CHILD DIRECTED INTERACTION TRAINING FOR YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDERS: PARENT OUTCOMES, MEDIATORS, AND PREDICTORS OF TREATMENT

By

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To the families who volunteered their time to this study and to the little ones who taught me so much.
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The prevalence of Autism Spectrum Disorders (ASDs) in young children continues to rise, underscoring the need for effective interventions for these children and their families. Intervention research with children with ASDs has shown less than optimal outcomes for nearly 50% of treated children. Parent outcomes in this population; have received less attention, although stress reduction following parent training programs has been reported. Parent-Child Interaction Therapy (PCIT) is a relatively available and inexpensive treatment with demonstrated effectiveness across a variety of child populations for improving child disruptive behaviors and positive parenting practices, as well as reducing parenting stress. The Child Directed Interaction Training (CDIT) phase of PCIT holds particular promise for children with ASDs due to its focus on improving the parent-child relationship in a naturalistic, child-led play situation. This study used a randomized controlled design to (a) evaluate CDIT outcomes for parenting skills and parenting stress and distress in the ASD population; (b) examine changes in parenting behaviors as a possible mediator of child disruptive behavior
outcomes; and (c) explore parent and child predictors of child outcome following CDIT to identify characteristics that may determine optimal child outcome following treatment.

Thirty mother-child dyads with children between the ages of 3 to 7 years with a previous ASD diagnosis participated in this study. Results revealed that following manualized CDIT, mothers learned to provide positive attention to their children’s appropriate social and play behaviors and these skills were maintained at 6-week follow up. Mothers also showed significant reductions in parent distress associated with child disruptive behavior. Exploratory analyses also provided evidence for child IQ, child adaptive behavior, maternal stress associated with difficult child behaviors, and maternal distress as predictors of child outcomes following CDIT. These results provide preliminary evidence of the efficacy of CDIT for changing parent behaviors and reducing distress for mothers of young children with ASDs. It also suggests that outcomes following CDIT may be optimal for children with higher IQ and adaptive functioning and families with lower reported maternal stress and distress, but that outcomes may not differ across the 3-7 age range and differing ASD symptom severity.
Prevalence and Description of Autism Spectrum Disorders (ASDs)

Children with an Autism Spectrum Disorder (ASD) experience deficits in reciprocal social interaction and communication skills and also show evidence of severely restricted or stereotyped interests and behaviors that are evident before age 3 (APA, 2000). Current estimates of the prevalence of ASDs, which include Autistic Disorder, Asperger Syndrome, and Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS), suggest that as many as 1 in 88 children are affected (Centers for Disease Control and Prevention, 2012). Although a great deal of research has focused on assessing child outcomes for the growing number of interventions available for this population, less research has focused on parent outcomes and determining which child and parent factors predict child outcomes.

Parents of Children with ASDs

Parents of children who have an ASD consistently report higher parenting stress than parents of typically developing children (Dumas et al., 1991; Smith et al., 2001). Additionally, these parents report higher levels of stress when compared to parents of children with chronic physical illnesses (Bouma & Schweitzer, 1990) as well as other developmental disorders including Down Syndrome (Sanders & Morgan, 1997) and mental retardation (Konstantareas et al., 1992). Perhaps the most consistent finding has been the high levels of stress reported by parents of newly diagnosed children with ASDs, which is likely influenced by the search for and initiation of services that typically occurs during this time (Davis & Carter, 2008; Keen, Couzens, Muspratt, & Rodger,
Previous research suggested that mothers experience more stress than fathers. More recently, however, comparable stress levels have been reported between mothers and fathers (Davis & Carter, 2008). These findings of elevated stress among parents of children with ASDs have been consistent across assessment measures including global assessments of stress as well as parent questionnaires specifically designed for children with and without disabilities (Koegel et al., 1992; Sharpley et al. 1997).

Among parents of children with ASDs who report high levels of stress, several child factors have consistently been associated with elevated parenting stress. Perhaps the most consistently cited child symptoms associated with parent reported stress are those related to social skills. Specifically, social impairments including social relatedness, social skills delays, and limited prosocial behaviors have been found to be predictive of higher levels of parenting stress (Bebko et al. 1987; Davis & Carter, 2008). Child symptom severity (Hastings & Johnson, 2001), language and communication impairment (Bebko et al. 1987), behavior problems (Lecavalier, Leone, & Witlz, 2006), and variable cognitive functioning abilities (Koegel et al., 1992) in preschool and school aged children have also been found to contribute to parent’s stress. These findings suggest that interventions that target child’s social, communication, and disruptive behaviors may also function to reduce parental stress.

Parents who are more stressed have been found to rate child behavior as more severe on parent-report measures when compared with objective measures used by clinicians (Davis & Carter, 2008). This suggests that parent stress may impact not only their view of the severity of their child’s behaviors, but may also have important implications for the selection of appropriate interventions for children because many
clinicians rely on parent-report questionnaires when referring families for treatment. Parent stress has also been associated with child progress and response to treatment. Higher levels of parent stress have been associated with less parent engagement in intervention services as well as lower levels of child response to treatment (Kasari & Sigman, 1997; Osborne, McHugh, Saunders, & Reed, 2008). These findings are especially true for interventions, such as Pivotal Response Training, that typically include a parent component to treatment (Robbins, Dunlap, & Plienis, 1991). Although previous research has typically focused solely on child outcomes following ASD interventions, these findings underscore the need to assess parenting stress both at pre-and post-treatment. This would allow researchers to understand better how stress might affect children’s outcomes following treatment, and may also help to determine which interventions are efficacious for reducing parent stress.

**Treatments for Children with Autism Spectrum Disorders**

Lovaas’s Applied Behavior Analysis (ABA; Dunlap, Kern-Dunlap, Clark, & Robbins, 1991) or Discrete Trial Training (DTT; Maurice, Green, & Luce, 1996) is currently the only treatment designated as a well-established evidenced-based treatment for children with Autism Spectrum Disorders (Rogers & Vismara, 2008). Lovaas’s ABA is based on operant theory and applies behavioral principles such as rewards, punishment, and ignoring to increase appropriate prosocial and language behaviors and reduce maladaptive aggressive or self-stimulatory behaviors (Lovaas, 1987). ABA treatment, including the Lovaas and Smith (2003) Young Autism Project (YAP) includes one-on-one intensive training conducted by a trained therapist for typically 40 or more hours per week. ABA treatment begins with one year of Discrete Trial Training. DTT includes six stages which focus on elements such as establishing a
teaching relationship with the child, beginning and expanding communication skills, adjusting to school expectations, and engaging in appropriate peer relationships. These skills are taught to the child through the use of clear, short instructions from the therapists followed by prompts to facilitate child response to instructions and immediate reinforcement following correct child responses (Lovaas & Smith, 2003; Campbell, Herzinger, & James, 2008).

Lovaas's (1987) initial study findings with a population of high functioning children with an ASD indicated that 48 percent of his sample showed normative intellectual and educational functioning following treatment, compared with only two percent in the control group. These findings have been replicated consistently in various settings, including community based settings, by a variety of research studies using well-designed randomized controlled trials (Lovaas & Smith, 2003; Rogers & Vismara, 2008; Sallows & Graupner, 2005). Notably, however, studies that attempted to replicate Lovaas's findings with less intensive treatments or lower functioning child populations have found fewer child outcome gains when compared with Lovaas's original study (Smith, Groen, & Wynn, 2000). Although research on Lovaas's ABA and DTT have shown improvements in child functioning, little research has been conducted to examine the effects of these interventions on parents, including their stress following treatment.

An additional treatment approach that has received empirical support is the naturalistic teaching method, which includes Pivotal Response Training (PRT; Koegal, Koegal, Harrower, & Carter, 1999), the Floortime or Developmental, Individual difference, Relationship-based model (DIR; Greenspan & Wieder, 1999), and the Treatment and Education of Autistic and Related Communication Handicapped Children
(TEACCH; Meisbov, 1994) program. Interventions based on the naturalistic teaching approach focus on skill use and acquisition in a natural situation like playtime, rather than an adult-directed situation, to allow for generalization across situations (Boutot, 2009). Naturalistic-based interventions focus not only on learning prosocial or communication skills in a child-led, play situation, but also aim to make play situations and interactions more rewarding and to increase spontaneous engagement in play activities by incorporating behavioral reinforcement strategies into the interactions. (Boutot, 2009; Rogers & Vismara, 2008).

Perhaps the naturalistic teaching method with the most research support is Pivotal Response Training (PRT; Koegal et al. 1999). PRT is derived from developmental and applied behavior analysis theory and uses child-led naturalistic interactions to develop child motivation and initiative. Rather than focusing on specific focal skills, PRT focuses on the areas of functioning that are most disabling for children with ASDs, deemed the “pivotal areas,” with the idea that treatment effects should also generalize to other areas of functioning. Key components of this treatment include teaching children to respond to environmental cues, as well as increasing motivation, self-management, and self-initiations (Koegal et al., 1999; Baker-Ericzen, Stahmer, & Burns, 2007). Following PRT, children with ASD have typically shown improvements in the domains of adaptive functioning, communication, social, problem behaviors, and play (Koegel et al., 1999; Koegal, Koegal, Shoshan, & McNerney, 1999). A study conducted by Sherer & Screibman (2005) found an increased interest in toys and increased verbal self-stimulatory behaviors as well as a decrease in nonverbal self-stimulatory behaviors in ASD children following PRT. Similar to Lovaas’s ABA interventions, however, the
naturalistic teaching interventions have typically focused on child outcomes with little focus on examining the efficacy of these treatments for reducing parental stress and improving parent functioning.

An emerging development in child ASD treatments has been the application of parent-training programs. The benefits of parent-based interventions have been widely documented for childhood disorders and include cost effective treatments that allow for consistency of treatment skills and generalization of the child’s abilities outside of treatment sessions (Brookman-Frazee, Stahmer, Baker-Ericzenn, & Tsai, 2006; McConachie & Diggle, 2007). A systematic review of available parent implemented interventions for young children with ASDs (McConachie & Diggle, 2007) found improvements in child social communication and receptive language following treatment. Parental training and education programs have also shown improvements in child verbal and nonverbal communication, appropriate play behaviors, and child initiation of play following treatment, which in some studies have shown maintenance for up to 6 months following treatment (Brookman-Frazee et al., 2006; Elder et al., 2010). ASD treatments that include parenting components have also shown initial evidence of improvements in parent competence, skills, and stress following treatment (Brookman-Frazee et al., 2006; Elder et al., 2010).

Parent training programs that contain a focus on improving the quality of parent-child relationship through the implementation of new parenting skills have also shown support for changing parenting behaviors and reducing parent stress, especially in the domain of child-related stress (Kaminski, Valle, Filene, & Boyle, 2008; Keen et al., 2010). Although child and parent results to date are promising, McConachie and Diggle
(2007)’s review of parent-implemented interventions for children with ASDs suggested that research on parent training programs for children with ASDs has often been limited by weak research designs, small sample sizes, and other methodological shortcomings and more research is needed in order to understand more fully their impact on this population of families.

Of the behavioral treatments available for children with ASDs, support has been shown for treatment components that include teaching children appropriate communication skills, play behaviors, and social skills while also emphasizing joint attention and utilizing predictable routines (Dawson & Osterling, 1997). More recent interventions have also shown promising findings for the inclusion of naturalistic treatment approaches which emphasize parent-training techniques and the use of child-led play with child-selected reinforcers paired with target behaviors to encourage improvement in communication and social behaviors that generalize across settings (Boutot, 2009). Current interventions, however, are often time and cost intensive, difficult to replicate due to a lack of manualized treatments, and limited in availability, especially to low-income, non-metropolitan, and minority families (Rogers & Vismara, 2008; Thomas, McLaurin, & Morrissey, 2007). Additionally, few studies include parent outcome variables to assess the efficacy of ASD interventions for changing parenting skills and stress levels.

**Parent Child Interaction Therapy**

Parent Child Interaction Therapy, a manualized, evidence-based treatment for young children with disruptive behavior, shows particular promise for the treatment for young children with ASDs. PCIT is a relatively accessible and inexpensive treatment that has been shown to be effective in treating children disruptive behavior problems
across a range of populations including children with a history of child abuse (Chaffin et al., 2004) and children with an intellectually delay (Bagner & Eyberg, 2007). PCIT is theoretically based on Baumrind’s (1976) developmental research on authoritative parenting style as well as attachment and social learning theories. It focuses on teaching parents positive parenting skills combined with consistent, firm limit setting (Zisser & Eyberg, 2010).

