of young children ages 3 to 7 for the Intensity and Problem Scores ($p \leq .001$) (Eisenstadt, Eyberg, McNeil, Newcomb, & Funderburk, 1993; Nixon, Sweeney, Erickson, & Touyz, 2003). The ECBI has also been used in a sample of children age 3 to 6 years old with intellectual disabilities (Bagner & Eyberg, 2007). Mean pre-treatment Intensity raw scores for the intellectual disabilities sample ranged from 156.40 to 170.9 (Intensity T-scores = 67 to 71). Problem raw scores ranged from 18.67 to 21.4 (Problem T-scores = 64 to 68) in the sample of preschool children with intellectual disabilities.

Social Validity

Therapy Attitude Inventory (TAI; Eyberg, 1993). The parent completed the TAI to assess the parent's satisfaction with the goals, procedures and outcomes of the intervention (Wolf, 1978). The TAI is a 10-question 5-point Likert scale that asks the parent to rate their satisfaction with various aspects of the intervention (See Appendix E). Scores range from "very dissatisfied (1)" to "very satisfied (5)." Therefore, higher scores represent more satisfaction. The parent was also invited to: "*Please write any additional comments here*" on the bottom of the form.

Sibling interview. The sibling completed an in-person semi-structured interview that contained six questions to gauge the sibling's perception of the procedures, goals and outcomes of the intervention (See Appendix F).

Direct observation measures

Dyadic Parent Child Interaction Coding System, Fourth Edition (DPICS-IV, Eyberg, et.al, 2013). Parent-child and sibling-child interactions were measured using the DPICS-IV, a behavioral coding system that quantifies the social interactions between caregiver and child. DPICS-IV served as a measure of ongoing progress during the intervention. The therapist used a frequency count of DPICS skills during a 5 min free play probe to monitor treatment process. In addition, research assistants coded two 5 min observations using a partial-interval recording system. Table 1 provides individual definitions of the selected parent and sibling codes. Table 3 represents child codes for frequency counts that were used to determine appropriate parent mastery of PDI skills.

Table 1

DPICS-IV Parent and Sibling Behavior Codes for Research and Treatment

Behavior	Operational Definition
Negative Talk (NTA)	A verbal expression of disapproval of the child or the child's attributes, activities, products, or choices that includes sassy, sarcastic, rude, or impudent speech
Labeled Praise (LP)	A positive evaluation of a specific behavior, activity, or product of the child
Unlabeled Praise (UP)	A positive evaluation of the child, an attribute of the child, or a non-specific activity, behavior, or product of the child
Reflection (RF)	A declarative phrase or statement that has the same meaning as a preceding child verbalization and may paraphrase or elaborate on the child's verbalization but may not change the meaning of the child's statement or interpret unstated ideas
Behavior Description (BD)	A non-evaluative, declarative sentence or phrase in which the subject is the other person and the verb describes that person's ongoing or immediately completed (< 5 s) observable verbal or nonverbal behavior
Direct Command (DC)	A declarative statement that contains an order or direction for a vocal or motor behavior to be performed and indicates that the child is to perform this behavior
Indirect Command (IC)	A suggestion for a vocal or motor behavior to be performed that is implied or stated in question form
Question (QU)	A verbal inquiry that is distinguishable from a declarative statement by having a rising inflection at the end and/or by having the sentence structure of a question that does not request an answer but does not suggest that a behavior is to be performed by the child
Positive Touch (PTO)	Any intentional positive physical contact during the interaction.
Negative Touch (NTO)	Any physical touch initiated by the parent or sibling that is intended to be directive, antagonistic, aversive, hurtful, or restrictive of the child's activity

Table 2

DPICS-IV Child Codes for Treatment

Behavior	Operational Definition
Compliance (CO)	Coded when the child performs, begins to perform, or attempts to perform a behavior requested by the parent/sibling within a 5-second interval following the command
No Opportunity for Compliance (NOC)	Coded when the child is not given an adequate chance to comply with a command, it is impossible to determine if the child has complied, or commands that occur outside the immediate future (> 5 s)
Non-compliance (NC)	Coded when the child does not perform, attempt to perform, or stops attempting to perform the requested behavior within a 5-second interval following a command
Answer (AN)	A verbal or nonverbal response to a question that provides or attempts to provide the information requested in the question
No Opportunity for Answer (NOA)	When the child does not have an adequate opportunity to provide the information requested (e.g. the parent keeps talking following the question or the parent follows with another question or command within 5 s). This code will also be used for parent reflections that are turned into questions due to a rising intonation at the end.
No Answer (NA)	When the child does not attempt to provide information requested in the question

Initiation of joint attention operational definition. The initiation of joint attention (IJA) was coded from a video recording during a 5 min free play sample. IJA was scored if any of the following occurred in the same 10 s interval: (1) the child looked at the same object as the parent/sibling for 5 s or more, (2) a referential 3-point shift in gaze/head orientation between an item and a person, or (3) if the child attempted to share a common interest with the parent or sibling by showing of an object or pointing. The

IJA operational definition was adapted from Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet (2002).

Play operational definitions. Four different types of parent-child and sibling-child play interactions were coded (See Table 3). Observations were coded from a 5 min free play video sample using a 10 s, partial-interval recording system. Play interaction operational definitions were adapted from Oppenheim-Leaf, Leaf, Dozier, Sheldon, & Sherman (2012).

Table 3

Play Interaction Codes

Behavior	Operational Definition
Independent play	Dyad members are not engaged with the same play materials or if the members are playing with the same play materials but are <i>more than three feet away</i> from each other.
Parallel play	Dyad members are within three feet of each other, playing with the same play materials, but not interacting.
Cooperative play	Dyad members are within three feet of each other, playing with the same play materials and interacting (sharing materials, commenting on activities, working toward a common goal) or if the dyad members are interacting with each other positively without using any play materials (e.g., rough and tumble play, chase, etc.).
Negative Physical Interactions	Coded when the target child pushes, hits, or swats at sibling or parent, destroys, throws, or swipes materials from the table.

Interobserver Agreement

Interobserver Agreement (IOA) was assessed using trained observers recording simultaneously, but independently. Observers were advanced-level undergraduate students enrolled in an independent study course. One undergraduate student became a master's-level student over the course of the study. IOA was calculated using an occurrence/non-occurrence agreement method: the number of intervals the observers agreed divided by the total number of intervals multiplied by 100 (Cooper, Heron, & Heward, 2007).

Undergraduate research assistants (URAs) were carefully selected in Spring 2013 and systematically trained according to the five step process outlined by Cooper, et al. (2007): (1) URAs read the DPICS-III abridged manual (Eyberg, et al., 2008) and familiarized themselves with the abbreviations, and coding sheets; (2) URAs practiced coding written vignettes provided in the DPICS workbook with $\geq 80\%$ accuracy; (3) URAs practiced coding using videotaped PCIT sessions from university-based PCIT research labs; and (4) URAs practiced live coding during PCIT sessions in the university's clinic. After one year of training, URAs practiced the DPICS-IV codes from videotaped PCIT sessions. All URAs demonstrated $\geq 80\%$ IOA using DPICS-IV before coding for the current study. Additionally, the URAs demonstrated $\geq 80\%$ IOA using the IJA and Play codes from video recordings before coding for research.

Independent Variable

Parent-Child Interaction Therapy (PCIT; Eyberg & Funderburk, 2011). The PCIT treatment protocol (Eyberg & Funderburk, 2011) was modified for the current study. As outlined in the protocol, the mother participated in teaching sessions where

skills were taught, modeled, and role-played. During the subsequent coaching sessions, the mother was coached during play interactions with the child through a BIE device.

The parent was coached in four phases of the study: CDI in the clinic (CDI-1), PDI in clinic (PDI-1), CDI in the home, CDI in the home with the younger sibling present (CDI-2), and PDI in the clinic with the younger sibling present (PDI-2). Sessions in clinic lasted approximately 90 min. The sessions were divided as follows: 10 min of processing parent concerns, 15 min for two DPICS-IV observations with a warm-up period, 30 min of parent coaching, 10 min for the child to use the restroom, 15 min of baseline observation or coaching with the sibling, and 5 min of parent and/or sibling debriefing.

The intervention was provided by a doctoral student in clinical/school psychology under the supervision of a licensed clinical psychologist. The clinical psychologist was independently trained as a PCIT therapist and the doctoral student participated in a 10 hr web course produced by the University of California-Davis PCIT Training Center and had two years of supervised experiential training in PCIT.

DPICS-IV observation modifications. The therapist utilized frequency counts to determine parent mastery of skills according to the protocol. Study data were based on a 10 s partial-interval recording procedure. Two 5 min partial-interval recoding observations were conducted during clinic and home sessions to provide a good sample of interactions. Most clinic session included two observations before coaching. However, some sessions included one observation before coaching and one observation after coaching depending on parent arrival time and the child's behavior. Some of the

child codes (no opportunity to comply, compliance, non-compliance, no opportunity to answer, answer, and no answer) are not reported in the current study data because the interval recoding system did not lend to observation of sequences. However, these data were tracked through frequency recording to determine parent mastery of skills.

Baseline. Prior to entering the play room, the parent was provided with the BIE device and told in the waiting room to: "Play with [child's name] like you normally would." After a warm-up period of approximately 3 min, the parent was provided instructions for the Child-Led Play Situation using the BIE device: *"In this situation tell [child's name] that he/she may play with whatever he/she chooses. Let him/her choose any activity he/she wants. You just follow his/her lead and play along with him/her"* (Eyberg & Funderburk, 2011, p. 13).

For sibling baseline, the child was not provided with a BIE device. The sibling was told to *"Play with [child's name] like you normally would"* and a research assistant remained in the room for safety precautions. After a 3 min warm up period the therapist entered the room and told the sibling, *"That's nice, please continue to play with [child's name]."*

CDI. In CDI, the parent was taught and coached in P.R.I.D.E skills with specific attention to targeted problem behaviors. This was accomplished by coaching the parent to use differential attention (i.e., attending to appropriate behaviors and actively ignoring non-aggressive, disruptive behaviors). In line with the protocol, the parent was required to meet CDI mastery criteria during a 5 min observation without coaching: 10 labeled

praises, 10 behavior descriptions, and 10 reflections with less than 3 negative comments, commands, and questions.

Modifications to CDI. Modifications to the CDI phase were informed by the ABA literature for addressing physical aggression (Geiger, Carr, & LeBlanc, 2010; Iwata, Pace, Kalsher, Cowdery, & Cataldo, 1990). Baseline observations and parent report suggested the referred child used aggression to escape demands or aversive situations. The mother received training in conducting a brief physical hold as a consequence for aggression. The hold was modeled for the parent and practiced several times during the CDI teach session in the clinic play room and in the clinic waiting room before the first CDI coaching session. The hold consisted of gently limiting movement by placement of the parent's index finger and thumb around the child's wrists. The child's wrists were held at his sides for 15 s while he sat in a child-sized chair or while standing if the aggression occurred while standing. The mother was taught to squat down on the child's level, remove eye contact, and remain vigilant of possible head-butting and kicking. The child was released at the end of 15 s if there was no resistance to the hold or after 15 s plus 5 s of decreased movement if the child was physically resisting. Therefore, the hold was extended longer than 15 s if the child attempted to break free, head butt, or kick. The 5 s of decreased movement requirement is similar to the 5 s of quiet required for release from the time out chair in the PCIT protocol. The parent was trained and coached so that the hold was mild, did not cause bruises, or did not put undue pressure on the child's wrists, shoulders, or arms.

PDI. During the second phase of treatment, PDI, the parent was taught and coached how to use effective commands to increase the probability of compliance and manage non-compliance with consistent and predictable follow-through.

The PCIT protocol outlines PDI mastery as 75% correct use of commands (direct, positively stated, single commands with a 5 s opportunity for compliance) that were followed by labeled praise if the child complied or a time-out chair warning for non-compliance that ends in labeled praise for compliance after time out. If the child does not comply with the 3 min timeout in a chair, the child is escorted to a time out room. If a time out room is unavailable, the parent uses a “Swoop and Go” procedure. During Swoop and Go the parent puts all the toys in a large bin and leaves the room for 1 min so the play room can serve as a time out room. At the end of 1 min, the parent then escorts the child to the time out chair and starts the time out procedure again until the child complies to the original command.

Modifications to PDI. Neither a time out chair nor a time out room was used in the current study due to inconsistent evidence of its effectiveness with young children with DDs. Also, time out was not used so that the therapeutic aspects of the playtime were maximized (Plummer, Baer, & LeBlanc, 1977). The parent was instructed to give an effective command such as, “Please give me a block.” If the child did not comply within 5 s, the parent was coached to repeat the command, adding a gesture for specificity, and wait another 5 s for compliance. If the child did not comply after the second command, the parent used a gentle, hand-over-hand guidance. This procedure was informed by the least-to-most prompting procedure. In ABA, physical guidance is often utilized with young children with DDs (Cooper, Heron, & Heward, 2007). The

initial parent command served as the least intrusive prompt, a verbal command. The repeated command with gesture served as a second prompt with an additional feature (gesture). If there was non-compliance, a quick hand-over-hand procedure was the most intrusive prompt. The parent was required to meet PDI mastery, 75% of appropriate command sequences, based on above modifications before programmed generalization sessions occurred in clinic.

Home probes. Parent-child probes were conducted to assess generalization of skills CDI skills at home. Home probes were accomplished in the living room of the family's home. The therapist and URAs coded two child-led play interactions simultaneously, but independently approximately 1 m from the parent-child play area. URAs coded behaviors in the home according to 10 s partial-interval recording procedures while the therapist used a frequency count. During home probes the younger sibling was present in the living room but contained in a playpen. Home probe sessions lasted approximately 15 min.

CDI in the home. Coaching of CDI skills in the home were similar to CDI coaching sessions in clinic. The toys used for home observations were similar to PCIT-approved toys (toys that promote building, creativity, and interaction, did not have rules, were not aggressive toys such as toy weapons, and did not include puppets/costumes).

During the CDI-1 home coaching phase, the younger sibling was present did not participate in play interactions and was contained in a playpen in the living room. The therapist and URAs coded two child-led play interactions simultaneously, but independently approximately 1 m from the parent-child play space in the living room

before CDI coaching began. The parent was coached to use CDI skills and the brief hold for aggression using the BIE device.