PCIT consists of two phases: Child-Directed Interaction (CDI), which focuses on increasing parental warmth and strengthening the parent-child relationship; and Parent-Directed Interaction (PDI), which teaches parents a structured and consistent approach to discipline. The Child Directed Interaction (CDI) phase of PCIT which includes an emphasis on following the child’s lead in play, parental use of differential attention to shape children’s behavior, and increasing parent-child attachment (Harwood & Eyberg, 2006), may be a particularly promising intervention for children with ASDs. These components have been associated with increased child prosocial behaviors and improvements in the quality of parent-child relationships in children with disruptive behavior problems (Eisenstadt, Eyberg, McNeil, Newcomb, & Funderburk, 1993). The CDI phase of treatment also shares similarities with naturalistic teaching interventions, like Pivotal Response Training (PRT), because it focuses on a child-led play situation with familiar play objects that creates a comfortable setting for the child and also facilitates motivation to interact and play with parents. This child-led play situation creates an environment in which the child views play, as well as parent-child interaction, as a positive, rewarding experience and promotes social and communicative learning as well as skill generalization (Masse, McNeil, Wagner, & Chorney, 2008). During CDI,
parents are also taught to use positive parenting techniques including praise, reflection, imitation, description, and enthusiasm (Eyberg, 1982) that allow parents to provide appropriate social modeling while also providing differential reinforcement for appropriate social and communicative behaviors. Together, the shared components from parent based and naturalistic interventions as well as support for behavioral changes from CDI with other populations, suggests that CDI may be an effective intervention for children with Autism Spectrum Disorders.

Initial pilot studies using PCIT with high functioning children with ASDs have shown promising gains in the domains of prosocial verbalizations and shared positive affect (Abner, 2008; Solomon, Ono, Timmer, & Goodlin-Jones, 2008). Additionally, case study research provides promising support for PCIT as an effective treatment for the reduction of aggressive and noncompliant behaviors in high functioning child with an ASD (Budd et al., 2011; Masse et al., 2008). A companion study is examining the effects of CDI training (CDIT) for increasing verbal, social, and behavioral functioning in children with ASD within a larger sample. The current study, however, is focused exploring the effects of CDIT on parents with children with ASD.

PCIT has shown consistent efficacy for improving positive parenting skills and reducing parent stress across various child populations including children with disruptive behavior disorders (Schuhmann et al., 1998), parents with a history of abuse (Chaffin et al., 2004), and mental retardation (Bagner & Eyberg, 2007). These findings have been shown to be maintained over time (Eyberg et al., 2001; Hood & Eyberg, 2003). Additionally, there is evidence for the reduction of total parenting stress following the
Little research has yet been conducted on parent outcomes following PCIT with the ASD population. A study examining an adaptation of PCIT with 19 high functioning children with ASD (Solomon et al., 2008) found a significant decrease in parental distress associated with disruptive behaviors as measured by the Eyberg Child Behavior Inventory (ECBI) following treatment. They failed, however, to find changes in the parent’s self-report of total parenting stress and did not report parental subscale ratings of stress related to the parent-child interaction. In a recent case study with a 5 year old autistic child with a comorbid diagnosis of Disruptive Behavior Disorder-Not Otherwise Specified (Budd et al., 2011), parents showed significant changes in parenting skills following treatment and also showed a reduction in parenting distress as well as stress related to parenting a difficult child and to the parent-child interactions. These findings provide initial support for the efficacy of PCIT for reducing child-related parenting distress and stress as well as promoting changes in positive parenting, although research is needed on the CDI phase of PCIT alone with children with an ASD.

**Importance of Treatment Mediators and Predictors of Outcome**

Throughout the literature on treatments studied with children who have an ASD, large percentages of children (i.e., nearly 50% in Lovaas’s studies of ABA) fail to demonstrate “optimal” gains across intellectual, communication, social, and adaptive functioning domains following treatment (Sherer & Schreibman, 2005). There is little insight, however, as to why certain children respond better than others to treatments. Across the child and adolescent treatment literature in general, there exists a paucity in research examining for whom interventions are most effective and determining how or
why treatments operate (Kraemer, Wilson, Fairburn, & Agras, 2002). This deficit in research is also evident in the ASD intervention literature. Recent reviews suggest that few studies examine predicting variables and less than 20% of articles examining interventions for children with ASDs include discussion of possible mediating variables; none of these studies include methodologically appropriate statistical analyses to examine these variables (Wolery & Garfinkle, 2002).

Mediators

Due to the paucity of mediator research in the ASD intervention literature, it is useful to examine variables that have been shown to mediate child outcomes in parent training interventions with other child disorders. The child and family treatment literature has identified several parenting behaviors, including increases in parental monitoring, decreases in negative parenting, and increases in family cohesion, as mediators of treatment outcomes in children with ADHD and delinquency (Hinshaw et al., 2000; Huey et al. 2000). Decreases in verbal criticism and harsh parenting practices were also found to mediate parent-training treatment outcomes for children with early-onset conduct problems (Beauchaine, Webster-Stratton, & Reid, 2005). Parent behaviors, including parenting behavioral changes measured during assessments of the parent-child interaction were also found to mediate the relationship between treatment participation and social skills outcomes in children with ADHD (deBoo & Prins, 2007). This research suggests that changes in parenting behaviors may serve as a mediator for outcomes for children across many diagnostic groups following parent training.

In the PCIT literature, Bagner and Eyberg (2007) found that changes in observed parenting behaviors during parent-child interactions (i.e., increases in positive parenting and decreases in negative parenting), from pre-to post-PCIT, mediated behavior
changes in children with intellectual delays. It was thus hypothesized that the outcomes in CDIT for children with ASDs might also be explained by similar parent mechanisms during treatment. The goal of this study was to examine change in parenting variables during CDIT for children with ASDs in order to determine whether child behavior changes are mediated by similar parent variables in this population as well.

Child Predictors of Outcome

The heterogeneity in child outcomes following interventions for children with ASDs has not been well accounted for; however, there is some support for several child predictors including intellectual and adaptive functioning as well as severity of symptoms and age of treatment entry (Perry et al., 2011). Child IQ and adaptive functioning, which are often highly correlated, have perhaps received the most research support as predictors for ASD intervention outcome thus far. Children’s IQ prior to treatment onset has been shown to predict a variety of treatment outcomes including communication and socialization (Makrygianni & Reed, 2010), as well as adaptive functioning (Makrygianni & Reed, 2010; Perry et al., 2011). Higher IQ at pre-treatment has also been associated with higher levels of appropriate play behavior including gaze at mothers and toy play (Dawson & Galpert, 1990). Nonverbal IQ at pre-treatment has also been related to improved language, adaptive functioning, and symptom severity after treatment (Gabriels et al., 2001).

Similarly, adaptive functioning, as measured by the Vineland Adaptive Behavior Scale, has been shown to predict the social skills of children with ASD (Sallows & Graupner 2005; Makrygianni & Reed, 2010). The predictive value of IQ and adaptive functioning in children with ASDs has also been shown across various interventions including Lovaas's ABA (Lovaas 1987; Sallows & Graupner, 2005) and other early
intensive behavioral interventions (Perry et al., 2011). To our knowledge, however, no study has examined intelligence or adaptive behaviors as predictors of outcomes in parent training based interventions for children with ASDs.

Within the ASD population, children’s age and ASD symptom severity at pre-treatment have been associated with mixed outcomes. Children rated as having less severe ASD symptoms at treatment onset have been associated with greater cognitive, adaptive, and language gains following treatment than more severely rated children (Itzchak & Zachor, 2011; Makrygianni & Reed, 2010). However, child symptom severity was not found to predict treatment progress in naturalistic treatments like DIR or Floortime (Greenspan & Wieder, 1999). Child age has also been an inconsistent predictor of outcome. In one study, Makrygianni and Reed (2010) found that younger age at treatment onset was associated with less severe symptoms and increased receptive language scores at post-treatment. Similarly, Perry and colleagues (2011) found that younger age was predictive of higher adaptive and cognitive scores following treatment (Perry et al., 2011). These findings, however, have not been replicated in study samples of children with ASD in the 2-to 7-year age range, which have often shown no association between outcome and age for children (Granpeesheh et al. 2009; Perry et al., 2011). In addition to these inconsistent findings, which may be a result of restricted age ranges, previous studies examining child predictors have also been criticized for examining eclectic treatments or combining various treatments to examine predictors of outcomes, which doesn’t allow for a determination of predictor variables for specific interventions (Gabriels et al., 2001). It will be important to assess these potential child predictor variables further for specific interventions to determine child
characteristics that suggest certain interventions that may be optimal for specific children with ASDs.

**Parent Predictors of Outcome**

The role of family characteristics and parent predictors has received significantly less attention than child predictors in the literature on potential predictors of ASD intervention outcomes. Parenting stress, however, has been identified as a potential predictor of child outcomes in various ASD interventions. In intensive behavioral treatment programs, such as ABA, low parenting stress has been associated with better child adaptive and intellectual functioning outcomes (Osborne et al., 2008). Parenting stress has also been predictive of less child language, communication, and socialization gains following treatment (Makrygianni & Reed 2010). Evaluating parenting stress as a predictor of child outcomes in parent training intervention programs for children with ASDs is especially important because it is possible that highly stressed parents are less likely than less stressed parents to implement intervention skills at home with their children following treatment sessions. This failure to implement skills at home also makes it less likely that child behaviors will generalize to other settings. Research on the effects of parenting stress in parent training interventions has suggested there is a strong relationship between parenting stress and parent engagement in treatment as well as child progress in treatment (Kasari & Sigman, 1997; Osborne et al., 2008). Strong relations between parenting stress and child treatment outcome have been found with many parent training programs and many diagnostic groups of children including PCIT for children with disruptive behavior problems (Werba, Eyberg, Boggs, & Algina, 2006) and the Triple P positive parenting program for preschool children with comorbid ADHD and disruptive behavior problems (Bor, Sanders, & Markie-Dadds,
It is likely that parenting stress also serves as a predictor of outcome following the CDI phase of PCIT for children with ASDs as well.

Maternal depression has also been suggested as an outcome predictor for child ASD treatments (Gabriels et al., 2001). Parental depressive symptoms have been extensively documented as a predictor variable in child and family literature in studies examining outcomes of child externalizing disorders (Beauchaine, Webster-Stratton, & Reid, 2005) and child ADHD (Owens et al., 2003). Similar to parenting stress, it seems likely that parents experiencing elevated levels of depressive symptomology may be less likely to practice parenting skills learned in parent training treatment and as a result children may be less likely to generalize treatment outcomes.

**Study Aims and Hypotheses**

This study sought to examine the efficacy of Child Directed Interaction Training (CDIT) for reducing stress and distress and improving positive parenting skills for parents of children with an Autism Spectrum Disorder. An additional focus of the study was to assess potential mediators and predictors of child outcomes of CDIT. Study aims and hypotheses are as follows:

**Aim 1:** To determine whether Child Directed Interaction Training (CDIT) improves parenting skills of parents with children with an Autism Spectrum Disorder (ASD) following treatment when compared to a waitlist control group.

**Hypothesis 1.1:** Primary caregivers in the immediate treatment (IT) group will demonstrate significant improvement in their use of positive parenting skills following treatment (Time 2 assessment) when compared with primary caregivers in the waitlist control (WL) group.
Hypothesis 1.2: Primary caregivers in the IT group will demonstrate a significant reduction in their use of negative parenting skills following treatment when compared to primary caregivers in the WL group.

Hypothesis 1.3: Six weeks following CDIT completion, primary caregivers will maintain changes in parenting behaviors when compared to baseline and post-treatment.

Aim 2: To compare improvements in parenting stress and distress associated with child disruptive behaviors, as measured by parent self-report questionnaires, between the CDIT IT group and the WL group.

Hypothesis 2.1: Primary caregivers in the IT group will report greater reductions in parenting stress associated with the Parent-Child Dysfunctional Interaction, Difficult Child, and Parent Distress subscales of the PSI-SF than parents in the WL group.

Hypothesis 2.2: Primary caregivers in the IT group will report greater reductions in total parenting stress than parents in the WL group.

Hypothesis 2.3: Primary caregivers in the IT group will report greater reductions in parenting distress associated with disruptive child behavior than parents in the WL group.

Aim 3: To examine mechanisms of child behavior change over the course of treatment using the indirect model (Hayes, 2009) of mediation.

Hypothesis 3.1: Changes in primary caregivers’ parenting skills will mediate child disruptive behavior change following treatment.
**Aim 4:** To explore child predictors of child outcomes following CDIT across all children. Possible predictor variables include child age at pre-treatment, autistic symptom severity, IQ, and adaptive functioning.

**Aim 5:** To explore parent predictors of child outcomes following CDIT. Potential parent predictor variables with past research support to explore are parenting stress and depressive symptoms.
CHAPTER 2
METHOD

Participants

Participants were 30 families with children ages 3 to 7 with a previous diagnosis of an Autism Spectrum Disorder (ASD). A priori power analyses were conducted using G*Power 3.1 to determine the number of parent-child dyads needed to conduct proposed analyses using an F test to yield within and between group effects. To yield a 95% confidence interval for statistically significant results, using a conservative effective size estimate of .80, it was determined that a sample size of 30 parent-child dyads would be needed, with 15 families assigned to the Immediate treatment group and 15 families assigned to the Waitlist group. This power analysis was conducted using data from a CDIT outcome study with biological mother-child dyads participants in treatment for disruptive child behavior using effect sizes found on the Parenting Stress Inventory-Short Form (Eisenstadt et al., 1993).

For study inclusion, child participants were required to be between the ages of 3 years 0 months and 7 years 11 months, and have had a previous diagnosis of an ASD from a healthcare professional. This diagnosis was confirmed in this study using the CARS-2 measure at the Time 1 assessment. Additional child inclusion criteria included cognitive functioning at the 2-year-old level or higher with the ability to speak at least 3 words or word approximations, which could include incomplete or incorrectly spoken words, as long as they had the meaning of words. Of note, due to the high comorbidity of ASD and Intellectual Disorder (ID) diagnoses, in combination with the known effectiveness of PCIT with children diagnosed with ID (Bagner & Eyberg, 2007), children
with dual diagnosis of ASD and ID were not excluded from the study. The final child inclusion criterion for the study allowed children to be taking medications to help manage their behaviors, as long as the child had been stable on the same medication and dosage for the month prior to the first study evaluation and remained on the same medication regimen for the duration of the study. Due to the prevalence of ASD children receiving multiple services concurrently, children participating in occupational, physical, or speech therapies were not excluded from the study; however, children receiving additional behavioral treatments (i.e., ABA) were not included in the study. Additional exclusion criteria for participants included a child history of severe sensory impairments (i.e. blindness), or suspected abuse or family crisis requiring child out-of-home placement during the study.

Primary caregivers were identified for the study as the parent or guardian who was able to attend all assessment visits and weekly treatment sessions and complete study measures. Efforts were made to include secondary caregivers in treatment whenever possible. To ensure that primary caregivers would have the capacity to learn the skills in treatment and generalize them beyond the treatment sessions, they also had to have cognitive functioning above a standard score of 75 on the Peabody Picture Vocabulary Test-III or completion of at least 2 years of college. A summary of inclusion and exclusion criteria can be found in Table A-1.

Families were recruited from multiple referral sources including the University of Florida Psychology Clinic (33%), UF Child and Adolescent Psychiatry outpatient clinics (17%), other research studies (10%), local pediatrician offices (10%), local speech and occupational therapist offices (10%), elementary and preschools (3%), and via
recruitment fliers and other sources (17%). Children in the present sample had a mean age of 4.72 years ($SD = 1.32$) at the time of enrollment in the study, and most of the children were male (80%). The children’s racial/ethnic background was 83% Caucasian, 10% Hispanic, and 7% bi-racial. Of the children in the study, 40% had a diagnosis of Autistic Disorder, 7% Asperger’s Syndrome, and 53% Pervasive Developmental Delay, Not Otherwise Specified (PDD-NOS).

All primary caregivers were female with a mean age of 36.80 ($SD = 1.32$) at the time of enrollment in the study. Mother’s racial/ethnic background was 87% Caucasian, 7% Hispanic, and 7% bi-racial. Educational attainment of mothers varied with 3% completing less than a high school degree, 13% completing high school, 33% attending some college or technical school, 23% graduating college, and 28% completing some graduate education. Of the 30 families, 50 percent participated with a secondary caregiver, of whom 93 % were the child’s biological father and 7 % were the child’s stepfather.

Families were randomly assigned to the Immediate Treatment (IT) group ($n=19$) or the Waitlist Control (WL) group ($n=20$). For the purposes of this study, however, only data on study completers (30 families; IT $n= 15$ and WL $n= 15$) were included in analyses. As shown in Table 2-1, no significant demographic differences were found between groups.

Aside from the 30 families who completed treatment, 9 families also attended a Time 1 assessment, met study inclusion criteria, and were randomized to a treatment condition. These families, however, did not attend their Time 2 assessment, and thus were considered study drop outs. The study drop outs consisted of 5 families.
randomized to the WL group and 4 families randomized to the IT group. Of the 9 families, only 2 families completed 1 or more treatment sessions before drop out and the remainder of families ended study participation prior to their first treatment session. Overall, the study dropout rate was 23% and treatment dropout rate was 5%, which reflects a significantly lower drop out rate than other child treatment outcome studies for families referred for behavior management treatment programs which often report drop out rates between 50 and 75% (Wierzbicki & Pekarik, 1993).

Reasons for drop out prior to starting treatment included: changes in medication or behavioral treatments outside the study (22%), changes in family stressors and availability (22%), financial difficulties that prevented attendance at assessment or treatment sessions (11%) and unknown due to loss of contact with the family (44%). Of the two families that dropped out of the study after beginning treatment, reasons for drop out included parental stress due to divorce and child behavior improvement in school.

A comparison of study dropout rates between the IT (n= 4) and WL (n=5) groups were not statistically significant. Independent samples t-tests and chi square analyses were conducted in order to analyze potential demographic differences between study drop outs and completers. Only child age was significantly different between groups, with younger children in the completer group, t(37)= 2.09, p < .05. See Table 2-2 for demographic information for study completers and drop outs. See Figure 2-1 for a display of study participant flow from screening through follow-up.
Measures

A list of all measures and the assessments at which they were collected can be found in Table A-2.

Family Demographic Questionnaire

A parent questionnaire was administered to the child’s primary caregiver at the Time 1 assessment to provide descriptive information about the child and family including sex, age, race/ethnicity, occupation, household income, education level, and medical history. See Appendix B for the Demographic and Background Questionnaire.

Semi-structured Interview

A semi-structured clinical interview was conducted with the primary caregiver at the Time 1 assessment to gather information on the child’s developmental, sociobehavioral, family, and treatment history. See Appendix C for the Semi-structured interview.

The Childhood Autism Rating Scale

The Childhood Autism Rating Scale, Second Edition (CARS2; Schopler, Reichler, & Renner, 1988; Schopler, Bourgondien, Wellman, & Love, 2010) is a 15-item observational rating screener developed to identify children with ASDs while distinguishing them from children with developmental disabilities without a comorbid ASD. Internal consistency of .94 and 1-year test–retest reliability of .88 have been reported (Schopler et al., 1988). Inter-rater reliability ranged from a correlation coefficient of .55 (Level and Consistency of Intellectual Response) to .93 (Relation to People), with an average inter-rater reliability of .71 (Schopler, Reichler, & Renner, 1988). The second edition of the CARS (the CARS-2) keeps the original format of the CARS and adds a form for evaluating children with High Functioning Autism and a
parent-report questionnaire to aide diagnosis. There are two versions of the CARS-2: the Standard version, appropriate for children younger than 6 or those with language or intellectual delays, and the High Functioning version, appropriate for children over the age of 6 or those with fluent language and IQ scores above 80. Prior to the Time 1 assessment, the assessor chose the CARS-2 version for use based on child age and characteristics. This clinical observation tool was administered at the Time 1 assessment to confirm the child’s ASD diagnosis for inclusion in the study and to provide a measure of ASD symptomatology severity.

**Differential Abilities Scale**

The Differential Abilities Scale, Second Edition (DAS-II; Elliott, 2007) is a brief, comprehensive measure of ability that is designed to measure the cognitive strengths and weaknesses in individuals between the ages of 2 years 6 months and 17 years 11 months across a broad range of developmental tasks. The DAS-II is divided into two main testing batteries: The Early Years battery and the School-Age battery. The Early Years core battery includes verbal, nonverbal, and spatial reasoning subtests appropriate for ages 2:6 through 6:11. The battery is divided into two levels: children ages 2:6–3:5 and 3:6–6:11. The younger children are administered four core subtests to obtain the General Cognitive Abilities (GCA) composite score and children ages 3:6–6:11 take six core subtests which contribute to the GCA composite score. Although these subtests focus on ages 2:6-6:11, they can also be used to assess children ages 7:0–8:11 who are suspected of having cognitive delay. In addition, a non-verbal cognitive functioning score can be obtained for children with very little language. The School-Age core battery contains subtests that can reliably be used to assess children ages 7:0 through 17:11. These subtests measure verbal, nonverbal reasoning, and
spatial reasoning abilities. The subtests can also be used to assess children ages 5:0–6:11 who may be cognitively gifted. Testing usually takes 20-30 minutes, and the subtests can be given in any order to enhance child cooperation. The DAS-II was administered at the Time 1 assessment to screen for children with cognitive functioning determined to be below the 2-years, 7 months level. The DAS-II subtest scores and overall GCA scores were also used as a measure of the child’s intellectual functioning for the current study.

**Peabody Picture Vocabulary Test**

The Peabody Picture Vocabulary Test, Third Edition (PPVT-III: Dunn & Dunn, 1997) is a well-standardized measure of receptive language in individuals’ ages 2.6 years through 90 years. The PPVT-III was used to assess children’s and parents’ levels of receptive language. A standard score of 75 or higher was required for study inclusion for parents who had not obtained the equivalent of a 2-year college degree. Children’s receptive language standard scores functioned as a demographic descriptive measure of the children and an outcome measure in the study.

**Vineland Adaptive Behavior Scales**

The Vineland Adaptive Behavior Scales, Second Edition (Vineland-II; Sparrow, Balla, & Cicchetti, 1984; Sparrow Cicchetti,, & Balla, 2005) is comprised of a semi-structured interview that assesses personal and social skills in children from birth through 18 years, 11 months. The Parent/Caregiver form covers the same content as the Survey Interview, but uses a rating scale format. Internal consistency coefficients for the Survey Form ranged from .83 to .94. Test-retest reliability for domains was .83 to .90; with an Adaptive Behavior Composite of .88. The Vineland-II demonstrates strong construct and concurrent validity. The Vineland-II Parent/Caregiver form was
administered at all 3 assessments to track changes in children’s adaptive behaviors across time points.

**Eyberg Child Behavior Inventory**

The Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999) is a 36-item parent rating scale of disruptive behavior. The Intensity and Problem scales yield internal consistency coefficients with preschoolers of .95 and .93 (Eyberg & Pincus, 1999); interrater (mother-father) reliability coefficients of .69 and .61 (Eisenstadt, McElreath, Eyberg, & McNeil, 1994); test–retest reliability coefficients of .80 and .85 across 12 weeks and .75 across 10 months, respectively (Funderburk, Eyberg, Rich, & Behar, 2003). In this sample, internal consistency estimates for Intensity and Problem Scales were .91 and .83, respectively. T-scores of 60 or higher are clinically significant on the ECBI Intensity and Problem scales. The ECBI is completed weekly by the primary and secondary caregivers to assess treatment progress in PCIT. For the current study, the ECBI Intensity Scale score was used as a measure of child treatment outcome and the ECBI Problem score was used as a measure of parents’ distress outcomes.

**Dyadic Parent-Child Interaction Coding System**

The Dyadic Parent–Child Interaction Coding System (DPICS-III; Eyberg, Nelson, Duke, & Boggs, 2004) is a behavioral observation coding system that measures the quality of parent–child social interaction during three 5-minute standard situations that vary in the degree of parental control (i.e., child-led play, parent-led play, and clean-up). For the purposes of this study, only the child-led play situation was conducted and coded. The convergent and discriminative validity of the DPICS categories have been extensively documented and the psychometric data are summarized in the DPICS
manual (Eyberg et al., 2004). The DPICS was administered to all caregivers and
children at all major assessments, as well as during the first 5-minutes of the parent-
child interaction of CDIT sessions. DPICS coding sessions were video-taped for later
coding.

For this study, to examine changes in parent-child interactions DPICS composite
categories were created. The “Do skills” composite category (behavior descriptions,
reflections, labeled praises) is composed of skills parents were taught to use to provide
positive attention to the child. The “Don’t skills” composite category (questions,
commands, critical statements) is composed of skills parents were taught to avoid
during CDIT to allow the child to lead the play. Undergraduate student coders were
trained to 80% reliability with two criterion tapes before coding the parent-child
interactions. The coders were uninformed of treatment status (IT or WL) prior to coding.
Interrater and Cohen’s kappa reliabilities for the parent coding category used in this
study were calculated for one-third of observations completed. Interrator reliability for
parent DPICS codes ranged from 77% (behavior descriptions) to 93% (information
question) and Cohen’s kappa reliability scores ranged from .73 (indirect command) to
.92 (information question). (See Table 2-3).

Social Responsiveness Scale

The Social Responsiveness Scale (SRS: Constantino & Gruber, 2005;
Constantino et al., 2000) is a 65-item rating scale that measures the severity of autism
spectrum symptoms as they occur in natural social settings, such as interactions with
parents or peers, for children 4 to 18 years old. The items are rated on a 4-point Likert
scale ranging from “not true” to “always true,” and informants are asked to consider the
last 6 months. This parent-completed measure takes approximately 15 to 20 minutes
and provides a clear picture of a child's social impairments, assessing social awareness, social information processing, capacity for reciprocal social communication, social anxiety/avoidance, and autistic preoccupations and traits. In addition to a Total Score reflecting severity of social deficits in the autism spectrum, the SRS generates scores for five Treatment Subscales: Social Awareness, Social Cognition, Social Communication, Social Motivation, and Autistic Mannerisms. The SRS standardization sample was composed of more than 1,600 children from the general population. Norms are provided for rater (i.e., parent, teacher) and for the rated child’s gender. Test-retest stability ranged from .77 to .85 for parent ratings, and mother-father interrater reliability was .91. Discriminant validity, concurrent validity, structural validation, and factor analytic studies have been established. In the current sample, internal consistency was estimated to be .84 for the Total Score. The SRS was administered to the parents of all children over 4 years of age at each of the three assessments and the Total Score was used as an outcome measure of children’s social functioning for the current study.