During the CDI-2 phase, the parent, referred child, and younger sibling participated in play interactions together on the living room floor. Two URAs coded behaviors using the 10 s partial-interval recording procedures simultaneously with the therapist who was using a frequency count before coaching. Coaching of CDI-2 in the home was similar to coaching sessions in clinic, but the parent was coached to provide praise and descriptions for the child's prosocial behaviors with the younger sibling such as sharing, allowing the younger sibling to play alongside, and using nice words and hands with the younger sibling. The parent also continued to receive coaching in using the brief hold for aggression. Duration of CDI-2 home coaching were approximately 60 min.

Sibling coaching. Sibling coaching is not a part of the PCIT protocol but has been outlined as a means to train older siblings who may serve as babysitters and to reduce sibling conflict (McNeil & Hembree-Kigin, 2010). The sibling was taught skills similar to parent CDI. Developmentally appropriate sibling CDI skills included “no bossy talk” (no commands), “look and describe” play behaviors (behavior description), “say nice things” (labeled praise), share toys, and play beside the child (imitation). The sibling participated in teaching sessions that included modeling, role play, and in-room coaching with the child.

During coaching sessions with the BIE device, a research assistant remained in the room. The sibling was coached in sibling-mediated CDI skills as outlined in McNeil

and Hembree-Kigin (2010): 1) the therapist verbally praised the sibling for spontaneous use of CDI skills; 2) the therapist prompted sibling to use a skill through Socratic questions (e.g., “What could you say”) and line-feeding (e.g., “I like your tower); and 3) the therapist privately discussed the effects of the sibling’s behaviors on the referred child’s behavior and the relationship after the interaction. The sibling and child were allowed to choose a small toy valued at less than \$1 for some sessions to reinforce effort and participation. This type of incentive was effective in a pilot study (White et al., 2013) and a sibling-mediated intervention for children with DDs (cf. Oppenheim-Leaf, et al. 2012).

RESULTS

A visual analysis of the graphed data was used to determine the effect of PCIT on the parent, sibling, and child's behaviors. Visual analysis is common in single-case research designs and focuses on the observable effects of an independent variable on the dependent variable (Baer, 1977; Kazdin, 2011). Ongoing assessment through direct observation and weekly parent report allowed for continuous evaluation of the data. The current study utilized Parsonson's (2003) recommendations for fine-grained visual analysis to assess treatment effects within and between conditions: 1) examine changes in levels and trends of data paths; 2) assess stability and variability of the data paths, 3) evaluate for potential patterns in the data; 4) observe for potential cycles or sequences, 5) examine potential overlap and range of the data points; 6) evaluate of the number of data points in each condition.

Interobserver Agreement

IOA was obtained from 40% of live parent sessions and 43% of parent-child IJA and play probes from video recordings. IOA was obtained for 61% of live sibling sessions and 27% of sibling-child IJA and play probes from video recordings. Lower IOA samples were obtained from sibling video-recorded sessions due to limitation of the camera's recording scope for sibling play.

The average IOA for the parent-child DPICS-IV was acceptable as all averages are > 80%. IOA of 75% may be acceptable for measurement of multiple behaviors that can occur simultaneously in a complex setting (Cooper, Heron, & Heward, 2007). Parent direct commands, labeled praise, questions, and reflections contained sessions where IOA

fell below 80%. See Table 4 for the average IOA and ranges for each parent-child DPICS-IV category.

Table 4

Interobserver Agreement for DPICS-IV Parent-Child Interactions

Behavior	Average IOA %	Range
Negative Talk	99.2	93-100
Direct Command	97.2	78-100
Indirect Command	99.9	97-100
Labeled Praise	96.4	83-100
Unlabeled Praise	98.3	90-100
Question	95.6	76-100
Reflection	93.7	73-100
Behavior Description	97.7	87-100
Positive Touch	98.8	83-100
Negative Touch	100	None

The average IOA for the sibling-child DPICS-IV was acceptable. All averages were > 80%. Sibling negative talk was the only category that contained an IOA occurrence of < 80%. See Table 5 for the average IOA and ranges for each sibling-child DPICS-IV category.

Table 5

Interobserver Agreement for DPICS-IV Sibling-Child Interactions

Behavior	Average IOA %	Range
Negative Talk	94.8	80-100
Direct Command	99.2	97-100
Indirect Command	97.9	90-100
Labeled Praise	100.0	None
Unlabeled Praise	100.0	None
Question	98.5	90-100
Reflection	99.7	97-100
Behavior Description	100.0	None
Positive Touch	99.7	97-100
Negative Touch	99.1	93-100

The average IOA for parent-child IJA, cooperative play, independent play, parallel play, and negative physical interactions was acceptable as all averages are > 80%. Parent-child independent play, parallel play, cooperative play, and negative physical interactions contained IOA sessions < 80%. See Table 6 for the average IOA and ranges for each parent-child IJA and play category.

Table 6

Interobserver Agreement for Collateral Behaviors with Parent

Behavior	Average IOA %	Range
Initiation of Joint Attention	96.67	87-100
Independent Play	96.50	83-100
Parallel Play	96.67	83-100
Cooperative Play	94.17	63-100
Negative Physical Interaction	98.08	83-100

The average IOA for sibling-child IJA, cooperative play, independent play, parallel play, and negative physical interactions was acceptable as all averages are > 80%. Sibling-child parallel play and cooperative play contained IOA sessions < 80%. See Table 7 for the average IOA and ranges for each sibling-child IJA and play category.

Table 7

Interobserver Agreement for Collateral Behaviors with Sibling

Behavior	Average IOA %	Range
Initiation of Joint Attention	94.6	90-100
Independent Play	97.4	87-100
Parallel Play	91.4	67-100
Cooperative Play	92.6	80-100
Negative Physical Interaction	100	None

Graphic Display of Aggregate DPICS-IV Data

Aggregate behavioral data in Figure 2 were calculated by dividing the number of intervals a behavior occurred by total opportunities available. The aggregate DPICS-IV data are presented across behavioral observations (x-axis). For CDI “Do” skills (unlabeled praise, labeled praise, behavior descriptions, and reflections), there were 120 opportunities for a behavior to occur (4 CDI “Do” skills x 30 possible intervals). For command data (direct commands and indirect commands), there were 60 opportunities for a command to occur (2 types of commands x 30 possible intervals). These calculations resulted in a percentage a behavior was observed out of the total possible interval opportunities using a 10 s partial-interval recording (y-axis). The graphs in Figure 2 represent parent and sibling skill acquisition throughout the intervention study phases.

Multiple Baseline Across Participants and Settings

To demonstrate experimental control, Figure 2 shows a multiple baseline of combined positive parent verbal behaviors (praise, behavior descriptions, and reflections) and commands across settings (clinic and home). The data were compared to sibling positive verbal behaviors and commands in clinic.

In the top third of the multiple baseline (Parent Clinic) the goal was to increase CDI “Do” skills and decrease commands at the first intervention point (CDI-1). The parent showed increased use of CDI “Do” skills after intervention and a decrease in commands. Commands stayed at a relatively low level during the CDI-1 phase. At the second intervention point (PDI-1), the goal was to have the parent continue to use CDI “Do” skills while also increasing effective commands. The parent maintained CDI “Do” skills and commands increased as expected. The frequency of commands remained at a lower than CDI “Do” skills. At the third intervention point (PDI-2), the goal was to have the parent maintain CDI “Do” skills and effective commands while the younger sibling was present during clinic play interactions. The parent continued to demonstrate a higher level of CDI “Do” skills compared to commands during the last phase of the intervention in clinic.

In the middle third of the graph (Parent Home) the goal was to have the parent generalize CDI-1 skills to the home. Before the point of intervention in the home, the parent demonstrated variable use of CDI “Do” skills with more use of commands in the home than clinic CDI-1. At the point of intervention (CDI-1 in the home), the parent increased CDI “Do” skills and decreased commands to zero. At the next point of

intervention (CDI-2), the goal was to have the parent generalize CDI “Do” skills while the younger sibling was present. In CDI-2, the parent’s CDI “Do” skills decreased but remained at a higher level than commands after the point of intervention.

In the bottom third of the graph (Sibling Clinic) the goal was to have the sibling increase select, CDI “Do” skills. At the point of intervention there was a decrease in the use of commands and an increase in the use of CDI “Do” skills.

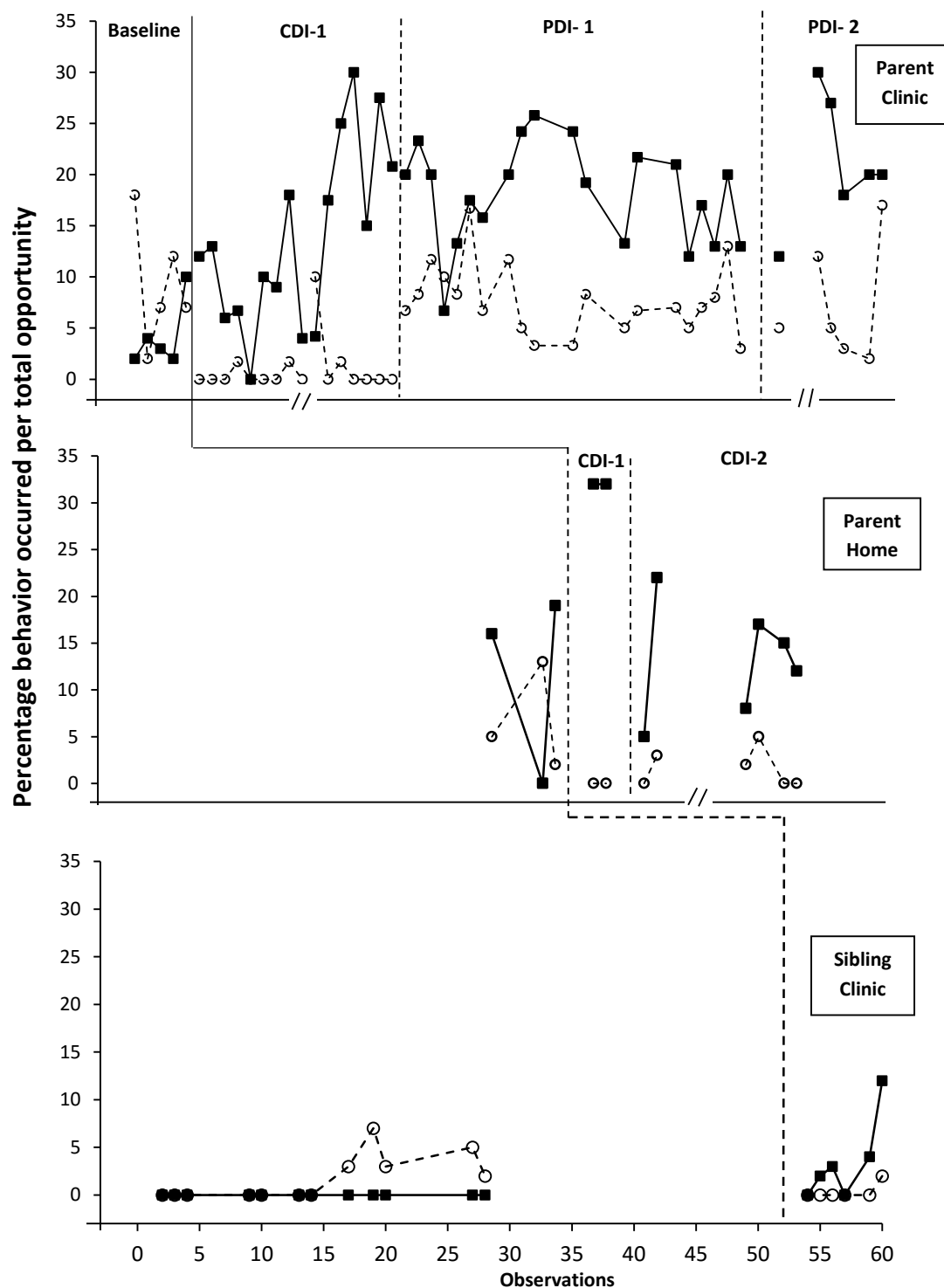


Figure 2. Mean percentage a behavior occurred out of total intervals during a 5 min observation using 10 s partial-interval recording across settings and participants. CDI “Do” Behaviors (unlabeled praise, labeled praise, reflections, and behavior descriptions) are represented by closed squares. Commands are represented by open circles. Breaks in the x-axis designate more than 3 weeks between data points.

Parent Clinic CDI “Do” skills. CDI “Do” skill behaviors (unlabeled praise, labeled praise, reflections, and behavior descriptions) occurred at a low level with an increasing trend at baseline. As expected, the percentage of intervals a CDI “Do” skill occurred increased from a mean level of 4.2% at baseline (range = 2 - 10%) to mean of 13.4% (range = 6 - 30%) in CDI-1. CDI “Do” skills in CDI-1 were variable and occurred at a low to mid-level. When PDI-1 was introduced, the mean occurrence of CDI “Do” skills increased to 18% of interval opportunities (range = 6 - 25.8%), with skills occurring at a low to mid-level. When PDI-2 was introduced, CDI “Do” skills increased to 21.1% of possible opportunities (range = 12 - 30%). In PDI-2 CDI “Do” skills were variable and occurred at a higher mean level relative to the previous intervention phase (PDI-1).

Parent clinic commands. The occurrence of a direct or indirect command occurred at a mid-level of 9.2% (range = 2 - 18%) with no trend at baseline. During CDI-1, commands occurred at a low level with no trend in the data path. The percentage of commands decreased during CDI-1 to a mean of 1% of opportunities (range = 0 - 1.7%). There was overlap with one data point from baseline to CDI-1 due to a spike in commands following a semester break. This spike quickly returned to a stable, low level in the data path. When PDI-1 was introduced, commands increased to a mean level of 7.7% (range = 3 - 16.7%). Commands occurred at a low level in PDI-1 with a decreasing trend. When PDI-2 was introduced, commands were variable. Commands in PDI-2 continued at a low level with a mean of 7.3% (range = 3 - 17%) with an increasing trend.

Parent CDI “Do” skills in the home. During home probes the mean level of CDI “Do” skills occurred at 11.7% of interval opportunities (range = 0 - 19%). CDI “Do” skills increased to a mean of 32% (no range) when CDI-1 coaching was introduced. CDI “Do” skills were stable at a mid-level and there was no overlap in data points from probe observations compared to CDI-1 home coaching. When CDI-2 was introduced, “Do” skills decreased from a mid-level to a low-level mean of 13.2% (range = 5 - 22%). “Do” skills also decreased after a 3-week break during the CDI-2 phase. There was no overlap in “Do” skills among data points in CDI-1 in the home and CDI-2 in the home.

Parent commands in the home. Parent commands during home probes occurred at a low level at 6.7% (range = 2 - 13%) of interval opportunities with no trend in the data path. When CDI-1 was introduced, commands decreased quickly to 0%. When CDI-2 was introduced there was a slight increase in the mean level of commands to 1.7% (range = 0 - 5%). Commands increased slightly following a 3-week break, but remained at a stable, low level in CDI-2.

Sibling CDI “Do” skills. During baseline sibling CDI “Do” skills remained at 0%. When sibling CDI was introduced, the mean level of CDI “Do” skills increased to 6.8% of possible intervals (range = 0 - 20%). There was no immediate change in CDI “Do” skills at the point of intervention (CDI). During CDI, sibling “Do” skills were at a stable, low level with an increasing trend. One data point fell at 0% after CDI was introduced and there was overlap with two data points from baseline to sibling CDI.

Sibling CDI Commands. There was an increasing trend in commands during baseline. Commands occurred at a stable, low level at 1.7% of interval opportunities

(range = 0 - 7%). Commands decreased to lower level of 0.3% (range = 0 - 2%) when CDI was introduced with the sibling and the data path appeared stable.

Graphic Display of Parent CDI “Don’t” Behaviors

The Parent CDI “Don’t” data (questions, negative talk, and commands) are presented as mean occurrences across intervention study phases (x-axis). Behavioral data were calculated by dividing the number of intervals a “Don’t” behavior occurred by 30, the total number of intervals. Calculations resulted in a percentage a behavior was observed using a 10 s partial-interval recording (y-axis).

Parent questions. Figure 3 shows the change in parent questions across study phases. In baseline, parent questions were at a mid-level with a mean occurrence of 41.5% of intervals (range = 27 - 43%). When CDI-1 was introduced, the mean occurrence decreased significantly, as expected, to a low level of 7.4% of intervals (range = 0 - 23%). In PDI-1, the mean level of parent questions decreased to 5.6% (range = 0 - 23%). Parent questions during home probes were low at a mean level of 3.3 % (range = 0 - 10%). When CDI-1 was introduced in the home, the mean level of questions was similar to home probes with a mean level of 3.5% (range = 0 - 7%). During CDI-2 in the home, questions were at a mean level of 3.2% (range = 3 - 7%), similar to the mean in CDI-1. In PDI-2 the mean occurrence of questions dropped to a lower level of 2.4% (range = 0 - 6%).

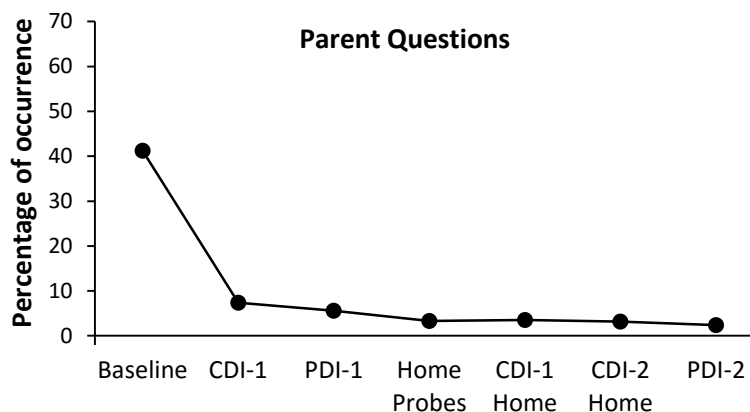


Figure 3. Mean percentage of intervals a parent question occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Negative Talk. Figure 4 shows parent negative talk across intervention study phases. In baseline, parent negative talk was at a low level with a mean interval occurrence of 9.2% (range = 0 - 23%). When CDI-1 was introduced, negative talk decreased significantly to a very low level of 1.1% (range = 0 - 7%). In PDI-1, the mean level of negative talk was again at a very low level at 0.6% (range = 0 - 3%). Parent negative talk during home probes was higher than PDI-I but remained at a low mean level of 3.3 % (range = 0 - 7%). During CDI-1 in the home, negative talk dropped to 0%. When CDI-2 was introduced, negative talk increased to a mean occurrence of 8.2% (range = 0 - 20%). In the PDI-2 phase in clinic negative talk dropped to 0%.

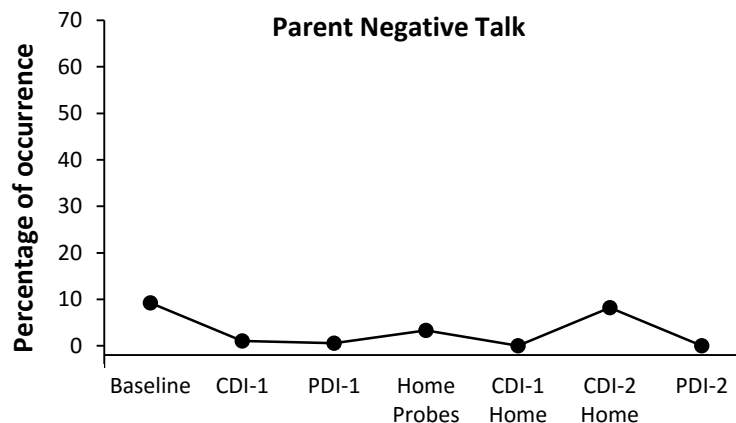


Figure 4. Mean percentage of intervals parent negative talk occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Commands. Figure 5 represents a comparison of parent direct and indirect commands across study phases.

Direct commands. During baseline, parent direct commands were at a low mean occurrence of 11.8% (range = 10 - 17%). When CDI-1 was introduced, direct commands decreased significantly to a very low level at 0.4% (range = 0 - 3%). In the PDI-1 phase, parent direct commands increased significantly, as expected, to a mean level of 15.4 % intervals (range = 6 - 33%). During home probes the parent demonstrated direct commands at a low to mid-level with a mean of 16.7% (range = 3 - 27%). During the CDI-1 and CDI-2 phases in the home, parent direct commands dropped significantly to 0%. When PDI-2 was introduced in the clinic, parent direct commands occurred at a low mean level at 10.6% (range = 3 - 23%).

Indirect commands. During baseline, parent indirect commands were at a low mean level of occurrence of 5.8% (range = 0 - 20%). When CDI-1 was introduced,

indirect commands decreased to a lower mean level of 1.4% (range = 0 - 20%). In the PDI-1 phase, parent indirect commands decreased again, as expected, to a very low mean level of 0.6% (range = 0 - 10%). During home probes and when CDI-1 was introduced, the parent demonstrated no indirect commands (0%) during observations. During CDI-2, parent indirect commands increased slightly to 3.2% (range = 0 - 10%) but remained at a low level. When PDI-2 was introduced in the clinic, parent indirect commands dropped to 0%.

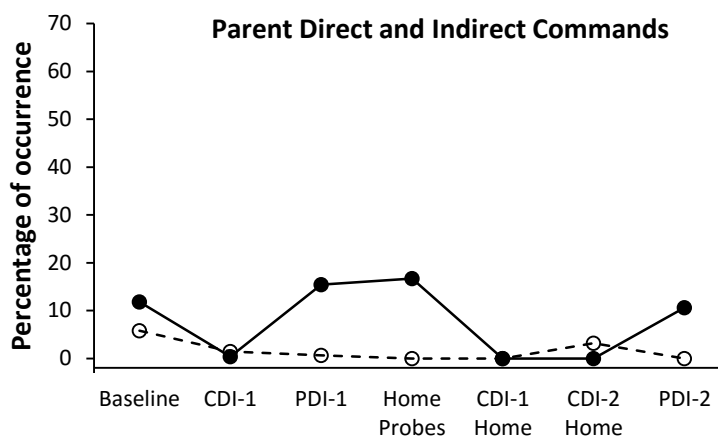


Figure 5. Mean percentage of intervals direct commands (closed circles) and indirect commands occurred (open circles) during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Graphic Display of Parent CDI “Do” Behaviors

Parent CDI “Do” behavioral data (praise, behavior descriptions, and reflections) are presented across intervention study phases (x-axis). Behavioral data were calculated by dividing the number of intervals a behavior occurred by 30, the total number of intervals. Calculations resulted in a percentage a behavior was observed (y-axis) using a 10 s partial-interval recording.

Praise. Figure 6 represents a parent labeled praise and unlabeled praise across study phases.

Labeled praise. During baseline parent labeled praise was at a low mean occurrence of 1.8% (range = 0 - 3%). When CDI-1 was introduced, labeled praise increased significantly to a higher, mean level of 16.2% (range = 0 - 40%). In the PDI-1 phase, parent labeled praise continued to increase and occurred at a mid-level mean of 25.5 % (range = 10 - 40%). Labeled praise decreased to 18% (range = 0 - 37%) during home probes. Labeled praise increased to mean occurrence of 22% of intervals during CDI-1 in the home (range = 17 - 27%). A similar mean of 21.2% (range = 13 - 37%) was observed when CDI-2 was introduced in the home. Labeled praise increased to a mid-level with a mean of 34.6% (range = 27 - 50%) when PDI-2 was introduced in the clinic.

Unlabeled praise. During baseline parent unlabeled praise was at a low mean interval occurrence of 3.8% (range = 0 - 13%). When CDI-1 was introduced, unlabeled praise increased slightly to 5.2% (range = 0 - 13%). In the PDI-1 phase, parent unlabeled praise decreased to a mean level of 2.9 % (range = 0 - 13%). During home probes and the CDI-1 phase in the home, unlabeled praise decreased to 0%. Unlabeled praise increased slightly to 3.8% (range = 0 - 17) when CDI-2 was introduced in the home. Parent unlabeled praise increased to a mean level of 9% (range = 3 - 20%) when PDI-2 was introduced in the clinic.

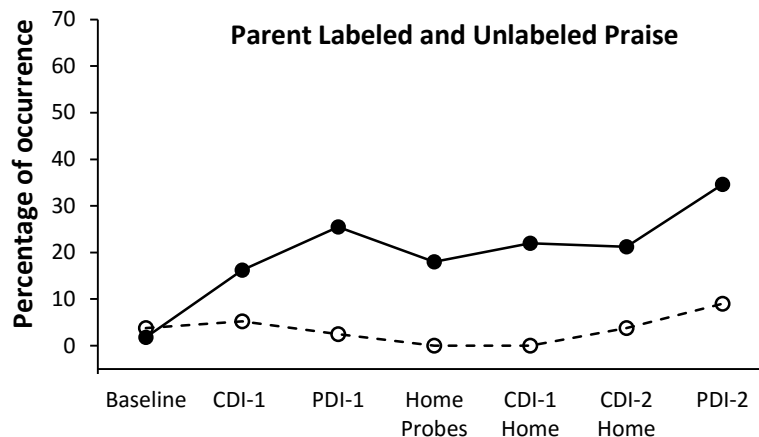


Figure 6. Mean percentage of intervals labeled praise (closed circles) and unlabeled praise (open circles) occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Reflections. Parent reflections across intervention study phases are shown in Figure 7. Parent reflections were variable in baseline with a low mean occurrence of 8.6% (range = 0 - 37%). When CDI-1 was introduced, reflections increased significantly to 21.2% (range = 0 - 73%) with variability ranging from no reflections to a high percentage of occurrence. In the PDI-1 phase, parent reflections continued to increase to a mean mid-level of 34.4 % (range = 3 - 70%) with variability ranging from low to high levels of occurrence. During home probes, reflections decreased to 24.7% of intervals (range = 0 - 37%). Reflections increased to a mid-level at 66.5% when CDI-1 was introduced in the home (range = 53 - 80%). When CDI-2 was introduced in the home, reflections dropped significantly to 9.7% (range = 7 - 13%) with little variability. Reflections increased to 19.4% (range = 0 - 37%) when PDI-2 was introduced in the clinic.

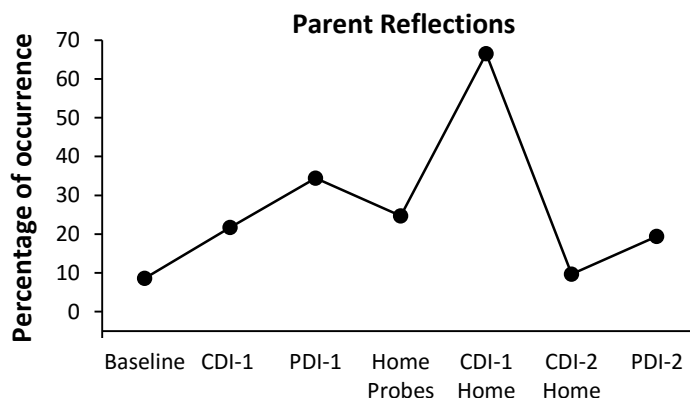


Figure 7. Mean percentage of intervals a parent reflection occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Behavior Descriptions. Parent behavior descriptions across intervention study phases are shown in Figure 8. Behavior descriptions were at 0% during baseline. When CDI-1 was introduced, behavior descriptions increased to a low, mean level of 9.4% of intervals (range = 0 - 27%). In the PDI-1 phase, parent reflections remained at a similar low, mean level of 9.5% (range = 3 - 27%). During home probes, behavior descriptions decreased to a lower mean level of 3% (range = 0 - 6%). Behavior descriptions increased significantly to a mid-level at 40% of intervals during CDI-1 in the home (range = 33 - 47%). When CDI-2 was introduced in the home, behavior descriptions dropped significantly to 8.2% (range = 0 - 20%). Behavior descriptions stayed at a low level of 9.4% (range = 0 - 20%) when PDI-2 was introduced in the clinic.

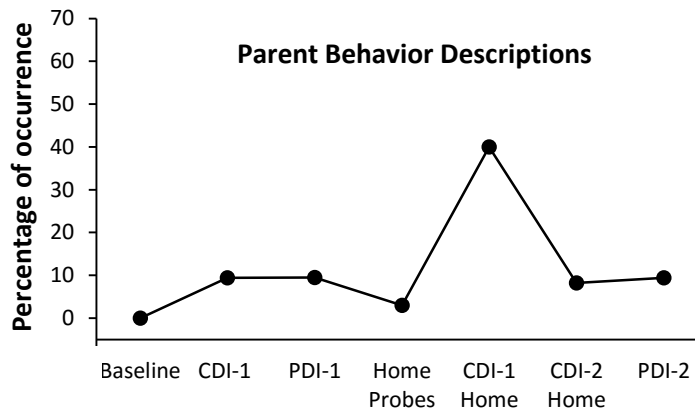


Figure 8. Mean percentage of intervals a parent behavior description occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Touch. Figure 9 represents a comparison of positive and negative touch initiated by the parent or child across intervention study phases.