**Parenting Stress Index-Short Form**

The Parenting Stress Index–Short Form (PSI-SF; Abidin, 1995) is a 36-item self-report scale containing three empirically derived subscales (Parental Distress, Parent-Child Dysfunctional Interaction, Difficult Child), which differ from those of the longer PSI, but correlate in the expected direction with the domains of the longer form. The PSI and the PSI-SF total scores are highly correlated with one another (.94). The short form subscales have shown Cronbach’s alphas from .80 to .91 and 6-month test-retest reliabilities from .68 to .85. In this sample, internal consistency estimates for the Parent Distress, Parent-Child Dysfunctional Interaction, and Difficult Child subscales were .80, .63, and .84, respectively. Additionally, internal consistency for the PSI-SF total score
was estimated to be .88. The PSI-SF was administered to all caregivers at each assessment.

**Adult Self Report for Ages 18-59**

The Adult Self Report for Ages 18-59 (ASR; Achenbach & Rescorla, 2003)) is a 123-item self-report measure of adult emotional and behavioral problems. Each item is rated on a three-point scale from (0) *not true*, to (2) *very true or often true*. Item scores are summed into empirically derived narrow- and broad-band scale scores. The item ratings may also be used to derive scale scores corresponding to DSM-IV diagnoses (depressive problems, anxiety problems, somatic problems, avoidant personality problems, ADHD problems, and antisocial personality problems). Internal consistency coefficients ranged from .51 to .88 for the empirically based narrow-band scales and from .68 to .84 for the DSM-Oriented scales. Test-retest correlations ranged from .77 to .86 for the DSM-Oriented scales, and all DSM-Oriented scales demonstrated discriminative validity in distinguishing referred from non-referred samples. Internal consistency estimates in this sample for the Anxious/Depressive, Depressive Problems, and Internalizing subscales were .89, .82, and .91 respectively. The ASR was administered to primary caregivers at the pre-treatment assessment as a measure of adult depressive and internalizing symptoms.

**Study Design and Procedure**

**Experimental Design**

The study was approved by the University of Florida Institutional Review Board and it was designed using Chambless and Hollon’s (1998) criteria for effective research design in evaluating intervention outcomes. A randomized controlled trial (RCT) was conducted to compare a CDIT treatment group with a wait-list control group. This design
allowed the study investigators to compare the Immediate treatment group with the Waitlist control group to determine the specific effects of CDIT while controlling for other effects such as time (Chambless & Hollon, 1998).

All families participated in a Time 1 assessment after being recruited into the study. Following this assessment and study inclusion eligibility, half of the families were randomized into Immediate treatment (IT) condition (n=15) and started CDIT one week after their Time 1 Assessment and the other 15 families were randomized to the Waitlist (WL) condition and started CDIT 12 weeks after their Time 1 assessment. All families participating in the study completed all 3 major assessments. The Time 2 assessment occurred following treatment for the IT group and after 10 weeks for the WL group. Finally, all families also participated in the Time 3 assessment, which occurs as a 6-week-follow-up for IT families and as a post-treatment assessment occurring within 1 week of treatment completion for families in the WL group. A table showing the assessment and treatment timelines is found in Table A-3.

**Phone Screening**

After a family contacted the study and expressed interest in study participation, a phone screener was conducted by one of the assessors. During this phone screener, basic information about the family was collected including parent and child name, contact information, child birth date, and child ASD diagnosis. Additional information regarding the child’s ASD symptoms, using a DSM-IV checklist of ASD behavior, and specific parent concerns was also collected. During the phone screener, families were also provided with information about the study procedures, wait-list design, and inclusion and exclusion criteria. Following completion of the phone screener, interested
and eligible families were scheduled for their Time 1 assessment. An outline of the phone screener is included in Appendix D.

**Study Assessments**

**Informed Consent:** At the beginning of each Time 1 assessment, the study’s principal investigator or co-principal investigator met with each family to review and complete the informed consent. The informed consent process included a review of limits of confidentiality as well as the purposes of the study, its methods, and procedures. During this discussion, the study investigators also reviewed parental expectations, experience, and knowledge related to ASD, and provide a summary of available evidence regarding ASD treatments for young children. The informed consent process also included a review of community treatment standards, risks and benefits, treatment options outside the study, requirements of participation, and the right to withdraw at any time without penalty. The study’s randomization process was also explained to participants at this time and they were informed that some families would not begin treatment for as long as 12 weeks if they were randomized to the Waitlist condition. Additionally, all participants in the study were told during the informed consent process that if they or their child reported child abuse to the researchers, or if the researchers observe evidence of child abuse or abusive behavior at any time during the study, the researchers would be required by law to report this information to the appropriate agents and agencies.

After completing the informed consent process with families and answering any questions from the caregivers, primary caregivers who agreed to participate documented their informed consent by giving their written signature on the informed consent form. For families with secondary caregivers participating, secondary
caregivers were also required to sign their own informed consent document. Child assent was not obtained due to the children’s age and possible inability to understand the study procedures and potential costs and benefits to participants. After signing the informed consent, parents were provided with a copy of the document to take home and review at their leisure. If parents determined that they did not want to participate in the study, were unwilling to wait to begin treatment for 12 weeks if they are randomized into the WL condition, or refused to sign the informed consent document, they were excluded from the study and provided with additional referrals for treatment at the Shands Psychology Clinic and elsewhere in the community.

**Time 1 Assessment**

The Time 1 assessment was conducted after each family met inclusion and exclusion criteria in the phone screener and prior to the onset of treatment. This assessment was conducted by the Co-Project Investigators of the study. The goal of this first assessment was to complete the study’s informed consent, administer the cognitive and ASD observational assessments in order to further determine study inclusion criteria, conduct the semi-structured clinical interview, and collect child and caregiver baseline data. Following the informed consent process, primary caregivers completed the demographic questionnaire, ECBI, Vineland-II, PSI-SF, ASR, Social Responsiveness Scale, and other forms, while the secondary caregivers complete the ECBI and PSI-SF forms. During this time, the study investigator administered the PPVT-III and the DAS-II to the child to further establish treatment eligibility and collect data on child receptive language abilities. Primary caregivers who had not obtained a 2-year college degree also completed the PPVT-III. Following these assessments, caregivers
and their children completed the DPICS parent-child interaction observations in a child led play situation for 10 minutes in order to code parent DPICS skills at pre-treatment. Finally, the caregivers were asked to participate in a semi-structured interview with the study investigator in order to gather information regarding developmental and educational histories as well as specific concerns and treatment goals. Once the family completed their Time 1 measures and the assessor reviewed them for any missing or incomplete items, the study investigator discussed the preliminary results of the assessment with family. Families who meet study criteria were contacted in the next several days following the Time 1 assessment to inform them of their treatment group assignment. Those families who do not meet criteria were referred to other local treatment options as appropriate.

**Time 2 and 3 Assessments**

Time 2 Assessments were completed by both the IT and the WL group after the IT group had completed treatment; 12 weeks after the family’s Time 1 assessment. The Time 3 Assessment was completed by the IT group 6 weeks after the Time 2 Assessment and was completed by the WL group after they completed treatment. These assessments were conducted by the study investigators or a trained undergraduate research assistant. Time 2 and 3 assessments were identical to one another and similar to Time 1 assessments except that the informed consent process, semi-structured clinical interview, PPVT-III for parents, and DAS-II were not re-administered. Families were paid $10 for completing each of these assessments and received a total of $20 dollars following the completion of their Time 3 assessment.
Randomization

Following completion of the Time 1 assessment, eligible families were randomly assigned to one of two treatment conditions: Immediate Treatment (IT) or Waitlist Control (WL). To ensure that both treatment conditions were similar in terms of children’s ASD symptom severity, a stratified randomization approach was used to assure there would be equal numbers of children from each of the three diagnostic groups (Autistic Disorder, Asperger’s Disorder, and PDD-NOS) in the two experimental conditions, the IT and WL groups. This stratified randomization process specified that there would be 3 lists of identification numbers corresponding to each diagnostic category. Within each of these lists, a group of 3 numbers was randomly pre-assigned to either the IT or WL group. Immediately following a family’s completion of the Time 1 assessment and determination of treatment eligibility, the study investigator randomly selected an identification number corresponding to the child’s specific diagnostic category. This number was pre-assigned to either the WL or IT group and determined the family’s treatment status. No random number was used more than once. An example of this process is as follows: if following a Time 1 assessment a family with a child who had a diagnosis of PDD-NOS was determined to be treatment eligible the study investigator randomly assigned them a number that corresponded to their diagnostic list, in this case the PDD-NOS list. This number would have been pre-assigned to either the WL or IT group and determined the family’s treatment status. The family was then contacted by the study investigator to inform them of their treatment status and either scheduled for their first therapy appointment or provided with information of when they could expect to be contacted for their next assessment if they were in the WL group.
Treatment

Families received 8 total CDIT sessions across a 10 week period. Sessions were 75 minutes long, held once per week, and were conducted by either one of the study’s investigators as a therapist or by 1 of 5 other trained graduate student in child clinical psychology with prior experience and training as a PCIT lead therapist. The first session, CDIT Teach, aimed to teach parents the CDI skills identical to those taught during standard PCIT treatment. The CDIT Teach session facilitated parental acquisition of skills through instruction, modeling, and role playing. Parents were taught the “Do” skills, which include Labeled Praise, Reflection, and Behavior Description. They were also taught to use enthusiasm in play and to imitate the child’s play. Parents also learned the “Don’t” skills which includes Questions, Commands, and Critical statements. This session also included a particular focus on tailoring these skills to the particular domains that each family identified as target behaviors for treatment. For example, for a family who expressed eye contact and social interaction as behavioral targets for their child, the therapist included a discussion of tailoring the skills to reinforce these specific behaviors (e.g. providing label praises for eye contact). Parents also learned the techniques of “active ignoring” in order to manage attention seeking or self-stimulating behaviors during play. Finally, the therapist also encouraged parents to practice these CDIT skills at home, daily for 5-minutes of “special time” and provided parents with a list of appropriate toys to use during this time.

The remaining 7 CDIT sessions included both discussions with the families as well as in-vivo practice and coaching of the CDIT skills. These sessions started with a review of parents’ “special time” practice and the child’s behavior at home in the past week and also included a discussion of difficulties that may have arose in finding time for or
completing “special time.” After a 5-10 minute discussion with the family, the remainder of the session was spent coding and coaching the parent’s CDIT skills in play with their child. Coaching focused on helping parents to obtain mastery of the CDIT skills (e.g. 10 Labeled praises, 10 Behavior descriptions, 10 Reflections; and fewer than 3 total Questions, Commands, or Criticisms) during the 5-minute interval of coding that occurred during each session. Another focus of coaching was to help parents tailor the CDIT to the specific needs of their child in order to work to improve the child’s social, adaptive, and language functioning while also decreasing disruptive behaviors. After completing 8 sessions of CDIT, families were presented with a certificate of treatment completion and scheduled for their follow-up assessment (e.g., Time 2 for IT families and Time 3 for WL families).

Of the 15 families in the IT group who completed the 8 sessions of CDIT, primary caregivers reported 70% of days were spent practicing “special time” at home with their children and 50% of primary caregivers obtained mastery of CDIT skills at the time of their final session. Secondary caregivers were involved in 72% of the IT group treatment cases and participated in 45% of sessions.

**Treatment Integrity**

To ensure that all therapy sessions were completed with treatment integrity 30% of videotaped sessions from each participant family were randomly selected and checked using the CDIT manual session integrity checklists. To calculate interobserver reliability estimates, 50% of integrity checked tapes were randomly selected and coded by a second coder. Integrity checking was completed by trained undergraduate research assistants who were trained to reach 80% reliability with two criterion tapes before coding treatment sessions. Accuracy was calculated for the 15 families in the IT group.
and was determined to be 98% with treatment protocol. The percent agreement interrater reliability was 97% (range = 90%-100%).

Statistical Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS), Version 18.0. Prior to conducting analyses, data were screened to assess for outliers and determine univariate normality. To conduct outlier assessments, data points were screened to determine if any data points lie beyond 3 standard deviations of the mean of participants’ scores on each measure. To assess univariate normality, descriptive statistics, histograms with normality curves, and boxplots were assessed for normality. Kurtosis and skewness scores were also calculated and examined for values of less than one. Additionally, Z-score statistics and their standard deviations were calculated in order to ensure that all values are below 2.58. The final assessment of normality included conducting Kolmogorov-Smirnov and Shapiro-Wilk tests in order to determine the significance of skewness and kurtosis values, which would indicate that they meet normality assumptions (Field, 2005). If any variables were determined to be non-normal, statistical transformations were conducted to correct variable normality and preserve data points.