Positive touch. In baseline, positive touch was at a 0%. When CDI-1 was introduced positive touch increased significantly to a mid-level of 29.3% of intervals (range = 0 - 100%) with variability ranging from no positive touch to continuous positive touch. In PDI-1, the mean level of positive touch decreased to 6.4% (range = 0 - 93%) and was variable from no positive touch to a high level. Positive touch during home probes was at a very low mean level of 1% (range = 0 - 3%) with little variability. During CDI-1 and CDI-2 in the home, positive touch dropped to 0%. In the PDI-2 phase positive touch increased to 8.5% of intervals (range = 0 - 27%).

Negative touch. Negative touch occurred at very low levels throughout the study. Negative touch was at 0% during the baseline phase and marginally increased to a mean level of 0.2% when CDI was introduced (range = 0 - 3%). When PDI-2 was introduced the mean level continued at a very low level at 0.1% (range = 0 - 3%). During CDI-1,

home probes, CDI-1 in the home, CDI-2 in the home, and PDI-2 in the clinic, negative touch remained at 0%.

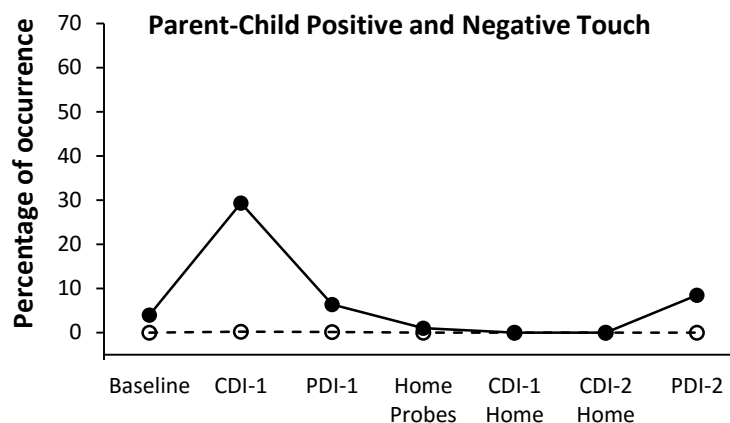


Figure 9. Mean percentage of intervals positive touch (closed circles) and negative touch (open circles) occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Graphic Display of Sibling CDI “Don’t” Behaviors

Sibling CDI “Don’t” data (negative talk and commands) are presented across intervention study phases (x-axis). Behavioral data were calculated by dividing the number of intervals a behavior occurred by 30, the total number of intervals. Calculations resulted in a percentage a behavior was observed (y-axis) using a 10 s partial-interval recording.

Negative talk. Figure 10 shows the change in sibling negative talk across study phases. In baseline, sibling negative talk was at a low level with a mean interval occurrence of 8% (range = 0 - 40%) with variability from no negative talk to a mid-level range of negative talk. When CDI-1 was introduced, interval occurrence of negative talk decreased significantly to low level of 3.3% (range = 0 - 20%).

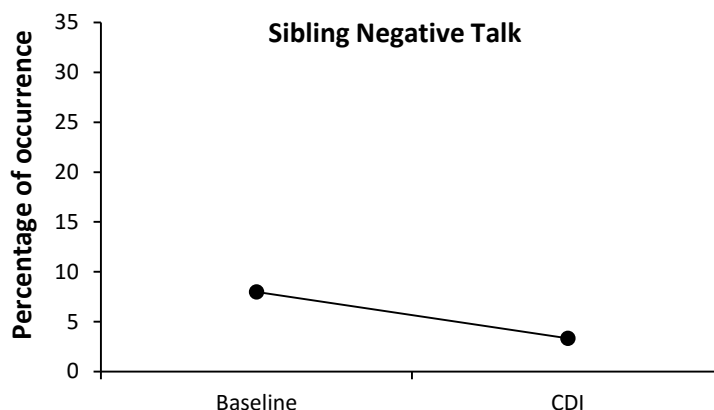


Figure 10. Mean percentage of intervals sibling negative talk occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Sibling commands. Figure 11 shows the change in sibling commands across intervention study phases. In baseline, sibling commands were at a low level with a mean interval occurrence of 3.2% (range = 0 - 13%). When CDI-1 was introduced, the mean interval occurrence of commands decreased to a lower level of 1% (range = 0 - 6%).

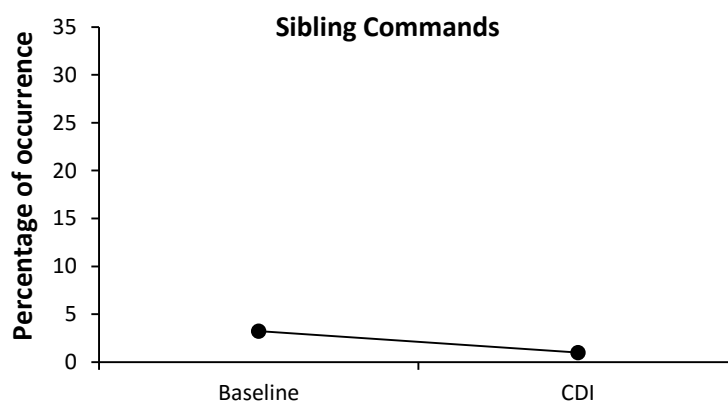


Figure 11. Mean percentage of intervals a sibling command occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Graphic Display of Sibling CDI “Do” Behaviors

Sibling CDI “Do” data (praise, behavior descriptions and reflections) are presented across intervention study phases (x-axis). Behavioral data were calculated by dividing the number of intervals a behavior occurred by 30, the total number of intervals. Calculations resulted in a percentage a behavior was observed (y-axis) using a 10 s partial-interval recording.

Sibling Praise. Figure 12 shows the change in sibling praise across study phases. In baseline, sibling praise was at 0%. When CDI-1 was introduced, the mean occurrence of praise increased to 7.2% (range = 0 - 17%).

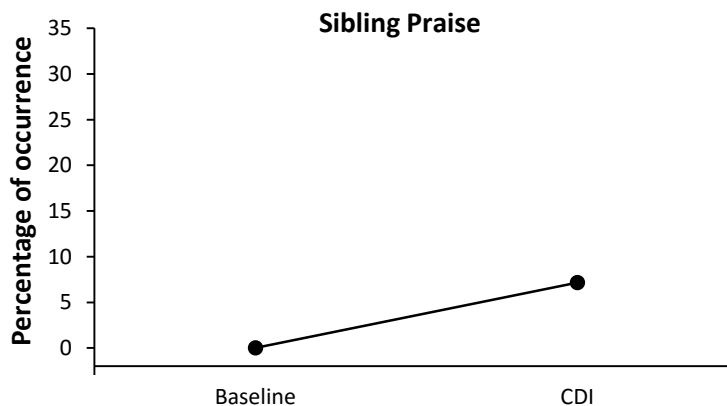


Figure 12. Total percentage of intervals sibling praise occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Sibling Reflections and Behavior Descriptions. Figure 13 shows the change in sibling reflections and behavior descriptions across intervention phases. In baseline, sibling reflections were at 0%. When CDI-1 was introduced, reflections increased to 5.5% (range = 0 – 17%). Sibling behavior descriptions were at 0% in baseline. When

CDI-1 was introduced, behavior descriptions increased to a mean of 2.7% (range = 0 – 13%).

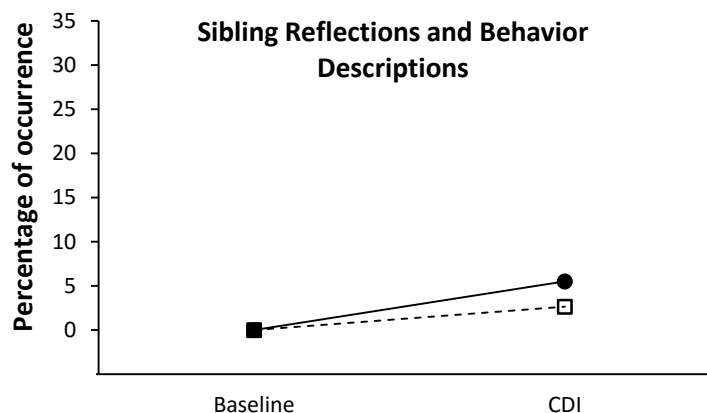


Figure 13. Mean percentage of intervals sibling reflections (closed circles) and sibling behavior descriptions (open squares) occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Collateral Sibling Verbal Behaviors

Sibling questions. Questions were not targeted for reduction in the sibling CDI phase and are therefore considered collateral verbal behaviors. Figure 14 shows the change in sibling questions across study phases. In baseline, sibling questions were at a mean level of 3.3% (range = 0 - 27%) and were variable ranging from no questions to a mid-level of occurrence. After CDI was introduced questions increased to 9% of intervals (range = 0 – 17%).

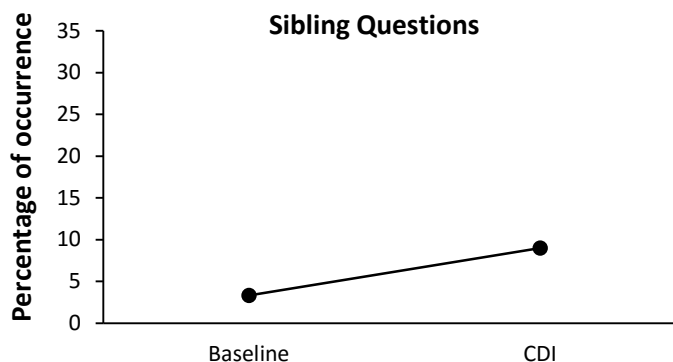


Figure 14. Mean percentage of intervals sibling questions occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Graphic Display of Child Collateral Behaviors

Child collateral behaviors (negative physical interactions, initiation of joint attention, and play) are presented from probes across study phases (x-axis). Behavioral data were calculated by dividing the number of intervals a behavior occurred by 30, the total number of intervals. Calculations resulted in a percentage a behavior was observed (y-axis) using a 10 s partial-interval recording.

Negative Physical Interactions

Child initiated with parent. Figure 15 shows probe data for negative physical interactions initiated by the referred child during parent and child play interactions in clinic. Negative physical interactions occurred at a low level during all observations (i.e., below 25% of intervals). In CDI-1 there was an increase in negative physical interactions before PDI-1 was introduced in clinic. Towards the end of PDI-1, there was an increasing trend in negative physical interactions that decreased to 0% when PDI-2 was introduced.

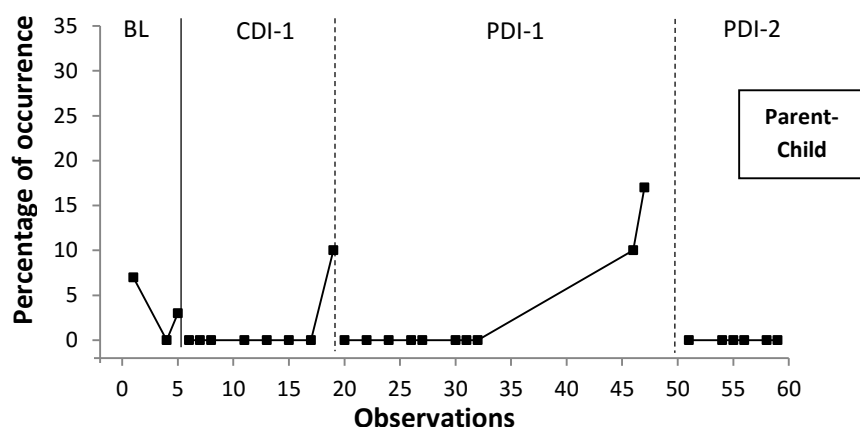


Figure 15. Percentage of intervals parent-child negative physical interactions occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Child initiated with sibling. Figure 16 shows probe data for negative physical interactions initiated by the referred child during sibling-child play interactions in clinic. Negative physical interactions occurred at a low level during all observation probes. In the first baseline observation, negative physical interactions occurred in 6% of intervals and remained at 0% throughout baseline and when CDI-1 was introduced in clinic.

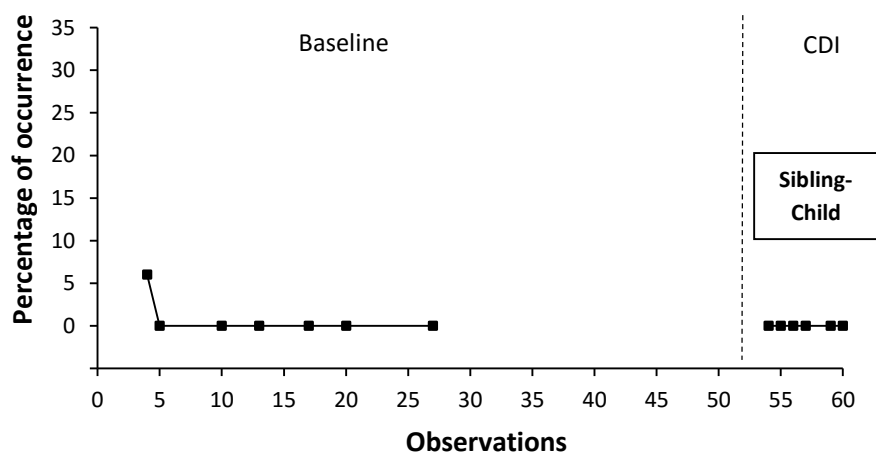


Figure 16. Percentage of intervals sibling-child negative physical interactions occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Initiation of joint attention (IJA)

Parent. Figure 17 shows the change in IJA across intervention phases. In baseline, the child's IJA was at a mean level of 4% of intervals (range = 0 - 13%). After CDI-1 was introduced in clinic IJA increased to a mean of 21% of intervals (range = 3 - 47%) and ranged from a low level to a mid-level of mean occurrence. In PDI-1, the mean level of IJA increased again to 29% of intervals (range = 0 - 40%) and varied from no instance of IJA to a mid-level of mean occurrence. In the final phase, PDI-2, mean occurrence of IJA decreased slightly from previous levels to 23% (range = 3 - 43%) and varied from a low mean level to a mid-level of occurrence. As indicated by the ranges, there was substantial variability in IJA across probe observations in each phase of the intervention.

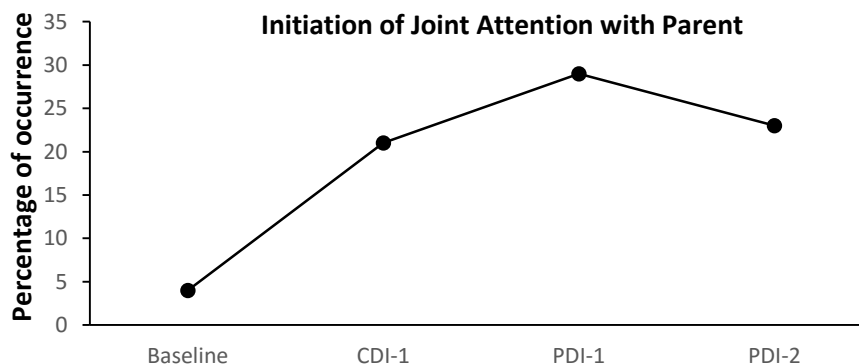


Figure 17. Mean percentage of intervals initiation of joint attention with parent occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Sibling. Figure 18 shows IJA with the sibling across study phases. In baseline, the child's IJA with the sibling was at a mean of 12.9% (range = 0 - 30%) and ranged from no occurrence of IJA to a mid-level of occurrence. After CDI was introduced, IJA

increased marginally to a mean of 13.3% of intervals (range = 0 – 37%) with a range up to a mid-level mean. As indicated by the ranges, there was substantial variability in IJA across sibling-child probe observations.

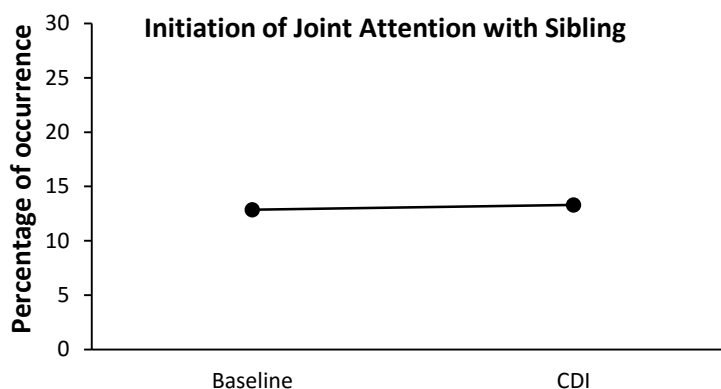


Figure 18. Mean percentage of intervals initiation of joint attention with the sibling occurred during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Parent-Child Play

Figure 19 shows the changes in the mean level of parent and child play interactions across types and intervention study phases.

Cooperative play. In baseline, cooperative play occurred at a mean level of 40% of intervals (range = 0 - 73%). After CDI-1 was introduced cooperative play increased to a mean level of 45% of intervals (range = 7 – 100%) and ranged from a low level to occurrence in every interval. In PDI-1, mean cooperative play increased again to 90% of intervals (range = 40 – 100%) and ranged from a mid-level mean of occurrence to occurrence in every interval. In PDI-2, mean occurrence of cooperative play increased marginally to 91% (range = 50 – 100%) and again ranged from a mid-level mean of occurrence to occurrence in every interval. As indicated by the ranges, there was

substantial variability in cooperative play during baseline and CDI-1. Overall, there was an increasing trend in the mean levels of cooperative play across study phases.

Parallel play. In baseline, parallel play occurred at a mean level of 10% of intervals (range = 0 - 30%). When CDI-1 was introduced, parallel play increased to a mean of 35.3% of intervals (range = 0 – 97%). In PDI-1, the mean occurrence of parallel play decreased significantly to 5.7% of intervals (range = 0 – 30%). In PDI-2, parallel play increased to 16.7% (range = 0 – 90%) with significant variability from no parallel play to a high level of parallel play.

Independent play. Independent play in baseline occurred at a mean level of 50% (range = 23 - 100%). When CDI-1 was introduced, independent play decreased to a mean of 30% of intervals (range = 0 – 93%) with substantial variability from no independent play to a high level of independent play. In PDI-1, the mean occurrence of independent play decreased significantly to 6.7% of intervals (range = 0 – 37%). In PDI-2, independent play decreased again to a mean level of 1.2% (range = 0 – 3%). Overall, there was a decreasing trend in the mean levels of independent play across study phases.

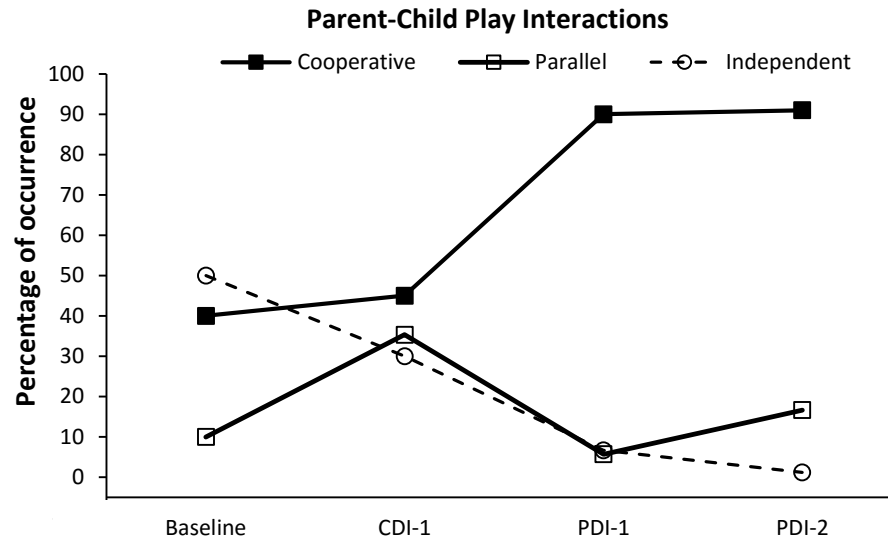


Figure 19. Mean percentage of intervals three types of play occurred between parent and child during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Sibling-Child Play

Figure 20 shows the changes in the mean level of sibling and child play interactions across types and intervention phases.

Cooperative play. Cooperative play during the sibling baseline occurred at a mean level of 22% of intervals (range = 0 - 87%) with variability from no cooperative play to a high level of cooperative play. During CDI-1, cooperative play increased significantly to a mean occurrence of 67.3% of intervals (range = 0 – 100%) with significant variability from no cooperative play to cooperative play occurring in all intervals.

Parallel play. In the sibling baseline, parallel play occurred at a mean level of 28.6% of intervals (range = 0 - 80%) with significant variability from no parallel play to parallel play occurring in all intervals. Parallel play increased to a mean level of 36.5%

of intervals (range = 0 – 100%) when CDI-1 was introduced with significant variability from no parallel play to parallel play occurring in all intervals.

Independent play. Independent play in baseline occurred at a mean level of 56.1% (range = 0 - 100%) with significant variability from no independent play to independent play occurring in all intervals. When CDI-1 was introduced independent play decreased substantially to a mean of 8.3% of intervals (range = 0 – 20%) with less variability.

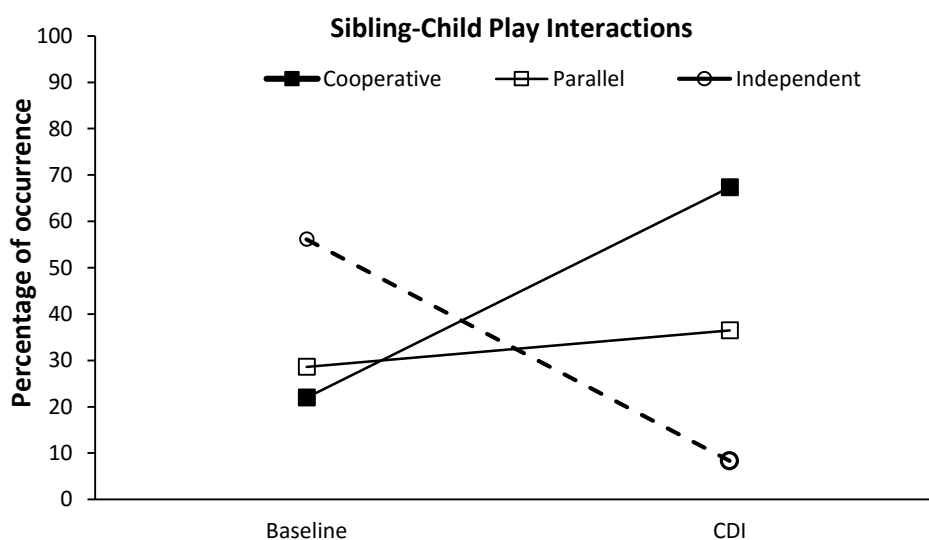


Figure 20. Mean percentage of intervals three types of play occurred between sibling and child during a 5 min observation using a 10 s partial-interval recording procedure across treatment phases.

Outcome measures

Table 8 shows T-scores obtained from norm-referenced composite scales administered before intervention and at the end of the study.

ECBI. The ECBI was administered for progress monitoring and an outcome measure. In sessions 1 through 3 of baseline, the ECBI Intensity Scale T-scores ($T = 83$, 78 , and 70 respectively) measured well above the clinical cut-off of 60 . At the end of the study, the Intensity score decreased $1.8 SD$ from session 1 in baseline.

The ECBI Problem Scale T-score measured below the clinical cut-off in sessions 1 and 2 of baseline ($T = 52$ and 58 , respectively). In session 3 of baseline, before CDI-teach occurred, the ECBI Problem Scale score fell above the clinical cut-off ($T = 73$). At the end of the study the Problem T-score measured at 67 , $0.5 SD$ from session 3 in baseline. The T-score increased $1 SD$ from a T-score of 52 in session 1 to a T-score of 67 at the end of the study.

Figure 21 shows the change in ECBI Intensity raw scores throughout the study. Parent report on the ECBI Intensity fell above the clinical cutoff (raw score of 131) throughout the study. At baseline, the Intensity raw score was 211 . When CDI-1 and PDI-1 were introduced the raw scores stayed at a high level. There was a decreasing trend in the raw scores when in-home coaching and PDI in clinic were introduced. Figure 21 also shows that the “ECBI Talk” (Eyberg & Funderburk, 2011) was conducted at session 27 (PDI coach 13).

Figure 21 also shows the introduction of various medications prescribed by a developmental pediatrician unaffiliated with the study (see open triangles). During the week of session 18, the child started guanfacine (Tenex ®). There was a significant drop in the ECBI Intensity score following this medication, but behavior ratings quickly returned to previous levels. A stimulant, amphetamine/dextroamphetamine (Adderall ®),

was started during the break before session 22. There was an increasing trend in the Intensity score following the introduction of the stimulant. A selective serotonin reuptake inhibitor (SSRI), citalopram (Celexa ®), was introduced the week of session 29. The introduction of citalopram was close to the introduction of PDI-2, during which there was a decreasing trend in the Intensity score.

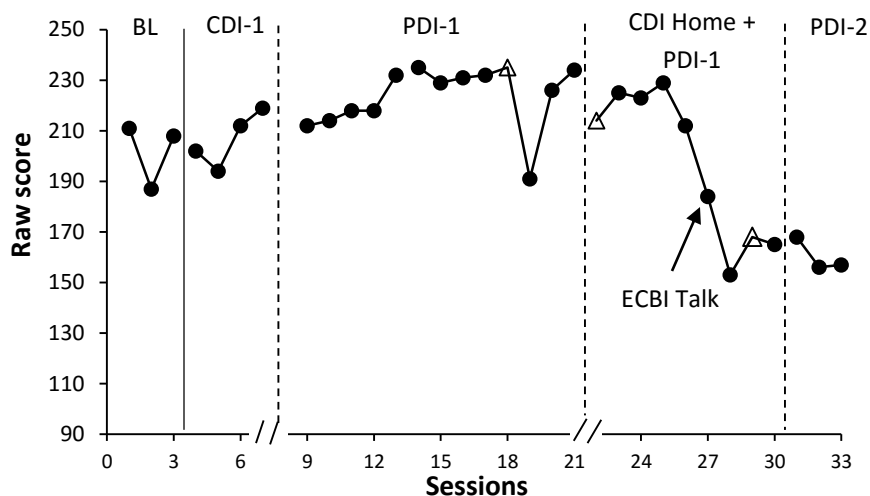


Figure 21. ECBI Intensity scale raw scores across study phases. Open triangles represent an introduction of medication.

SRS-2. On the SRS-2 Total scale, the child's T-score decreased 0.9 *SD* from a T-score of 79 to a T-score of 70. The Social Communication Index T-Score decreased 0.8 *SD* from a T-score of 78 to 70. The Restricted Interests and Repetitive Behavior T-score decreased the most at 1.8 *SD* from a T-score of 80 to a T-score of 68.

CBCL. The Total score on the CBCL decreased .5 *SD* from a T-score of 76 to a T-score of 71. The Internalizing Problems Scale decreased 0.2 *SD* from a T-score of 67 to 65. The Externalizing Problems Scale decreased substantially at 2.1 *SD* from a T-score of 97 to a T-score of 76.

PSI-4. Parent stress was in the average range pre- and post-intervention on the PSI-4. There was a 0.3 *SD* increase pre- and post-intervention from a T-score of 52 to a T-score of 55. On the Child domain, the T-score decreased 0.3 *SD* from a T-score of 62 to a T-score of 59. The Parent Domain fell in the average range pre-and post-intervention and increased 0.7 *SD* from a T-score of 42 to a T-score of 51.

Table 8

Outcome Measures Pre-and Post T-scores

Measure	Pre-T-score	Post T-score
ECBI Intensity	83	65
ECBI Problem	52	67
SRS-2 Total	79	70
SRS-2 Social Communication	78	70
SRS-2 Restricted Interests and Repetitive Behavior	80	68
CBCL Externalizing	97	76
CBCL Internalizing	67	65
CBCL Total Problems	76	71
PSI-4 Total Stress	52	55
PSI-4 Child Domain	62	59
PSI-4 Parent Domain	42	51

Note: ECBI = Eyberg Child Behavior Inventory; SRS-2 = Social Responsiveness Scale-2; CBCL = Child Behavior Checklist; PSI-4 = Parenting Stress Index

Social Validity

The parent's total raw score on the TAI was 48 out of 50, indicating very high satisfaction with the goals, procedures, and outcome of the intervention. The mean satisfaction score was 4.8 (range = 4 - 5). The parent's additional comments on this measure were: *"I feel like everyone within the program took their time, connected, and did so great with our family! I enjoyed working with this group of people who taught us so much in a short amount of time."*

The sibling's responses in the 5 min semi-structured interview indicated satisfaction with the goals, procedures, and outcomes (see all responses in Appendix F). Specifically, in response to the question to assess satisfaction with the intervention procedures ("How did you like learning how to play with [child's name]"), the sibling's response was, *"I liked it a lot. We don't hurt each other and we don't make each other bleed..."* The sibling's response to a question assessing satisfaction with the goals of the intervention ("Tell me about when I had you say nice things to [child's name]"), the sibling replied, *"When I didn't know something, a word that was nice, you would tell me and I would say it to [child's name]. And I gave him toys to play with...and we talked about superheroes some..."* In response to a question assessing the outcomes of the intervention ("Do you think [child's name] liked when you played together?"), the sibling replied, *"I think he liked it a lot because he likes me a lot. And, we play a lot of times when we're at the house."*

DISCUSSION

PCIT is an effective and empirically-supported treatment for behavior problems in young children without cognitive delays (Eyberg, Nelson, & Boggs, 2008; SAMHSA, 2011). There is some evidence that PCIT with or without modifications can be used to treat behavior problems in children with mild cognitive delays. To date there has been one experimental study (Bagner & Eyberg, 2007) that showed the standard PCIT protocol can be used to effectively treat ODD in young children with mild intellectual delays (i.e., IQs between 55 and 75). The current study utilized a modified PCIT protocol that did not use time out and added immediate consequences for aggression. Positive results were shown by decreased negative parent behaviors across settings, increased positive parenting behaviors across settings and contexts, decreased externalizing behavior problems on parent report measures, and increased prosocial behaviors across family members (parent and older sibling).