Descriptive statistics were calculated and reported, including means and standard deviations of all outcome and baseline predictor variables. Total scores for the CARS, DAS, PSI-SF, SRS and Vineland-II will be reported. Subscale scores for the ASR, Vineland-II (Maladaptive Behaviors and Socialization), ECBI (Intensity and Problem), and PSI-SF (Parent-Child Dysfunctional Interaction and Difficult Child) will also be reported. Cronbach’s alpha was also calculated for questionnaire data and kappa/percent agreement for each of the DPICS categories.
Proposed analyses for each hypothesis are detailed below.

In order to investigate Hypotheses 1.1 and 1.2, changes in parenting behaviors were analyzed using an analysis of covariance (ANCOVA), with pre-treatment scores as the covariate. ANCOVAs have been recommended for use with randomized controlled trials due to their power as an analytic measure when compared to a repeated measure ANOVA (Rausch, Maxwell, & Kelley, 2003). To examine Hypothesis 1.3, maintenance of changes in parenting behavior gains, paired samples t tests were first conducted to assess for significant changes between the post treatment assessment and the six week follow up after CDIT for IT group mother-child dyads. Additional paired samples t tests were then conducted to assess for significant changes between the pre-treatment assessment and the six week follow up assessment to further assess for maintenance of parenting behavior changes six weeks after completing CDIT.

To examine Hypotheses 2.1 through 2.3, changes in parenting stress and distress were analyzed using an analysis of covariance (ANCOVA) to compare changes within and between the IT and WL groups.

Hypotheses 3.1 was examined using the bootstrapping method in order to test for an indirect model of mediation. The current literature supports this method over the more historically used Baron and Kenny (1986) model which relies on the causal steps approach. This method has been criticized for its low power, especially in detecting indirect effects of mediator variables. The bootstrapping method to detect indirect effects does not assume normality in the sample, which makes it more appropriate for use in smaller samples, and it has shown evidence of high power and Type 1 error control (Hayes, 2009). The Preacher and Hayes (2008) SPSS indirect macro, which
estimates the size of an indirect effect of \( X \) (treatment participation) on \( Y \) (child disruptive behavior as measured by the ECBI Intensity Scale) through a single mediator \( M \) (parenting behavior as measured by the DPICS composite scores for CDI Do and Don’t skills at the Time 2 assessment) controlling for parent skills at pre-treatment, and computes a bootstrap approach for inference, was used for this analysis.

Aims 4 and 5 proposed exploratory analyses to assess potential predictor variables on child outcomes following CDIT. Child treatment outcomes, included child disruptive behavior as measured by the ECBI frequency score; receptive language as measured by the PPVT standard score; social responsiveness as measured by the Social Responsiveness Scale; and adaptive behavior as measured by the Vineland Adaptive Behavior Scale. To explore the relations between child treatment outcomes and potential parent and child predictor variables, bivariate correlations were conducted. Following the model suggested by Makrygianni and Reed (2010) parent and child variables that were found to have a statistically significant (\( p < .05 \)), medium to large (\( r > .30 \)) correlation with child outcome were included in a stepwise, multiple regression analysis for each outcome variable.
Table 2-1. Demographic Characteristics of Immediate Treatment (IT) and Waitlist (WL) groups

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Immediate Treatment</th>
<th>Waitlist Control</th>
<th>t(28)</th>
<th>$\chi^2$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child age (years)</td>
<td>4.32 1.16</td>
<td>5.12 1.39</td>
<td>1.55</td>
<td>--</td>
<td>0.10</td>
</tr>
<tr>
<td>CARS-II severity</td>
<td>49.67 7.16</td>
<td>48.40 6.80</td>
<td>-0.49</td>
<td>--</td>
<td>0.62</td>
</tr>
<tr>
<td>Child sex (% male)</td>
<td>80.00 --</td>
<td>80.00 --</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Child ethnicity (% Caucasian)</td>
<td>86.70 --</td>
<td>80.00 --</td>
<td>--</td>
<td>--</td>
<td>0.00 1.00</td>
</tr>
<tr>
<td>Receiving other treatments during participation (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational therapy</td>
<td>33.30 --</td>
<td>60.00 --</td>
<td>2.80</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Speech therapy</td>
<td>73.30 --</td>
<td>53.30 --</td>
<td>0.42</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td>Psychiatric medication</td>
<td>28.60 --</td>
<td>28.60 --</td>
<td>0.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Diagnosis (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autistic Disorder</td>
<td>46.70 --</td>
<td>33.30 --</td>
<td>0.56</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>Asperger’s Syndrome</td>
<td>6.70 --</td>
<td>6.70 --</td>
<td>0.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>PDD-NOS</td>
<td>46.70 --</td>
<td>60.00 --</td>
<td>0.54</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>Maternal age (years)</td>
<td>34.67 9.14</td>
<td>38.93 7.11</td>
<td>1.43</td>
<td>--</td>
<td>0.17</td>
</tr>
<tr>
<td>Maternal education (% completed ≥ 2 years college)</td>
<td>80.00 --</td>
<td>86.70 --</td>
<td>0.24</td>
<td>0.62</td>
<td></td>
</tr>
</tbody>
</table>

Note: PDD-NOS = Pervasive Developmental Disorder, Not Otherwise Specified

$^a$n = 15.

$^b$n = 15.
Table 2-2. Demographic Characteristics of Time 2 Completers and Drop-Outs before Time 2

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Study Completers&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Study Drop-Outs&lt;sup&gt;b&lt;/sup&gt;</th>
<th>t&lt;sup&gt;(37)&lt;/sup&gt;</th>
<th>X²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child age (years)</td>
<td>4.72 1.32</td>
<td>5.72 0.99</td>
<td>2.09</td>
<td></td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Child sex (% male)</td>
<td>80.00 --</td>
<td>66.70 --</td>
<td>--</td>
<td>0.69</td>
<td>0.41</td>
</tr>
<tr>
<td>CARS-II severity</td>
<td>49.03 6.89</td>
<td>49.33 8.32</td>
<td>-0.12</td>
<td></td>
<td>0.91</td>
</tr>
<tr>
<td>Child ethnicity (% Caucasian)</td>
<td>83.30 --</td>
<td>55.60 --</td>
<td>--</td>
<td>5.01</td>
<td>0.17</td>
</tr>
<tr>
<td>Receiving other treatments during participation (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational therapy</td>
<td>46.70 --</td>
<td>55.60 --</td>
<td>--</td>
<td>0.22</td>
<td>0.64</td>
</tr>
<tr>
<td>Speech therapy</td>
<td>63.30 --</td>
<td>66.70 --</td>
<td>--</td>
<td>0.03</td>
<td>0.86</td>
</tr>
<tr>
<td>Psychiatric medication</td>
<td>20.00 --</td>
<td>22.20 --</td>
<td>--</td>
<td>0.02</td>
<td>0.89</td>
</tr>
<tr>
<td>Diagnosis (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autistic Disorder</td>
<td>40.00 --</td>
<td>44.40 --</td>
<td>--</td>
<td>0.13</td>
<td>0.72</td>
</tr>
<tr>
<td>Asperger’s Syndrome</td>
<td>3.33 --</td>
<td>0.00 --</td>
<td>--</td>
<td>0.31</td>
<td>0.58</td>
</tr>
<tr>
<td>PDD-NOS</td>
<td>53.33 --</td>
<td>55.60 --</td>
<td>--</td>
<td>0.50</td>
<td>0.48</td>
</tr>
<tr>
<td>Maternal Age (years)</td>
<td>36.80 8.34</td>
<td>37.56 9.14</td>
<td>0.23</td>
<td></td>
<td>0.81</td>
</tr>
<tr>
<td>Maternal Education (% completed ≥ 2 years college)</td>
<td>83.30 --</td>
<td>77.70 --</td>
<td>--</td>
<td>0.15</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Note: Completers = completed Time 2 Assessment, Drop-Outs = did not complete Time 2 Assessment
PDD-NOS = Pervasive Developmental Disorder, Not Otherwise Specified
<sup>a</sup>n= 30.
<sup>b</sup>n = 9.
Table 2-3. Inter-coder reliability of the Dyadic Parent-Child Interaction Coding System-II (DPICS-III) for mothers of children with Autism Spectrum Disorders

<table>
<thead>
<tr>
<th>DPICS Category</th>
<th>Percent Agreement$^a$</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CDI Do Skills</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavior Description</td>
<td>77</td>
<td>.76</td>
</tr>
<tr>
<td>Unlabeled Praise</td>
<td>84</td>
<td>.82</td>
</tr>
<tr>
<td>Labeled Praise</td>
<td>87</td>
<td>.86</td>
</tr>
<tr>
<td>Reflective Statement</td>
<td>77</td>
<td>.74</td>
</tr>
<tr>
<td><strong>CDI Don’t Skills</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Command</td>
<td>75</td>
<td>.73</td>
</tr>
<tr>
<td>Direct Command</td>
<td>91</td>
<td>.90</td>
</tr>
<tr>
<td>Descriptive Question</td>
<td>92</td>
<td>.86</td>
</tr>
<tr>
<td>Information Question</td>
<td>93</td>
<td>.92</td>
</tr>
<tr>
<td>Criticism</td>
<td>86</td>
<td>.81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>88</td>
<td>.84</td>
</tr>
</tbody>
</table>

$^a$Percent Agreement is based on summing the agreements across participants and dividing by the agreements plus disagreements.
Figure 2-1. Participant Flow Diagram.
CHAPTER 3
RESULTS

This study evaluated the efficacy of CDI training in changing maternal parenting behaviors and reducing maternal stress and distress associated with caring for a child on the Autism Spectrum. This study also assessed maternal behavior change as a mediator of change in child disruptive behavior and identified potential child and maternal predictors of child outcome following treatment. All analyses were conducted using comparisons between the 15 IT and 15 WL mother-child dyads who completed their Time 1 and Time 2 assessments with the exception of the exploratory predictor analyses, which were conducted using data from the 27 total mother-child dyads from both groups after completing CDI Training.

**Observed Parent-Child Interaction**

Results suggested that at post-CDIT, mothers in the IT group used significantly more CDI Do skills than mothers in the WL group, $F(1, 27) = 92.45 \, p < .001, \, d = 2.60$. Mothers in the IT group also used significantly fewer CDI Don’t skills during the Time 2 assessment when compared to WL mothers, $F(1, 27) = 23.84 \, p < .001, \, d = 1.78$. The very large effect sizes found for both analyses suggest that mothers in the IT group used significantly more Do skills and fewer Don’t skills during the child-led play observation following CDI training when compared to the WL mothers. Mean scores and the effect sizes of changes between the IT and WL group on the DPICS measures of CDI Do and Don’t skills during parent-child interactions at the Time 1 and Time 2 assessment points are presented in Table 3-1.
To assess the maintenance of parenting skills in the observed parent-child interactions at follow-up, a paired samples $t$ test was conducted to assess for significant changes in observed CDI Do and Don’t skills from the Time 2 to 6-week follow up assessment for families in the IT group. Results from both analyses were non-significant (see Table 3-2).

Changes in pre-treatment CDI Do and Don’t skills between the pre-treatment assessment and 6-week follow up assessment for the IT group were also assessed using a paired samples $t$ test. Results indicated a significant increase in CDI Do skills from pre-treatment to 6 week follow up for IT mothers, $t(10) = -5.90$, $p < .001$, $d = 1.29$. Mothers also continued to use significantly fewer CDI Don’t skills than during pre-treatment parent-child interaction observations, $t(10) = 4.59$, $p = .001$, $d = 1.71$ (see Table 3-3).

**Parent Report of Stress and Distress**

To determine if CDIT improves parent report of stress and distress associated with caring for their child with ASD at immediate post-treatment when compared with the WL group, mixed between-within subject analyses of covariance (ANCOVA), with pre-treatment scores as covariates, were conducted. At the Time 2 assessment, differences between the IT and WL groups were analyzed for the following outcome variables: (a) total parent stress as measured by the Parenting Stress Index-Short form (PSI-SF) Total Stress score, (b) parental stress associated with parenting a difficult child as measured by the PSI-SF: Difficult Child subscale, (c) parental stress associated with the parent-child dysfunctional interaction as measured by the PSI-SF: Parent-Child Dysfunctional Interaction subscale, (d) parental distress as measured by PSI-SF:
Parental Distress subscale; and (e) parental distress associated with child disruptive
behavior as measured by the ECBI Problem Scale. Mean scores for the IT and WL
groups on parental stress and distress outcome measures are shown in Table 3-4.