Analysis of Expected Parent Outcomes

Positive verbal behaviors and differential attention to prosocial behaviors are key ingredients in behavioral parent training programs. Changes in the way a parent views and approaches their child can be considered an antecedent intervention to enhance the parent-child relationship and thus establish the likelihood the child will comply with parent directives when needed. The current study showed notable positive changes in parent behaviors that were in line with the expected results. Generalization was also shown across settings (home and clinic) and contexts (individual play with the referred child and play while the younger sibling was present). As expected, the parent decreased

the use of less supportive verbal behaviors (questions, negative talk, and commands) in the clinic and when coached in the home. Questions and negative talk remained at low levels across study phases in the clinic. On the other hand, the parent showed an increase in negative talk, similar to baseline, when the younger sibling was introduced to parent-child play in the home. This suggests the parent's behavior may have been less nurturing during multifaceted play interactions that required divided attention between children and when interactions occurred in a less-controlled environment like the home. However, in PDI-2 when clinic coaching focused on effective divided attention between the referred child and the younger sibling, negative talk decreased to 0%.

Overall, there was a visible increase in positive verbal behaviors after the first phase of the intervention. The mean level of these verbal behaviors continued to increase across intervention phases in the clinic and increased in the home after direct coaching. The increasing trend in CDI "Do" skills demonstrates the maintenance of positive verbal skills when additional skills were added (effective use of commands) and when the context became more complex (i.e., play while a younger sibling present).

There was a notable increase in parent labeled praise after baseline that increased across study phases. Unlabeled praise stayed at approximately the same level throughout the study with a slight increase in the final phase of the intervention. The increasing labeled praise is a significant positive outcome. Praise that is specific and tells the child exactly what the adult likes has been shown to increase appropriate behavior in children with behavior problems. As a result, labeled praise exists as a key parent skill in behavior training programs (Barkley, 2013; Forehand & McMahon, 1983; Kazdin, 2005; Patterson, et al., 1975; Walker, 1993). The differential positive attention to appropriate

behavior through labeled praise while also selectively ignoring non-aggressive behaviors will likely make the parent-child interaction more pleasurable.

Parent reflections showed the most variability compared to other CDI “Do” skills. There was a significant increase in reflections after CDI-2 home coaching but that level was not maintained. The decrease in reflections in CDI-2 may have occurred for several reasons. Child verbalizations may have decreased during home probes and in contexts when the younger sibling was present, which decreased opportunities for the parent to reflect verbalizations. A decrease in reflections may have also occurred because the parent had increased divided attention between siblings during CDI-2. Furthermore, reflections may have also decreased because negative talk increased during the CDI-2 phase.

Behavior descriptions increased after CDI was introduced in the clinic, showed the least amount of variability throughout the study, and occurred at a lower level compared to other CDI “Do” skills. One reason behavior descriptions occurred at a generally lower level than other CDI “Do” skills may be due to the DPICS-IV priority order used during coding procedures. The priority order is used when a verbalization falls into two separate categories (Eyberg, Nelson, Ginn, Bhuiyan, & Boggs, 2013). For example, the verbalization, “You are making an awesome tower,” while the child is making a tower, could qualify as a behavior description and a labeled praise. However, the labeled praise trumps the behavior description in the DPICS-IV priority order. Therefore, the phrase is only coded as a labeled praise. This hypothesis is in line with the higher level of parent labeled praise compared to other verbal categories, thus accounting for lower behavior descriptions overall.

There was an unpredicted positive outcome of parent-child interactions - an increase in the use of positive touch after CDI was introduced in clinic. In a study investigating the effectiveness of PCIT in 5- to 12-year-old boys with high functioning autism, a significant increase in positive touch, as a dimension of “shared positive affect,” was also shown (Solomon et al., 2008). The significant increase in positive touch should be considered a significant outcome in that positive touch is the opposite of aggression. An increase in parent warmth, as partially demonstrated by positive touch, is a goal in most parent training programs (Patterson, 2005). Likewise, the parent did not use corporal punishment that would qualify as negative touch. This outcome is important given that in a recent parent survey of discipline strategies for children with DDs, 19% of parents endorsed spanking as an acceptable method (Stary et al., 2016). The contrast between positive and negative touch in the current study also shows that the brief physical hold as a consequence for aggression did not increase negative touch between the parent and child.

As predicted, the mean level of effective (direct) commands increased only after PDI-1 was introduced in the clinic and remained at a relatively low level. The mean level of indirect commands, which have been shown to be less effective for children with DDs and a history of non-compliance, also stayed at a lower level across intervention phases. Young children with behavior problems tend to receive more commands than other children, likely making their interactions with adults less rewarding (Forehand, King, Peed, & Yoder, 1975; Strain, Lambert, Stagg, & Lenker, 1983; Walker, 1993). The reduction in the parent’s commands overall in the current study is beneficial for reducing future coercive parent-child cycles (Patterson, 2005).

Setting Generalization

Home probes showed parent CDI skills generalized to the home but occurred with more variability and at a lower level than in clinic. Therefore, it was important that CDI “Do” skills were “trained to generalize” in the home setting (Stokes & Baer, 1977; Stokes & Osnes, 1989). Specifically, after coaching in the home, the parent demonstrated a significant increase in CDI “Do” behaviors and a significant decrease in commands. Likewise, decreased commands generalized to a more complex play situation (CDI-2 in the home) without direct coaching in the more complex situation. Coaching of CDI in the home could be viewed as a supportive therapeutic intervention for the parent outside the clinic. Therefore, in-home coaching reinforced parent behaviors in the setting the family will likely encounter most frequently.

Analysis of Expected Sibling Outcomes

Previous research has shown that siblings can serve as peer models and as therapeutic agents for socialization. The current study showed that a slightly older sibling demonstrated behaviors that can increase the likelihood of problematic interactions between siblings (direct commands and negative talk). The sibling in this study showed a visible increase in selected CDI “Do” skills as predicted. Specifically, the sibling learned to “say nice things” through modeling, role play, and eventually through live coaching with the referred child. The sibling visibly increased praise as well as reflections and behavior descriptions in non-coached play situations. Similarly, the sibling learned to decrease the use of “bossy talk” and showed a visible decrease in the mean occurrence of negative talk and commands. Questions were not targeted for

reduction with the sibling and this behavior showed a notable increase. The increase in questions was likely due to an increase in sibling verbalizations overall.

Analysis of Collateral Behaviors

There is substantial empirical support that PCIT produces a significant reduction in child behavior problems based on parent report and direct observational measures. However, changes in prosocial skill development is often not addressed in the literature. The current study filled that gap and measured changes in parent perception of problem behavior as well as direct changes in prosocial skill development such as play and joint attention. ABA procedures informed the selection of using a brief hold for aggression, rather than ending the play or using time out. This allowed the child to have maximum contact with the therapeutic aspects of play. Social play in young children enhances language, social, and cognitive development and is therefore encouraged in early childhood (Xu, 2008). Play with the sibling allowed the child to come into contact with another play “exemplar” through which the child could generalize social play skills developed with the parent (Stokes & Baer, 1977).

The mean level of IJA with the parent noticeably increased, as predicted, after CDI. Unexpectedly, the mean level of IJA increased again after PDI-1 was introduced. The continued increase of IJA suggests the parent increase of positive interaction skills before the “discipline” phase remained effective even after the parent began to increase demands. An increase in IJA may be a critical skill for children with DDs because once the parent can capture and encourage the child’s visual attention, increased contact with additional reinforcers can occur to facilitate skill development.

The mean level of cooperative play between the parent and child did not increase substantially after CDI as predicted. However, parallel play noticeably increased after CDI was introduced and independent play noticeably decreased. Interestingly, cooperative play increased remarkably after PDI-1 was introduced in clinic. This suggests that the effects of positive parent behaviors on play may occur incrementally across stages of play.

IJA with the sibling stayed at the same approximate level (mean level of approximately 13% in baseline and after CDI). Therefore, the expected outcome of generalization of IJA to sibling-child interactions did not occur. However, sibling-child cooperative play increased before sibling CDI was introduced (sibling baseline range = 0 – 87%), suggesting generalization of adaptive play behaviors to the sibling interactions. Cooperative play also increased substantially after sibling CDI was introduced while independent play decreased remarkably.

It was predicated that child-initiated negative physical interactions would decrease as a result of parent CDI skills. The mean level of negative physical interactions occurred at very low levels throughout the study; therefore, this expected outcome was not supported. Interestingly, before each phase change in the current study, there was an increase in negative physical interactions. It is unclear why there was an uptick in negative physical interactions before condition changes; however, the levels decreased to 0% after each condition change in the clinic.

A decrease in child-initiated negative physical interactions during sibling-child play was also expected after CDI was introduced. However, negative physical

interactions occurred at near 0% throughout sibling-child interactions in baseline and after CDI was introduced. In fact, negative physical interactions were only observed during the first baseline observation. The presence of a research assistant during sibling-child interactions for safety precautions may have inadvertently influenced the occurrence of negative physical interactions overall.

Treatment Effects and Social Validity

Kazdin (2011) outlines two ways to evaluate the effects of a single-case intervention: 1) social validation (changes in social comparison data or subjective evaluation) and 2) clinical significance (behaviors fall within normal limits after intervention). Responses on parent rating scales in the current study suggest positive changes in externalizing problem behaviors. However, these changes failed to meet clinical significance because behavior problems continued to fall outside the normative range on the CBCL and the ECBI. On the other hand, parent report on the TAI indicated a high level of satisfaction with the goals, procedures and outcomes of the intervention. Therefore, the subjective evaluation (rather than the social or normative comparison) supports positive, clinically meaningful treatment outcomes. Likewise, the sibling also attested to satisfaction with the goals, procedures and outcomes of the intervention.

Although treatment dropout is an issue for PCIT and other behavior parent training programs (Fernandez & Eyberg, 2005), the family in the current study stayed the course of the study despite university breaks and additional family stressors such as loss of family income for a month. The mother met PDI mastery criteria; however, the child did not meet the ECBI criteria for graduation (Intensity T-score within .5 *SD* of the

mean). Nevertheless, parent satisfaction with the treatment was high and the treatment met the goals for the family.

The current study chose to use different consequences for non-compliance such as hand-over-hand guidance to maximize therapeutic time and provide separate consequences for physical aggression based on the hypothesized escape-motivated function of the behavior. The effectiveness of time out for young children with cognitive delays is mixed (Plummer, Baer, & LeBlanc, 1977; Walker, 1993). Moreover, time out from positive reinforcement is most useful if the function of the problem behavior is to gain attention or access tangible reinforcers such as toys (Cipani & Schock, 2011). If aggression or other problem behavior is demonstrated to escape parent demands or interactions, time out can reinforce problem behavior. Similarly, the therapeutic time for young children with DDs has to be managed effectively and consequences for problematic behaviors should be considered carefully. A time out would remove the child from contact with contingencies that are in place to enhance the prosocial skill repertoire (Plummer, Baer, & LeBlanc, 1977). Likewise, if the function of the problem behavior is escape, the time out loop can continue for most of the therapeutic time, increase parent frustration, and decrease the likelihood the child will come in contact with other pleasurable activities.

The issue of parent acceptability of discipline techniques such as time out comes into play for children with DDs. In a recent study of 200 parents, acceptability of time out for children with DDs was considered acceptable to 61% of parents, while response cost was at 68% acceptability and positive reinforcement was at 74% (Stary, Hupp, Jewell, & Everett, 2016). Therefore, alternatives to timeout such as least-to-most

prompting with hand-over and guidance may be needed to increase parent buy-in. A high level of parent satisfaction with the procedures and the “connection” with the team was endorsed for the current study. This points to the importance of parent agreement with the treatment approach to decrease drop out and increase buy-in. Parents are less likely to continue with a treatment if they do not support the procedures, which means delayed treatment for the child. The current study also utilized 90 min appointments and child care was provided by clinic research assistants. The additional appointment time allowed the parent to process barriers to homework completion and problem-solve access to other systems of care before coaching. Additionally, in-home coaching and the reduction of financial burdens such as seeking child care for other siblings likely enhanced the parent’s feeling of connection.

Study Limitations and Future Recommendations

There was some overlap between data points from baseline to CDI due to an increasing trend in parent CDI “Do” skills. This is an issue of experimental control. One reason for the possible increasing trend in baseline is that the parent came into contact with clinic research assistants and URAs who use CDI “Do” skills on a regular basis as part of basic clinic procedures. During pre-treatment child care facilitation and during other incidental interactions the parent may have started to notice these clinic assistants’ therapeutic interactions, which may account for the rapid uptick in CDI “Do” behaviors right before CDI occurred. For the sibling portion of the study, there was no immediate change observed in sibling CDI “Do” skills. One reason for this may have been the young age of the sibling. The sibling required several sessions of practice and role play in clinic before live coaching with the referred child.

The non-concurrent multiple baseline with the sibling may be viewed as a research design limitation. The older sibling had a long baseline period and was not readily available for continuous baseline assessment. Additionally, before the sibling received teaching and coaching in CDI skills, there was little reinforcement of his behavior and at times the sibling chose to visit other family members rather than come to clinic. Consistent with IRB standards, the older sibling was never forced to participate. Future studies evaluating the use of siblings as therapeutic agents should take care in making sure the sibling encounters multiple pleasurable events to maintain interest. A sibling preference assessment for certain toys or other preferred activities (coloring, playing with an adult, etc.) could be conducted to sustain sibling motivation.

External validity for the current study is low. Nevertheless, the results are helpful for informing the development of treatment technologies for larger, more rigorous multiple-baseline designs or group studies. The results from the current study cannot be generalized to treatment of other preschool children with ID and co-morbid behavior problem, but the information can be used to inform the flexible use of empirically-supported procedures.

Another limitation of the study was the length of treatment and disruption in treatment. The study was conducted in a university-based clinic. University breaks occurred at three intervals (summer, winter, and spring). The first break occurred during CDI when the parent was approaching CDI mastery in the clinic. After a three month break, there was a spike in commands at a level similar to baseline. The parent's CDI skills quickly recovered, however. The second university break (three weeks) occurred during home coaching and a decrease in CDI "Do" skills was observed after this break.

Lastly, the third break occurred between the spring and summer semesters shortly after PDI-2 was introduced. There was an increase in commands after this break, but there was also an increase in CDI “Do” skills. The disruption in treatment due to long breaks is not optimal for parent training, likely extended the duration of the treatment, and interfered with parent skill mastery.

The referred child did not meet graduation criteria by the end of the study. To the author’s knowledge there have not been any studies evaluating the severity of the child’s behavior or developmental delays as it relates to PCIT outcomes. Most randomized control trials exclude children with multiple comorbid conditions. For example, children with ID and autism were excluded from the only experimental study investigating PCIT in children with mild ID. The child in the current study had high scores on an autism screening measure, the SRS-2, but did not present as a child with autism as measured by the ADOS-2 or other evaluations conducted outside the current study. This may mean that traditional PCIT outcome measures such as the ECBI may not be a valid outcome assessment for this population if used in isolation.

The parent reported daily special play time with the child for 5 to 10 min a day, but parent documentation of homework in the current study was infrequently completed. Special care was taken to remind the parent to bring in homework sheets before clinic appointments but this did not change behavior. Future research studies may wish to offer a parent incentive such as a fuel gift card to encourage parent completion of special play time homework documentation and return of documentation sheets.

A possible confounding variable for the current study was the introduction of three psychotropic medications during the course of the intervention. The parent sought a medication consultation with a developmental pediatrician. The child was reportedly diagnosed with ADHD and ODD during the initial consult. He was reportedly later diagnosed with disruptive mood dysregulation disorder (DMDD) in subsequent visits. According to the DSM-5, DMDD should not be diagnosed in children under 6 years old. Therefore, it is unclear why the referred child received this diagnosis. Medications were prescribed well after the child met the study's inclusion criteria although the introduction of medications during the study was not optimal. Ongoing monitoring of behaviors through parent report on the ECBI showed that after the first medication (guanfacine) was used, there were no parent-reported changes in behavior. Furthermore, after a stimulant medication was introduced (amphetamine-dextroamphetamine) there was no immediate effect. ECBI scores started to decrease a month after the stimulant was introduced and further declined after the clinician administered the "ECBI talk." When an anti-depressant (citalopram) was introduced, no significant changes were noted on the ECBI scores in the final four weeks of the study.

Interprofessional collaboration may have been a missed opportunity in the treatment of the referred child. The referred child had special behavioral healthcare needs that would have benefitted from professional collaboration among the developmental pediatrician, the clinician, and early childhood special education teachers. The PCIT manual contains handouts for teachers and suggests possible points for consultation. Future research studies may address this directly by strategically planning for

interprofessional collaboration through signing the appropriate health care record release documents.

Lastly, one major limitation of the current study was a lack of treatment integrity checks, which may be a threat to internal validity. According to Perepletchikova, Treat, and Kazdin (2007), treatment integrity assesses the level the clinician uses previously set procedures, delivers treatment at a competent level, and the way in which treatment is differentiated across certain important characteristics. The standard PCIT protocol contains treatment integrity sheets that could have been used and modified to monitor treatment integrity for the current study. Internal validity was addressed in other ways. Adequate training of raters who conducted IOA to ensure adequate measurement of dependent variables was a strength in the current study. Likewise, IOA was high for the current study given the level of variables assessed simultaneously. However, IOA was not used for therapist frequency counts to determine parent mastery of skills or measure the child's compliance with commands. Future studies should assign IOA coders for both frequency and interval recording when both are used. This way a reliable assessment of direct changes in child compliance behaviors can occur.

Implications for practice

It is well-documented that untreated disruptive behaviors outside the normative range in preschool years continue through adolescence. Many empirically-supported procedures and programs exist for addressing challenging behaviors in young children. A treatment approach like the one in the current study was in line with evidence-based practice as it demonstrated flexible use of empirically-supported procedures while

addressing the unique challenges of the child and family. Combining ABA procedures frequently used with children with DDs with the PCIT protocol seems to be a natural approach in addressing challenging behaviors in children with DDs. Addressing disruptive behaviors in this population is imperative because challenging behaviors can interfere with skill development, parent-child interactions, and reduce participation in habilitation programs. PCIT treatment as usual, by ending the play for aggression or implementing time out, may be less preferred when working with parents of children with DDs.

The current study addressed barriers to treatment such as childcare, problem-solving parent management of stressors before coaching sessions, and in-home coaching to facilitate skills generalization. Outpatient clinics could disseminate effective parent-training interventions for more families if barriers to treatment were addressed in this way. As much as possible, attention to barriers such as childcare or inclusion of the siblings in treatment should occur. In university-based clinics, volunteer undergraduate psychology, education, or pre-professional health majors may serve as ready candidates to address the onsite childcare issue. Likewise, parent engagement in any intervention is key to preventing dropout. Effective and efficient processing and problem-solving of parent concerns in parent training programs is highly recommended and likely served to prevent attrition in the current study.

Appendix A

Evidence-based Psychosocial Treatments for Young Children with Disruptive Behaviors

Intervention	Population	Citation	Intervention Reference
Prevention Programs			
Incredible Years – Parent Training (IY-PT)	Parents of 3-8 year olds	1,2	Webster, Stratton, & Reid (2003)
Incredible Years- Child Training (IY-CT)	Three to 8-year olds	1,2	Webster, Stratton, & Reid (2003)
Positive Parent Program (Triple P)	Parents	1,2	Sanders (1999)
Project ACHIEVE/Stop and Think Social Skills Program	Parents/Teachers of K-8 th grade	2	Knoff (2001)
First Steps to Success Program	Parents/Teachers of Pre-K - 3 rd graders	2	Walker, Seely, Small, Severson, Graham, et al. (2009)
School-Based Interventions			
Anger Control Training	Elementary age	1	Lochman, Barry, & Pardini (2003)
Coping Power	4 th – 6 th graders	2	Lochman, Wells, & Lenhart (2008)
Early Risers “Skills for Success” Program	Elementary age	2	August, Realmuto, Hektner, & Bloomquist (2001)
Promoting Alternative Thinking Strategies (PATHS) Curriculum	Elementary age	2	Kusché & Greenberg (1994)
Second Step	K – 5 th grade	2	Frey, Hirschstein, & Guzzo, (2000)
Family Interventions			
Helping the Noncompliant Child (HNC)	Parents/3- 8 year-olds	1,2	Forehand & McMahon (1983)
Problem-Solving Skills Training (PSST) + Parent Management Training (PMT)	Parents & children	1,2	Kazdin & Whitley (2003)
Parent-Child Interaction Therapy (PCIT)	Parents/2-6 year-olds	1,2	McNeil & Hembree-Kigin (2010)
Parent Management Training Oregon Model (PMTO)	Parents	1,2	Patterson, Reid, Jones, & Conger (1975)
Multidimensional Treatment Foster Care (MTFC)	Parents/youth in foster care	1,2	Chamberlain & Smith, 2003)

Note: 1= Eyberg, Nelson, & Boggs, (2008); 2 = SAMHSA (2011)

Appendix B

Recruitment Flyer



Treatment of Children with Developmental Disabilities with Co-Occurring Behavior Challenges

This study will provide free therapeutic support for families with a child with a developmental disability (DD) and behavioral difficulties such as non-compliance, aggression, and hyperactivity.

The parents and the typically-developing sibling will learn how to interact with the child in a friendly and positive manner during play interactions. The parents will also receive live coaching and feedback to react productively to challenging behaviors of the child with a developmental disability.

This study will use Parent Child Interaction Therapy (PCIT), an evidence-based treatment that has been shown to be beneficial in the management of children's problematic behavior and in the development of positive behavior in young children with and without developmental disorders.

- Ⓢ Age range for child with developmental disability: 2 – 10
- Ⓢ Age range for sibling of child with developmental delay: 5 – 15
- Ⓢ Duration: 90 minute sessions over 12 - 16 weeks
- Ⓢ Location: Alvin V. Baird Attention and Learning Disabilities Center, James Madison University,
601 University Blvd. Harrisonburg, VA

Ⓢ Cost: Free

Ⓢ Contact: Mariel Smith Cannady, cannadms@jmu.edu

Developmental disabilities could include: autism spectrum disorder, intellectual disability, developmental delay, attention-deficit/hyperactivity disorder, psychological factors secondary to a medical condition.

Please contact Mariel if there are any questions about qualifying for this study.



Appendix C

PCIT RESEARCH STUDY
INTAKE QUESTIONNAIRE

Child's Name _____ ☐ Male ☐ Female

First Middle Last Nickname

Child's Date of Birth _____

Does your child have a diagnosis of autism spectrum disorder (ASD)? ☐ Yes ☐ No

If yes, who made this diagnosis? _____

Where? _____

When? _____

Please list any other diagnoses your child has:

What are the reasons your family is seeing help now?

What type of changes would you like to see with our work together?

Who referred you to our Clinic? _____

If a professional referred you, what concerns would they like addressed during the evaluation?

Mother's Name _____ Father's Name _____

Marital Status:

☐ Married ☐ Separated ☐ Divorced ☐ Widowed ☐ Never Married

Mother's Address _____

Street	City	State	Zip

Mother's Home Phone _____

Mother's Cell Phone _____

Mother's Occupation _____ Work Phone _____

Father's Address _____
 Street City State Zip

Father's Home Phone _____ Father's Cell Phone _____

Father's Home Phone	Father's Cell Phone
Father's Occupation	Work Phone

LIST ALL PERSONS LIVING IN THE CHILD'S HOME

Name	Relationship	Age

BROTHERS & SISTERS LIVING ELSEWHERE

Name	Age

Name	Age

Academic Information:

Child's School				
Name of	School	City	State	School Division

Grade _____ Teacher _____ Principal _____ Grades Retained _____

If child is home schooled, what school division would he/she attend?

Has child ever been evaluated for any special education services? (This includes psychological or educational testing in the school setting.) ☐ No ☐ Yes – Where and When? _____

Is child currently receiving special education services? ☐ No ☐ Yes – If so, child's placement and program

Has your child received special services (i.e. PT, OT, SLP, Special Instruction, vision, etc.)?

If so, when and for how long? What types of interventions were utilized?

Is there anything that you feel should be changed about the school situation or the way he/she behaves or learns at school?

Medical History:

Has your child had a **psychological assessment** ☐ Yes ☐ No

If yes, reason for assessment: _____

Date: _____

Location: _____

Summary of Results:

Has your child had a **neurological assessment** ☐ Yes ☐ No

If yes, reason for assessment: _____

Date: _____

Location: _____

Summary of Results:

Has your child had any other health or educational assessment? ☐ Yes ☐ No

If yes, reason for assessment: _____

Date: _____

Location: _____

Summary of Results:

Is there a family history of diagnosed conditions such as: Autism Spectrum Disorder, Learning Disabilities, Attention-Deficit Hyperactivity Disorder, and Seizures, etc.?

Labor: ☐normal ☐induced ☐C-section

Birth Weight: _____ Full Term Birth? Yes No _____

Please list any medical complications during pregnancy: _____

Is there a history of any difficulties with the following?

(If yes, please describe)

Hearing _____

Vision _____

Ear infections _____

Constipation _____

Reflux _____

Allergies _____

Respiratory Infections _____

Hospitalizations _____

Other _____

Please list all medications your child is taking currently and please explain why. _____

Please list all medications your child may have taken in the past and explain why. Why did the child stop taking them? _____

Does your child have any difficulty with sleep routines? ☐ Yes ☐ No If yes, please explain

What was your child like as a baby/toddler (content, fussy, aggressive, timid)? _____

Speech History:

Did your child cry? normal amount _____ a great deal _____ very little _____

How much cooing? a great amount _____ moderate _____ little _____ one _____

How much babbling? a great amount _____ moderate _____ little _____ none _____

At what age did your child use words meaningfully? _____

Does your child use sentences? ☐ Yes ☐ No

If so at what age did your child use sentences? _____

How did your child's speech development compare with his/her siblings?

If applicable, what age was the speech difficulty first noticed?

If applicable, please describe the speech difficulty

What has been done to overcome the problem?

Is your child receiving private speech or language services? ☐ Yes ☐ No

If yes, by whom? _____

Has your child ever previously received private speech or language services? ☐ Yes ☐ No

If yes, by whom? _____

Hearing History:

Has your child experienced frequent ear infections? ☐ Yes ☐ No

If yes, how many times has your child had an ear infection in the last 6 months? _____

When was the last ear infection? _____

Has your child ever had tubes? ☐ Yes ☐ No If yes, when? _____

Does your child respond the following? (Answer yes, no, or sometimes)

loud sounds _____ soft sounds _____ human voice _____

telephone ringing _____ airplanes _____ automobile horn _____

At the present time, does your child's hearing appear to be better, worse, or the same as usual?

Does your child wear a hearing aid? _____

Has your child had any other hearing tests? _____

Self-Help Skills

Feeding

Does your child have any difficulties with eating, drinking or using utensils?

Toileting

Age toilet trained (please note any problems with toilet training):

Dressing

Does your child have any difficulties dressing for their age (i.e. zipping, fastening, etc.)?

Do you have any concerns related to play?

Do you have any concerns related to the child's sibling relationships?

Do you have any concerns related to the child's peer relationships?

Leisure

What kinds of activities does your child enjoy doing?

What does your child really dislike doing? _____

Are there any barriers to your child's successful participation in activities?

If so, what might help your child to participate in those activities?

Is there anything that may get in the way of attending your sessions (i.e. lack of reliable transportation, child care, chronic health issues, variable work schedule, etc.?)