For total parenting stress, mothers in the IT group reported less stress when
compared to mothers in WL group at the Time 2 assessment; however, this difference
was not significant, \( F(1, 28) = 1.83, p = .19, d = .53 \), but yielded a medium effect size.
Group differences were not significant at the Time 2 assessment for the individual
subscales of the Parenting Stress Index-Short form (PSI-SF) (see Table 3-4) and
differences between the IT and WL groups on all subscales resulted in small effect
sizes. For parent distress measured by the Problem Scale on the ECBI, however,
mothers in the IT group reported significantly less distress following CDIT when
compared to mothers in the WL group at Time 2 assessment, \( F(1, 24) = 6.73, p = .02, \)
\( d = .79 \). At pre-treatment, 79% of the mothers in the IT group reported clinically
significant distress associated with child disruptive behavior, however, following CDIT
this number was reduced to 23%. Clinically significant change in parent distress was
assessed using stringent criteria proposed by Jacobson and Truax (1991) and 67% of
the mothers in the IT group demonstrated clinically significant changes in parent
distress following CDIT. This suggests that following CDIT, mothers experienced both a
statistically and clinically significant reduction in distress associated with child disruptive
behavior.

**Indirect Effects of Parent Behavior Change**

To test for mediation, the Preacher and Hayes (2004) bootstrapping procedure
was used to determine total and indirect effects of the proposed mediator, change in
maternal parenting skills. Interpretation of the bootstrap data is accomplished by
determining whether zero is contained within the 95% Confidence Interval, thus indicating the lack of significance. The SPSS macros that Preacher and Hayes provide for this procedure was used. In the first analysis, the experimental condition (IT versus WL group) was the independent variable, child disruptive behavior as measured by the ECBI Intensity Scale at the Time 2 assessment was the dependent variable, and CDI Do skills at the Time 2 assessment, controlling for pre-treatment CDI Do skills, was the mediator. Analyses revealed, with 95% confidence, that the total indirect effect (i.e., the difference between the total and direct effects) of the proposed mediator, change in parenting skills as measured by CDI Do skills, was not significant, with a point estimate of 27.62 and a 95% bootstrap confidence interval of -.0252 to 64.35. To further evaluate changes in parenting behaviors, the model was also run using maternal CDI Don’t skills at the Time 2 assessment as the proposed mediator, controlling for pre-treatment CDI Don’t skills. Results from this model indicated that the indirect effect of the mediator, change in parenting skills as measured by CDI Don’t skills, was significant with a point estimate of 20.54 and a 95% bootstrap confidence interval of 6.52 to 47.63. Significant values for the direct effects within the models are shown in Figures 3-1 and 3-2.

**Child Predictors of Outcome**

To explore the relations between child predictors (age, ASD symptom severity, IQ, and adaptive behaviors) and child outcomes at post-CDIT (receptive language, disruptive behavior, social responsiveness, and adaptive behaviors) bivariate correlations were conducted. Results revealed significant correlations of medium to large magnitude for several child predictors including child IQ, overall adaptive behavior, and the maladaptive behavior subscale. Neither child age nor ASD severity, however,
were significantly correlated with treatment outcome. Pearson correlations between CDIT post-treatment outcomes and child predictors are shown in Table 3-5.

**Maternal Predictors of Outcome**

To explore the relations between maternal predictors (maternal stress, distress, and depressive symptoms) and child outcomes at post-CDIT (receptive language, disruptive behavior, social responsiveness, and adaptive behaviors) bivariate correlations were conducted. Results revealed significant correlations of medium to large magnitude for several maternal predictors including parental stress as measured by each of the subscales of the PSI-SF, parent distress, and depressive symptoms. Pearson correlations between CDIT post-treatment outcomes and child predictors are shown in Table 3-6.

Following the model suggested by Makrygianni and Reed (2010), parent and child variables that were found to have a statistically significant ($p < .05$), medium to large ($r > .30$) correlation with child outcomes were included in a stepwise, multiple regression analysis for each outcome variable.

For the first outcome variable, multiple regression analysis was used to test predictors of receptive language at post-CDIT. The results of the regression indicated that the three predictors: IQ, adaptive functioning, and parent distress on the PSI-SF, explained 72% of the variance, $R^2 = .72$, $F(2,12)=7.64$, $p < .01$. Child IQ significantly predicted child receptive language abilities at post-CDIT, $\beta = .72$, $p < .01$. The second regression model distinguished maternal distress associated with child disruptive behaviors at pre-treatment as the best predictor, $\beta = .57$, $p = .02$, of child disruptive behaviors at post-treatment. The overall model with both predictors, child adaptive
behaviors and maternal distress at pre-treatment, was significant, $R^2 = .30$, $F(2,18) = 3.44$, $p = .05$, and predicted 30% of the variance. The regression model for child social responsiveness following treatment with overall maternal stress, maternal depression, and maternal stress associated with dysfunctional parent-child interaction and difficult child as predictor variables predicted 49% of the variance, $R^2 = .49$, $F(2,21) = 4.04$, $p = .02$. Mothers’ report of stress associated with parenting a difficult child at pre-treatment, $\beta = .72$, $p = .05$, was the only significant predictor of child social responsiveness outcomes. Finally, the regression model examining predictor variables for child adaptive behavior outcomes was found to be significant, $R^2 = .59$, $F(2,16) = 9.91$, $p = .002$, and predicted 59% of variance. Child adaptive behavior at pre-treatment was found to be the best predictor of post-treatment adaptive behavior, $\beta = .76$, $p = .001$.

For the final two regression models, none of the included predictor variables were found to have a significant unique contribution to variance in post-treatment scores on the socialization or maladaptive subscales of child adaptive behavior.
Table 3-1. Mean scores for observational measures of Child Directed Interaction Training at Time 1 and 2 assessments

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group</th>
<th>Time 1 M</th>
<th>SD</th>
<th>Time 2 M</th>
<th>SD</th>
<th>p</th>
<th>d^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do skills</td>
<td>IT</td>
<td>5.00</td>
<td>6.06</td>
<td>20.07</td>
<td>8.32</td>
<td>&lt;.001</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>WL</td>
<td>3.80</td>
<td>1.97</td>
<td>3.07</td>
<td>4.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t skills</td>
<td>IT</td>
<td>38.53</td>
<td>24.01</td>
<td>8.47</td>
<td>8.15</td>
<td>&lt;.001</td>
<td>1.78</td>
</tr>
<tr>
<td></td>
<td>WL</td>
<td>27.73</td>
<td>14.89</td>
<td>26.33</td>
<td>11.65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. IT = immediate treatment (n = 15), WL = wait-list control (n = 15).
^aCohen’s d = effect size of change between IT and WL groups at the Time 2 assessment

Table 3-2. Mean scores for observational measures of Child Directed Interaction Training at Post CDIT (Time 2) and 6 week Follow up (Time 3) for IT families

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group</th>
<th>Time 2 M</th>
<th>SD</th>
<th>Time 3 M</th>
<th>SD</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do skills</td>
<td>IT</td>
<td>20.45</td>
<td>9.56</td>
<td>17.27</td>
<td>10.45</td>
<td>.09</td>
</tr>
<tr>
<td>Don’t skills</td>
<td>IT</td>
<td>8.09</td>
<td>8.02</td>
<td>6.00</td>
<td>4.69</td>
<td>.37</td>
</tr>
</tbody>
</table>

Note. IT = immediate treatment (n = 11).

Table 3-3. Mean scores for observational measures of Child Directed Interaction Training at Pre CDIT (Time 1) and 6 week Follow up (Time 3) for IT families

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group</th>
<th>Time 1 M</th>
<th>SD</th>
<th>Time 3 M</th>
<th>SD</th>
<th>p</th>
<th>d^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do skills</td>
<td>IT</td>
<td>5.91</td>
<td>6.80</td>
<td>17.27</td>
<td>10.45</td>
<td>&lt;.001</td>
<td>1.29</td>
</tr>
<tr>
<td>Don’t skills</td>
<td>IT</td>
<td>37.73</td>
<td>25.81</td>
<td>6.00</td>
<td>4.69</td>
<td>.002</td>
<td>1.71</td>
</tr>
</tbody>
</table>

Note. IT = immediate treatment (n = 11).
^aCohen’s d = effect size of change between Time 1 and 3 assessments for IT group.
Table 3-4. Mean scores for mothers on parent report measures at Time 1 and 2 assessments

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group</th>
<th>n</th>
<th>Time 1</th>
<th></th>
<th></th>
<th>Time 2</th>
<th></th>
<th></th>
<th>F(1,28)</th>
<th>p</th>
<th>d^a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td></td>
<td>M</td>
<td>SD</td>
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<tr>
<td>Parenting Stress Index-Short Form</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult Child</td>
<td>IT</td>
<td>15</td>
<td>40.67</td>
<td>8.58</td>
<td></td>
<td>36.40</td>
<td>7.30</td>
<td>0.89</td>
<td>0.35</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WL</td>
<td>15</td>
<td>41.67</td>
<td>8.24</td>
<td></td>
<td>39.13</td>
<td>8.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent-Child Dysfunctional Interaction</td>
<td>IT</td>
<td>15</td>
<td>30.40</td>
<td>4.60</td>
<td></td>
<td>28.33</td>
<td>5.85</td>
<td>0.87</td>
<td>0.36</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WL</td>
<td>15</td>
<td>30.47</td>
<td>8.00</td>
<td></td>
<td>30.40</td>
<td>8.23</td>
<td></td>
<td></td>
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<tr>
<td>Parent Distress</td>
<td>IT</td>
<td>15</td>
<td>28.00</td>
<td>6.90</td>
<td></td>
<td>27.33</td>
<td>6.80</td>
<td>0.50</td>
<td>0.49</td>
<td>0.42</td>
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<tr>
<td></td>
<td>WL</td>
<td>15</td>
<td>30.67</td>
<td>7.80</td>
<td></td>
<td>30.40</td>
<td>7.86</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Total</td>
<td>IT</td>
<td>15</td>
<td>99.07</td>
<td>17.91</td>
<td></td>
<td>91.00</td>
<td>14.66</td>
<td>1.83</td>
<td>0.19</td>
<td>0.53</td>
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</tr>
<tr>
<td></td>
<td>WL</td>
<td>15</td>
<td>102.80</td>
<td>18.23</td>
<td></td>
<td>99.93</td>
<td>19.07</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Eyberg Child Behavior Inventory Problem Scale</td>
<td>IT</td>
<td>12</td>
<td>15.92</td>
<td>7.18</td>
<td></td>
<td>7.75</td>
<td>6.57</td>
<td>6.73</td>
<td>0.02*</td>
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</tr>
<tr>
<td></td>
<td>WL</td>
<td>14</td>
<td>15.07</td>
<td>8.18</td>
<td></td>
<td>13.36</td>
<td>7.52</td>
<td></td>
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</tr>
</tbody>
</table>

Note: IT = immediate treatment, WL = waitlist control.
d^a Cohen’s d = effect size between IT and WL groups at Time 2.
*p < 0.05

Table 3-5. Pearson correlations between outcome variables and potential child predictors

<table>
<thead>
<tr>
<th>Child Predictors at Pre-Treatment</th>
<th>Child Outcomes</th>
<th>PPVT</th>
<th>ECBI Intensity</th>
<th>SRS total</th>
<th>VABS total</th>
<th>VABS Maladaptive</th>
<th>VABS Socialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.163</td>
<td>- .010</td>
<td>-.184</td>
<td>-.280</td>
<td>.189</td>
<td>-.223</td>
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<tr>
<td>Severity</td>
<td>-.398</td>
<td>- .298</td>
<td>-.141</td>
<td>-.361</td>
<td>-.195</td>
<td>-.233</td>
<td></td>
</tr>
<tr>
<td>IQ</td>
<td>.831**</td>
<td>.117</td>
<td>-.146</td>
<td>.753**</td>
<td>.231</td>
<td>.641*</td>
<td></td>
</tr>
<tr>
<td>VABS Total</td>
<td>.575**</td>
<td>-.072</td>
<td>-.233</td>
<td>.765**</td>
<td>.108</td>
<td>.718*</td>
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<tr>
<td>VABS (Maladaptive)</td>
<td>.029</td>
<td>.523*</td>
<td>.343</td>
<td>-.091</td>
<td>.564*</td>
<td>-.126</td>
<td></td>
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<tr>
<td>VABS (Socialization)</td>
<td>.077</td>
<td>-.062</td>
<td>-.016</td>
<td>.241</td>
<td>-.295</td>
<td>.160</td>
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</tr>
</tbody>
</table>

Severity: Childhood Autism Rating Scale; IQ: Differential Ability Scale; VABS: Vineland Adaptive Behavior Scale; PPVT: Peabody Picture Vocabulary Test; ECBI: Eyberg Child Behavior Inventory-Intensity Scale; SRS: Social Responsiveness Scale.

*p < 0.05

**p < .001
Table 3-6. Pearson correlations between outcome variables and potential maternal predictors

<table>
<thead>
<tr>
<th>Maternal Predictors at Pre-Treatment</th>
<th>Child Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPVT</td>
</tr>
<tr>
<td>Maternal Stress</td>
<td></td>
</tr>
<tr>
<td>PSI-Total</td>
<td>.209</td>
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<tr>
<td>PSI-DC</td>
<td>.106</td>
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<tr>
<td>PSI-CDI</td>
<td>-.129</td>
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<tr>
<td>Parent Distress</td>
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<tr>
<td>PSI-PD</td>
<td>.463*</td>
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<tr>
<td>ECBI- Problem</td>
<td>-.068</td>
</tr>
<tr>
<td>Parent Depression</td>
<td></td>
</tr>
<tr>
<td>ASR Anx/Dep</td>
<td>.013</td>
</tr>
<tr>
<td>ASR Dep Problems</td>
<td></td>
</tr>
</tbody>
</table>

PSI: Parent Stress Index-Short Form; PSI-DC: PSI Difficult Child subscale; PSI-CDI: PSI Parent-Child Dysfunctional Interaction subscale; PSI-PD: PSI Parent Distress subscale; ECBI-Problem: Eyberg Child Behavior Inventory Problem Scale; ASR: Adult Self-Report- Anxiety and Depression and Depressive Problems Subscales; PPVT: Peabody Picture Vocabulary Test; ECBI: Eyberg Child Behavior Inventory-Intensity Scale; SRS: Social Responsiveness Scale

*p < 0.05
**p < .001

Table 3-7. Regression analyses predicting changes in receptive language (PPVT)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Beta</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ</td>
<td>.721</td>
<td>3.107</td>
<td>.013*</td>
</tr>
<tr>
<td>VABS Total</td>
<td>.143</td>
<td>.619</td>
<td>.551</td>
</tr>
<tr>
<td>PSI-PD</td>
<td>.135</td>
<td>.754</td>
<td>.470</td>
</tr>
</tbody>
</table>

IQ: Differential Ability Scale; VABS: Vineland Adaptive Behavior Scale; PSI-PD: PSI Parent Distress subscale PPVT: Peabody Picture Vocabulary Test

*p < 0.05
**p < .001

Table 3-8. Regression analyses predicting changes in disruptive behavior (ECBI-Frequency)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Beta</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECBI-Problem</td>
<td>.566</td>
<td>2.617</td>
<td>.019*</td>
</tr>
<tr>
<td>VABS (Maladaptive)</td>
<td>-.182</td>
<td>-.843</td>
<td>.412</td>
</tr>
</tbody>
</table>

ECBI: Eyberg Child Behavior Inventory; VABS: Vineland Adaptive Behavior Scale

*p < 0.05
**p < .001
Table 3-9. Regression analyses predicting changes in social responsiveness (SRS)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Beta</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSI-Total</td>
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<td>-.688</td>
<td>.501</td>
</tr>
<tr>
<td>PSI-DC</td>
<td>.723</td>
<td>2.158</td>
<td>.046*</td>
</tr>
<tr>
<td>PSI-CDI</td>
<td>.124</td>
<td>.392</td>
<td>.700</td>
</tr>
<tr>
<td>ASR-Dep Problems</td>
<td>.423</td>
<td>1.845</td>
<td>.083</td>
</tr>
</tbody>
</table>

PSI: Parent Stress Index-Short Form; PSI-DC: PSI Difficult Child subscale; PSI-CDI: PSI Parent-Child Dysfunctional Interaction subscale; PSI-PD: PSI Parent Distress subscale; Adult Self-Report- Anxiety and Depression and Depressive Problems Subscales; SRS: Social Responsiveness Scale

*p < 0.05
**p < .001

Table 3-10. Regression analyses predicting changes in adaptive behavior (VABS-total)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Beta</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>VABS Total</td>
<td>.763</td>
<td>4.42</td>
<td>.001**</td>
</tr>
<tr>
<td>VABS (Maladaptive)</td>
<td>-.029</td>
<td>-.167</td>
<td>.870</td>
</tr>
</tbody>
</table>

VABS: Vineland Adaptive Behavior Scale

*p < 0.05
**p < .001

Table 3-11. Regression analyses predicting changes in adaptive behavior (VABS-maladaptive behavior)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Beta</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECBI-Problem</td>
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<td>.960</td>
<td>.355</td>
</tr>
<tr>
<td>VABS (Maladaptive)</td>
<td>.400</td>
<td>1.374</td>
<td>.193</td>
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</tbody>
</table>

ECBI: Eyberg Child Behavior Inventory; VABS: Vineland Adaptive Behavior Scale

*p < 0.05
**p < .001

Table 3-12. Regression analyses predicting changes in adaptive behavior (VABS-socialization)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Beta</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>VABS Total</td>
<td>.446</td>
<td>1.139</td>
<td>.288</td>
</tr>
<tr>
<td>Child IQ</td>
<td>.310</td>
<td>.791</td>
<td>.452</td>
</tr>
</tbody>
</table>

IQ: Differential Ability Scale; VABS: Vineland Adaptive Behavior Scale

*p < 0.05
**p < .001
Figure 3-1. Direct effects of mediator model. Path values represent unstandardized regression coefficients and the corresponding p values. Values in the parentheses represent the direct effect of experimental group on child disruptive behavior before inclusion of the proposed mediator, changes in CDI Do skills.
Figure 3-2. Direct effects of mediator model. Path values represent unstandardized regression coefficients and the corresponding $p$ values. Values in the parentheses represent the direct effect of experimental group on child disruptive behavior before inclusion of the proposed mediator, changes in CDI Don't skills.
This study is the first study to examine parent outcomes following the CDI phase of PCIT with children with ASDs using a randomized controlled trial design. It is also one of few studies to examine parent outcomes following a parent based intervention for children with an ASD. The findings from this study indicate that treating young children with an ASD using CDIT not only results in significant parental skill acquisition, but also in reduced maternal distress associated with child disruptive behavior. Results also reveal that changes in maternal CDI skills remain significantly improved at 6-week follow up when compared to baseline. Exploratory analyses also revealed several child and parent predictors of child treatment outcome, including child IQ and adaptive behavior, as well as parent stress associated with caring for a difficult child and parent distress associated with child disruptive behavior. These results suggest that CDIT may be an effective, short-term, parent-training intervention for changing parenting skills and reducing parental distress for parents of children with an ASD.

**Observed Parent-Child Interaction**

The first aim of the study was to examine changes in parenting skills for mothers following Child Directed Interaction Training when compared to mothers in the Waitlist group. As hypothesized, mothers significantly changed their interaction style with their child as evidenced by their increased use of CDI “Do” skills and decreased use of CDI “Don’t” skills following CDIT. These findings from behavioral observations following treatment suggest that mothers learned how to follow their child’s lead in play successfully and attend positively to their child’s appropriate behaviors in order to
reinforce the child’s social, play, and language abilities. This result is similar to past studies examining the efficacy of PCIT across various child populations (Bagner & Eyberg, 2007; Eisenstadt et al., 1993; Schuhmann, Foote, Eyberg, Boggs, & Algina, 1998) and is especially important because it suggests that mothers of children with ASDs are able to implement CDI skills effectively to change their child’s behavior with standard, manualized CDI training.

There were no significant changes in CDI skills of the IT group between post-treatment and 6-week follow up. Analyses of CDI skills at pre-treatment and follow up assessments, revealed continued significant change in both the CDI “Do” and “Don’t” skills. These findings suggest that mothers maintained changes in parenting behaviors following treatment.

**Parent Report of Stress and Distress**

Mothers’ report of stress associated with dysfunctional parent-child interactions, disruptive child behavior, and total overall stress did not significantly change as expected following CDIT. In contrast, parent distress associated with child disruptive behavior did significantly decrease following treatment. Both the IT and WL groups reported clinically significant parent distress associated with disruptive behavior as measured by the ECBI problem score at pre-treatment, but mothers in the IT group, on average, reported stress well below the clinical cutoff. These findings suggest that CDIT may be an appropriate treatment for reducing not only disruptive behaviors in children with ASDs, but also for reducing the maternal distress associated with these behaviors within normal limits. With the knowledge that stress in mothers of children with ASDs is often strongly associated with child disruptive behavior (Lecavalier, Leone, & Witlz, 2006), this finding is especially important for this population.
One possible explanation for failure to find significant changes across other domains of parenting stress may be that the PSI-SF did not adequately capture or describe the specific stress experienced by parents of children with ASDs. Zaidman-Zaid and colleagues (2010) found that the PSI-SF had low discriminative validity across the parent-child dysfunctional interactions and child behavior difficulty subscales when administered to parents of young children with ASDs with a range of stress severity. It is also possible that the measure used in the study did not fully capture the impact of the unique stressors experienced by parents of children with developmental delays including the child’s cognitive development, the child’s need for continuous, close supervision, and lack of access to services (Pisula, 2007). Another potential explanation for our findings is that our sample was largely (80%) recently diagnosed children, within the past year. Research has consistently shown that parents of newly diagnosed children report the highest stress levels when learning to understand their child’s diagnosis and beginning to seek and initiate treatment services (Davis & Carter, 2008; Keen, Couzens, Muspratt, & Rodger, 2010). This may help to explain why the reported total stress of mothers in this study remained in the clinical range as many of the mothers in the study were continuing to experience stress associated with initiation of other treatments (i.e. Occupational Therapy) at the time of the study.

**Indirect Effects of Parent Behavior Change**

The third aim of this study was to identify whether parenting skills, as measured by the CDI “Do” and “Don’t” skills, served as a mechanism of child disruptive behavior change over the course of CDI training. The indirect effects of changes in maternal CDI “Don’t” skills were found to be significant, suggesting that changes in negative parenting behaviors during mother-child interactions may explain the decreases in child disruptive
behavior. Specifically, the findings indicate that the skills in manualized CDIT that focused on ignoring child maladaptive behaviors and avoiding the use of behaviors that take over the lead of the play from the child contributed significantly to the changes in the child’s disruptive behaviors.

Perhaps most unexpected, however, was the finding that the relationship (as shown in Figure 3-1) between maternal use of CDI “Do” skills and child disruptive behavior was not significant. There are several possible explanations for this finding. It may be that factors, other than overall change in positive parenting skills better explain the mechanism of child behavior change during CDIT for children with ASDs. Possible examples may include change in maternal expectations for their child’s behavior or in their ability to manage child behavior, or change in maternal stress. It is also possible that mothers’ use of a specific CDI “Do” skill use (i.e., use of labeled praises to provide positive attention for appropriate behavior) or use of imitation of child behavior taught in CDIT, which is not captured in the DPICs coding program, may be the mechanism for change, which may be masked by solely examining the overall composite category of the CDI “Do” skills. Additionally, although bootstrapping methods for estimating indirect effects have been reported to be the most appropriate method for use in smaller samples (Hayes, 2009), it is possible that the study’s sample size was not sufficient for detecting effects. Further research should examine multiple mediators of change following CDIT with a larger sample because it is possible that there are multiple mechanisms contributing to changes in child disruptive behavior.

Child and Maternal Predictors of Outcome

The final aims of the study were to examine possible child and parent predictors of outcome following CDIT in order to begin to determine for whom this treatment might be
most appropriate for. Correlations between the child characteristics at baseline and CDIT outcomes showed an association between child IQ and higher receptive language and adaptive functioning at post-treatment. Child adaptive behavior at pre-treatment was also significantly correlated with higher receptive language, total adaptive functioning, and social adaptive functioning at post-CDIT. When examining parent variables, child social responsiveness outcomes were correlated with maternal stress and depression at pre-treatment. Pre-treatment parent distress was also associated with child receptive language, disruptive behavior, and maladaptive behaviors at post-CDIT. Regression analyses helped to specify further the parent and child variables most strongly related to child outcome. Across predictors and outcomes it was determined that child IQ, child adaptive behaviors, parent distress associated with disruptive behavior, and parent stress associated with difficult child behavior were predictive of several child outcomes at post-CDIT.

The findings that higher child IQ and adaptive functioning are predictive of higher scores on measures of receptive language and adaptive behavior respectively at post-treatment are unsurprising. Research examining child predictors of ASD interventions has previously found these variables most strongly related to treatment outcomes including communication and adaptive functioning (Makrygianni & Reed, 2010; Perry et al., 2011). Previous studies, however, have focused primarily on behavioral treatment approaches such as ABA, and to our knowledge this is the first study to replicate these child predictor findings to a parent training based intervention for children with ASDs.

Maternal self-report of parent distress associated with child disruptive behavior and stress associated with difficult child behaviors were predictive of higher levels of
child disruptive behavior and limited changes in social responsiveness, respectively, following CDIT. Both findings are consistent with past research suggesting that higher parenting stress is associated with less change in child adaptive functioning (Osborne et al., 2008) and in language and socialization (Makrygianni & Reed, 2010) following treatment. These findings underscore the need for assessment of parental stress before treatment to tailor treatments effectively.