Appendix D

Parent Informed Consent



Consent to Participate in Research

Identification of Investigators & Purpose of Study

You and your children are being asked to participate in a research study conducted by Trevor Stokes, Ph.D., Director of the Alvin V. Baird Attention and Learning Disabilities Center at James Madison University. The purpose of this study is to provide therapeutic support for families with a child with a developmental or related disability. After initial assessment, the parents and sibling of the child with a developmental disability will learn how to interact with the child in a friendly and positive manner consistent with the procedures of Child Directed Interaction (CDI), which is designed to facilitate attachment and the value of social interactions with children. The parents will also receive live coaching to react productively to challenging behavior of the child with a developmental disability during Parent Directed Interaction (PDI). These procedures are components of Parent Child Interaction Therapy (PCIT), an evidence based treatment protocol.

Research Procedures

Should you decide to participate in this research study, you will be asked to sign this consent form once all your questions have been answered to your satisfaction.

Most of the research procedures will be conducted at the Alvin V. Baird Attention and Learning Disabilities Center in Blue Ridge Hall on the campus of James Madison University. We will also make five to thirty visits to your home to help you implement procedures there if that is advisable.

When at the clinic, we will first meet to talk about the study and about your participation. We will then ask you and your child's sibling to play and interact with your child with a developmental disability so that we may assess the interactions and observe the behavior of your child. We will also teach you and the child's sibling how and when to interact in a positive manner to support the development of prosocial skills.

After you and your child have learned the style of positive interaction, only you will be taught the techniques for discipline and managing challenging child behavior, as well as techniques focusing on listening and following your requests. This will involve providing positive attention to behaviors which are the opposite of the challenging behaviors, stating questions and requests in a way which is better communication, following through with consequences for listening, and reacting in a consistent way to misbehavior and noncompliance by restricting ongoing activity briefly using a sit-out procedure.

All procedures will be implemented and supervised by Dr. Stokes, a Virginia licensed clinical psychologist and his graduate and undergraduate students. Coaching will be in direct interaction with therapists and via a bug-in-the-ear communication system that allows the coach to talk to you or the sibling from behind the one-way mirror while you are in interactive play with your child.

Your interactions will be observed and coded from behind a one-way mirror or from within the clinic room by project staff. Sessions at the Baird Center will be videotaped from behind the one-way mirror.

In addition to observations by us, we will ask you to complete ratings of your children using the Eyberg Child Behavior Inventory (ECBI), the Child Behavior Checklist (CBCL), the Parenting Stress Index-4 (PSI-4), and the Social Responsiveness Scale-2 (SRS-2). We will also ask your child to participate in a structured, play-based assessment of communication, play and social skills, the Autism Diagnostic Observation Schedule-2 (ADOS-2). All of these assessments are well established and researched assessments of child behavior.

Visits to your home will be scheduled at a mutually convenient time when you are all at home, most likely late in the afternoon or early evening. We will ask you and your children to play and interact in your living room / play room as you have been doing at the clinic. There will be no audio or video taping in your home. Visitors to the home will be one to two observers and one therapist at most for each visit. If additional treatment consultations occur in the home because of need, these will be conducted through discussion or using the bug-in-the-ear communication system.

Time Required

Participation in this study will require 12 to 40 sessions of 90 minutes of your time. There will also be 5 to 40 home visits of one-hour duration. Your total time in the study will be 23 to 65 hours, which depends on how quickly you progress through the program. Different families complete the program at various rates because the treatment progresses from phase to phase as each component is mastered by individual families. Extended periods of time in the project are necessary because the treatment of a developmental disability requires many appointments for treatment. There are no costs for the treatment except your own time and transportation costs.

Risks

The investigator does not perceive more than minimal risks from your involvement in this study. The procedures of PCIT are well researched and documented as effective with minimal risk. In previous research on this topic, the investigator has found that parents are satisfied with the procedures as implemented and no adverse events have been noted or reported. Siblings have reported positively about their experiences and positive effects are potentially available for them as well.

Benefits

Potential benefits from participation in this study include the development of more positive and nurturing interaction styles in behavior management, the learning of specific techniques for supporting the development of your child, and the development of more adaptive and positive styles of interaction between the sibling and your child with a developmental disability.

Confidentiality

In order to protect confidentiality, no names will appear on data sheets. You will be identified only by randomized numbers. No information that could identify individuals will be included in any reports or discussions related to this research.

Data sheets will be secured in locked file cabinets at the Baird Center and also stored in computers secured by passwords so that data and information even while coded only by number are accessible only to members of the research team.

The results of this research will be submitted for presentation at professional meetings and for publication and distribution for educational purposes. Confidential data obtained may also be reported without identification in grant applications. The results of the research will be coded in a way that participants' identities will never be revealed in any presentation or publication.

Upon completion of the study, all information that matches up individual respondents with their answers (including audio/video tapes) will be destroyed.

Participation & Withdrawal

Your participation is entirely voluntary. You are free to choose not to participate. Should you choose to participate, you can withdraw at any time without consequences of any kind.

Questions about the Study

If you have questions or concerns during the time of your participation in this study, or after its completion or you would like to receive a copy of the final aggregate results of this study, please contact:

Trevor Stokes, Ph.D.
Director, Baird Center
James Madison University
stokestf@jmu.edu
Telephone: (540) 568.8829

Questions about Your Rights as a Research Subject

Dr. David Cockley
Chair, Institutional Review Board
James Madison University
(540) 568-2834
cocklede@jmu.edu

Giving of Consent

Project Title: Assessment and treatment of children with developmental and related disabilities with co-occurring behavior problems

I have read this consent form and I understand what is being requested of me and my children as participants in this study. I freely consent to participate. I have been given satisfactory answers to my questions. The investigator provided me with a copy of this form. I certify that I am at least 18 years of age.

☐ I give consent to be (*video*) taped during my interview. _____ (initials)

Name of Parent Participant (Printed)

Name of Parent Participant (Signed)

Date

Name of Child Participant

Name of Sibling Participant

Name of Researcher (Signed)

Date



Appendix E

Sibling Assent to Participate in Research



Assent to Participate in Research

What this Study is About

As the sibling of a child with a developmental disability you are being asked to participate in a research study conducted by Dr. Trevor Stokes, at James Madison University. The purpose of this study is to provide help for families with a child who has a developmental disability. You and your parent(s) will learn how to interact with your brother or sister in a friendly manner consistent with procedures called Child Directed Interaction (CDI). These procedures are designed to develop better interactions between you and your brother or sister.

Research Procedures

If you decide to participate in this study, you will be asked to sign this assent form once all your questions have been answered. Your parent will also need to agree that you may participate.

Most of the research procedures will be conducted on the campus of James Madison University. We will also make visits to your home to help you and your sibling during interactions if that would be helpful to you.

When at the clinic, we will ask you and your brother or sister to play so that we may watch the interactions to see how we may teach you both to have more friendly interactions. Sometimes we will watch from behind a one-way mirror and we will also video tape you while you play. We will show you how this is done and take you into both rooms so you know where we are sitting while you play with your brother or sister. We will make suggestions about how to play in a friendly way with your brother or sister. Sometimes we will practice this with you. Sometimes we will talk to you while you play. We will do this by speaking to you through an ear piece which is similar to what you may already use when you listen to music.

Visits to your home will happen at a time when you are at home with your family, most likely late in the afternoon or early evening. We will ask you to play together with your brother/sister in your living room / play room while we watch. We may make suggestions just as we do when you visit us at the clinic.

Time Required

We will ask you to come to the clinic with your parent up to 40 times. There will also be home visits of one-hour duration.

Risks and Benefits

The procedures of this study are well understood and in previous research on this topic, we have found that parents and siblings are satisfied with the procedures because they usually improve positive interactions among brothers and sisters.

Confidentiality

When we talk about this research, you will not be named. If you wish, we can use a name for you which you can decide upon for yourself.

Participation & Withdrawal

You decide if you want to participate - is entirely voluntary. You are free to choose not to participate. If you choose to participate, you can stop at any time and we will understand that is your wish.

Questions about the Study

If you have questions now or later, please ask your parent contact us for you. We will be happy to talk to you again. This is the person to talk to:

Dr. Trevor Stokes
Director, Baird Center
James Madison University
stokestf@jmu.edu
Telephone: (540) 568.8829

Questions about Your Rights as a Research Subject

If we do not answer your questions and you want to talk to someone else, please contact

Dr. David Cockley
Chair, Institutional Review Board
James Madison University
(540) 568-2834
cocklede@jmu.edu

Giving of Assent

I have read this assent form and I understand what is being asked of me. I freely assent to participate. My questions have been answered and I have received a copy of this form.

Name of Child Participant (Printed)

Name of Child Participant (Signed)

Date

Name of Researcher (Signed)

Date



Appendix F

Therapy Attitude Inventory
Eyberg (1993)

Parent Name: _____

Please circle the response for each question that best expresses how you honestly feel.

1. *Regarding techniques of disciplining, I feel I have learned:*

- | | | | | |
|------------|----------------|-------------------------|------------------------------|--------------------------------|
| 1. Nothing | 2. Very little | 3. A few new techniques | 4. Several useful techniques | 5. Very many useful techniques |
|------------|----------------|-------------------------|------------------------------|--------------------------------|

2. *Regarding techniques for teaching my child new skills, I feel I have learned:*

- | | | | | |
|------------|----------------|-------------------------|------------------------------|--------------------------------|
| 1. Nothing | 2. Very little | 3. A few new techniques | 4. Several useful techniques | 5. Very many useful techniques |
|------------|----------------|-------------------------|------------------------------|--------------------------------|

3. *Regarding the relationship between myself and my child, I feel we get along:*

- | | | | | |
|---------------------------|-------------------------------|-----------------------|--------------------------------|---------------------------------|
| 1. Much worse than before | 2. Somewhat worse than before | 3. The same as before | 4. Somewhat better than before | 5. Very much better than before |
|---------------------------|-------------------------------|-----------------------|--------------------------------|---------------------------------|

4. *Regarding my confidence in my ability to discipline my child, I feel:*

- | | | | | |
|------------------------|----------------------------|-----------------------|----------------------------|------------------------|
| 1. Much less confident | 2. Somewhat less confident | 3. The same as before | 4. Somewhat more confident | 5. Much more confident |
|------------------------|----------------------------|-----------------------|----------------------------|------------------------|

5. *The major problems that my child presented at home before the program started are at this time:*

- | | | | | |
|-----------------------------------|-------------------------------|-----------------------|----------------------|---------------------|
| 1. Considerably worse than before | 2. Somewhat worse than before | 3. The same as before | 4. Somewhat improved | 5. Greatly improved |
|-----------------------------------|-------------------------------|-----------------------|----------------------|---------------------|

6. *I feel that my child's compliance to my commands or request is at this time:*

- | | | | | |
|-----------------------------------|-------------------------------|-----------------------|----------------------|---------------------|
| 1. Considerably worse than before | 2. Somewhat worse than before | 3. The same as before | 4. Somewhat improved | 5. Greatly improved |
|-----------------------------------|-------------------------------|-----------------------|----------------------|---------------------|

7. *Regarding the progress my child has made in his/her general behavior, I am:*

- | | | | | |
|----------------------|--------------------------|------------|-----------------------|-------------------|
| 1. Very dissatisfied | 2. Somewhat dissatisfied | 3. Neutral | 4. Somewhat satisfied | 5. Very satisfied |
|----------------------|--------------------------|------------|-----------------------|-------------------|

8. *To what degree has the treatment program helped with other general personal or family problems not directly related your child in the program?*

- | | | | | |
|-----------------------------------|----------------------|--------------------------------|--------------------|---------------------|
| 1. Hindered much more than helped | 2. Hindered slightly | 3. Neither helped nor hindered | 4. Helped somewhat | 5. Helped very much |
|-----------------------------------|----------------------|--------------------------------|--------------------|---------------------|

9. *I feel the type of program that was used to help me improve the behaviors of my child was:*

- | | | | | |
|--------------|---------|-------------|---------|--------------|
| 1. Very poor | 2. Poor | 3. Adequate | 4. Good | 5. Very good |
|--------------|---------|-------------|---------|--------------|

10. *My general feel about the program I participated in, is:*

- | | | | | |
|-------------------------|---------------------------|-------------------|------------------------|-------------------------|
| 1. I liked it very much | 2. I disliked it somewhat | 3. I feel neutral | 4. I liked it somewhat | 5. I liked it very much |
|-------------------------|---------------------------|-------------------|------------------------|-------------------------|

Appendix G

Semi-Structured Sibling Interview Transcript

1. How did you like learning to play with [child's name]?

I liked it a lot. We don't hurt each other and we don't make each other bleed. And, we don't break somebody's body parts. [Did you ever make each other bleed before you started coming here?] (Nods head yes). [Where did you bleed?] He made me bleed on my lip one time (points to lip).

2. Tell me about having the "speaker" in your ear.

You get to hear me say nice things and being nice and sharing. [How did you like having the speaker in your ear?] I liked it a lot. I was sharing and I was saying thank you when he gave me something and when I didn't want something I said no thank you.

3. Tell me about when I had you say nice things to [child's name]?

When I didn't know something, a word that was nice, you would tell me and I would say it to [child's name]. And, I gave him toys to play with and I played with him and we talked about superheroes some. I had to tell him some because he didn't know that one. The first one he knew was Incredible Hulk.

4. Tell me about when I had you share with [child's name]?

I gave him toys and sometimes he gave me toys and I said thank you when he gave me toys. And when he gave me toys I said you're welcome and he said thank you. [How do you like that?] A lot.

5. Do you think [child's name] liked when you played together?

I think he liked it a lot because he likes me a lot. And we play a lot of times when we're at the house.

6. Would you like to come back to play using the speaker in your ear?
(Nods head yes).

Appendix H

DPICS-IV Coding Sheet

DPICS-IV Interval Coding Sheet													
Date: _____		Circle One: Parent		Sibling									
Observer ID: _____		Observer for IOA: Primary		Secondary									
Research Participant ID: _____		Observation #: _____											

		Parent / Sibling Codes										Child Codes							
		NTA	DC	IC	LP	UP	QU	RF	BD	PTO	NTD	NOC	CO	NC	NOA	AN	NA	NTA	Y
Minute 1	1																		
	2																		
	3																		
	4																		
	5																		
	6																		
Minute 2	1																		
	2																		
	3																		
	4																		
	5																		
	6																		
Minute 3	1																		
	2																		
	3																		
	4																		
	5																		
	6																		
Minute 4	1																		
	2																		
	3																		
	4																		
	5																		
	6																		
Minute 5	1																		
	2																		
	3																		
	4																		
	5																		
	6																		
Behavior Total																			
Behavior % (#/30)																			
IOA	Agree/ Total	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
	%																		
RATIO		# of LP + UP + RF + BD / 120 =					# of DC + IC / 60 =												

[illegible]

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