Interestingly, neither child age nor child ASD symptom severity was predictive of child outcomes following CDIT. The lack of association between child age and outcome is not surprising as past studies containing samples of children in the 2-to 7-year age range have often shown no association between outcome and age for children (Granpeesheh et al. 2009; Perry et al., 2011). The finding that child severity was not predictive of differential outcomes is especially important. In the past, researchers have hypothesized that only “high-functioning” children with ASD would respond or benefit from the techniques used in CDIT (i.e., differential social attention) (Masse, McNeil, Wagner, Chorney, 2007). Although our findings do not provide evidence that young children with varying degrees of ASD symptom severity experienced the same gains following CDIT, it supports our qualitative observations that children across severity and age levels were able to make significant improvements during this brief intervention.

**Study Limitations and Future Directions**

It is important to consider the limitations of this study when interpreting the findings. First, although the study used a randomized controlled trial design with groups of equal size, the total sample size of 30 participating mother-child dyads was relatively small. To evaluate child and maternal predictors of outcome and compensate for missing data, which limited sample size at post-treatment, study groups were combined.
to examine post-treatment outcomes, which results in a bi-modal sample in terms of contact with the study. A larger sample in future studies would allow for supplementary data analyses including additional mediation and moderator analyses in order to continue to determine the mechanisms of change in treatment and the families for whom CDIT may be most appropriate.

Follow-up data analysis was also limited by a reduced sample size returning for the 6-week follow up assessment (n=11) due to difficulty contacting the families or changes in child behavioral or medication treatments during this time. Follow-up analysis of the IT families returning for the 6-week assessment was also limited due to study design which did not allow for a control group at the follow up assessment. Additionally, although our sample was fairly representative of the typical population of families seeking treatment for ASD in the community (Thomas et al., 2007), future studies would benefit from a sample with increased ethnic diversity and multiple study sites to control for the limited geographic range of this study. Another study sample limitation to consider is the recency of child diagnosis across our study population, with the majority of children (80%) diagnosed within the past year. This likely impacted multiple family variables, including maternal stress, and may limit the generalizability of our findings across the child ASD population.

Another study limitation is the diagnosis of child ASD in our initial study assessment. For study inclusion, children were required to have a pre-existing diagnosis by another healthcare provider, which we confirmed by the administration of the CARS-2 during the Time 1 assessment. Although the use of a gold standard diagnostic measure to confirm child ASD diagnosis, such as the Autism Diagnostic
Observation Scale (ADOS; Lord et al., 2000), would have been preferable, the cost of training in the administration of this measure was prohibitive.

It is important to note, however, that approximately one-third of the study (27%) participants reported having been diagnosed using the ADOS as a diagnostic measure by a local, trained and licensed psychologist. The use of the CARS-2 and other assessment practices used in the study, however, were representative or superior to diagnostic practices typically used in the community, where many healthcare professionals often use no formal diagnostic measure (Wiggins, Baio, & Rice, 2006).

Future studies assessing the efficacy of CDIT, however, should include a gold standard diagnostic measure, like the ADOS, in the initial assessment to further confirm the accuracy of child ASD diagnosis.

Future studies using randomized controlled trials to evaluate parent and child outcomes following CDIT in the ASD child population should address the limitations of this study by including a larger, more representative sample using gold standard diagnostic practices to confirm child ASD diagnoses. Another important consideration for future studies evaluating parent outcomes following CDIT is the selection of parent outcome measures and questionnaires. The PSI-SF may not fully assess the range of stress severity within this population of parents, and studies could benefit from the inclusion of other measures of parent stress aimed at assessing the unique stressors for this population, such as the Questionnaire on Resources and Stress (QRS; in Dabrowska & Pisula, 2010; Osborne et al., 2008). Additional measures to consider for future study inclusion would be observational coding categories or other parent-report measures of child social and play behaviors tailored to children with ASDs to assess the
array of additional changes in child behavior observed following CDIT. Such measures would also help to identify characteristics that may be stronger predictors of child outcomes following CDIT. Future studies would also benefit from the inclusion of additional measures of parent characteristics including measures such as the Broad Autism Phenotype Questionnaire (BAPQ; Hurley, Losh, Parlier, Reznick, & Piven, 2007) to assess the milder, but qualitatively similar personality and language characteristics common to non-autistic relatives of individuals with ASD. This measure could add to our understanding of more fine-grained, disorder specific outcomes or predictor variables for parents.

It will also be important for future studies to assess the efficacy of CDIT for parents and children after non-time limited CDIT. Although mothers showed significant changes with large effect sizes in their use of the skills learned in CDIT, only 50% of mothers reached CDI mastery criteria by the 8th and final session of CDI. Our recent pilot research has shown increased gains in child language, social responsiveness, and disruptive behavior as well as parental demonstration of CDI mastery criteria following four additional sessions of CDIT (Ginn, Clionsky, Warner-Metzger, Abner, & Eyberg, 2011). It will be important to continue to assess both parent and child improvements following different lengths of CDIT treatment after achievement of parent skill mastery. Studies should also attempt to determine the child and parent characteristics that may predict which children and families may require longer lengths of treatment. Finally, future studies would also benefit from taking a multidisciplinary approach to assess CDIT gains in combination with other domains of treatment, like speech or occupational therapy in order to assess the combined impact of different facets of ongoing treatment.
for children. With the knowledge of the stress experienced by parents initiating and maintaining multiple treatments for children with ASD at once (Davis & Carter, 2008), it will be important to continue to examine the preliminary findings of changes in parent skills and distress following CDIT in future multidisciplinary studies that may further help to address and target parental stress in this population of families.
## APPENDIX A
### TREATMENT TABLES

Table A-1. Inclusion and Exclusion Criteria

<table>
<thead>
<tr>
<th></th>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
</tr>
</thead>
</table>
| **Child**            | • Diagnosis of ASD (based on the CARS2 + previous diagnosis by a Mental Health Professional)  
                        • Cognitive functioning ≥ 2 years 0 months  
                        • Speaks 3 intelligible words  
                        • Age 3 years 0 months to 7 years 11 months  
                        • Stable on their medications one month prior to the study and throughout the duration of their study participation | • History of severe sensory impairment (e.g., deafness)  
                                                                                                                                  • Currently receiving behavioral therapy other than Speech Therapy or Occupational Therapy during treatment |
| **Primary Caregiver** | • Cognitive functioning ≥ 75 OR 2 years of college education  
                        • Attendance at all sessions and assessments | • Suspected abuse  
                                                                                                                                 • Crisis requiring out-of-home placement during the study. |
<table>
<thead>
<tr>
<th>Instrument</th>
<th>Informant</th>
<th>Weekly During Tx</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
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</thead>
<tbody>
<tr>
<td>Demographic and Background Questionnaire</td>
<td>PrimP</td>
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<tr>
<td></td>
<td>SecondC</td>
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<tr>
<td>Semi-Structured Interview</td>
<td>PrimP</td>
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<tr>
<td></td>
<td>SecondC</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
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<td>O</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Vineland-II</td>
<td>PrimP</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>PPVT-III (administered to child)</td>
<td>O</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>PPVT-III (administered to primary caregiver)</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPICS</td>
<td>O</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EBCI: Intensity Scale</td>
<td>PrimP</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>SecondC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECBI: Problem Scale</td>
<td>Prim P</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Second C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSI-SF</td>
<td>PrimP</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>SecondC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASR</td>
<td>PrimP</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Responsiveness Scale</td>
<td>PrimP</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Note. PrimC = Primary caregiver; SecondC=Secondary caregiver if participating; O = Observer.
### Table A-3. Assessment and Treatment Timeline

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Weeks 2-11</th>
<th>Week 12</th>
<th>Weeks 13-17</th>
<th>Week 18</th>
<th>Week 19-22</th>
<th>Week 23</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IT</strong></td>
<td>Time 1 Assessment</td>
<td>Weekly CDIT Tx</td>
<td>Time 2 Assessment</td>
<td>No Tx</td>
<td>Time 3 Assessment</td>
<td>No Tx</td>
<td></td>
</tr>
<tr>
<td><strong>WL</strong></td>
<td>Time 1 Assessment</td>
<td>No Tx</td>
<td>Time 2 Assessment</td>
<td>Weekly CDIT Tx</td>
<td>Time 3 Assessment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. IT = Immediate Treatment condition; WL = Waitlist condition; Tx = Treatment*
APPENDIX B
DEMOGRAPHIC QUESTIONNAIRE

Date: ___/___/_____

Child’s LAST Name: ___________________________ Child’s FIRST Name: ________________
Child’s Date of Birth: ___/___/_____
Child’s Age: _____ year

Child’s Sex (circle one):    Male  Female

Child’s Ethnicity: (check one)
___ Caucasian
___ Hispanic
___ African-American
___ Native American
___ Asian-American
___ Bi-racial (please specify) ___________________
___ Other (please specify) ___________________

Who referred your child for treatment: (please check one)
___ Outpatient or clinic at Shands
___ Another Agency, clinic, or hospital referred
___ School or teacher
___ Another physician or doctor
___ Another psychologist
___ I decided to seek treatment for him/her
___ Other (please specify) ___________________

Is your child currently in school?
___ No
___ Daycare
___ Preschool
___ Kindergarten
___ Elementary School
___ Home school

Is your child in a special classroom? (circle one)   Yes       No

Who diagnosed your child with an Autism Spectrum Disorder: (please check one)
___ Pediatrician
___ Psychologist
___ Psychiatrist
___ School psychologist
___ Other (please specify) ___________________

How old was your child when he/she was officially diagnosed: _______ years old

What kinds of assessments have been done to evaluate your child’s functioning: (please check all that apply)
___ Intelligence Testing
___ Full psychological battery
___ Language testing
___ Occupational therapy evaluation
___ Parent questionnaires
___ Special tests ordered by a physician

Which Autism Spectrum Disorder diagnosis describes your child: (please check one)
___ Autistic Disorder
___ Asperger’s Syndrome
___ Pervasive Developmental Delay, Not Otherwise Specified (PDD-NOS)
___ Unsure (please describe) _________________________

Has your child been diagnosed with any other health or psychological difficulties: Yes
No
If Yes, please describe:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Is your child currently receiving services related to ASD symptoms (circle one): Yes
No

Where are you receiving services for your child’s ASD symptoms (please check all that apply):
___ School
___ Psychologist’s office
___ Pediatrician’s office
___ Psychiatrist’s office
___ Speech/language therapist’s office
___ Occupational therapist’s office

What treatments for ASD is your child currently receiving (please check all that apply):

79
Behavioral treatment
Special services at school
Social skills group
Speech/language therapy
Occupational therapy
Special diet
Medication
Play therapy
Other (please specify)

What treatments for ASD has your child received in the past (please check all that apply):
Behavioral treatment
Special services at school
Social skills group
Speech/language therapy
Occupational therapy
Special diet
Medication
Play therapy
Other (please specify)

Please list your child’s current medications, the reason he or she takes them, and how long he or she has been on them:

Medication #1
Name:
Dosage
How long (months)
Reason:

Medication #2
Name:
Dosage
How long (months)
Reason:

Medication #3
APPENDIX C
PARENT INTERVIEW

I. Primary Concerns: What do they want from the evaluation?
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

II. Developmental information:

A. Pregnancy:
   Illness, medication, accidents, problems, complications; Length of Pregnancy, birth-weight
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________

B. Labor & Delivery:
   Length of labor; problems or complications (medication, anoxia, jaundice, forceps)
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
C. Temperament as an infant: (e.g., crying, sleep, or feeding problems)

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

D. ASD Diagnosis

1. When did you first notice your child displaying behaviors that concerned you? Please describe in detail.
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

2. How was your child diagnosed? (At what age/ by whom/ details)
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
3. What treatments have you tried/are currently using (frequency/effectiveness)

E. Developmental Milestones:

1. Walking: (age began)
2. Talking: (age of first words; age of first 2-word sentences)

3. Toilet Training: (age bladder trained; bowel trained; problems)

F. Family Information:

1. Who is in the family now:

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Relationship to Child</th>
<th>ASD diagnosis</th>
</tr>
</thead>
</table>
2. Parent(s) involvement with child during early years:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. Relationship with parents & siblings:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

G. Medical History of Child

1. Accidents:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
2. Illnesses/ Hospitalizations/ Surgery:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. Head Injury (ever been in a car accident or knocked unconscious)

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

Seizures, tics, or unusual staring spells:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

4. Sensitivities (food/ textures/sounds/lights)

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
5. Medications (current and past) – effective/problems/dose:

(If relevant, is child on medication today)

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

H. School:

1. Day Care (type of day care or child care arrangement)
   Behavior, Learning, Peer relationships:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

___
2. Preschool (ages; type of school or child care arrangements)
   Behavior, Learning, Peer relationships:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

3. Kindergarten (Type of School; Behavior, Learning, Friends):

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

4. First Grade (Behavior, Learning, Friends):

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

5. Second Grade (Behavior, Learning, Friends):

__________________________________________________________________
6. Other Relevant Grades (e.g., grades in which behavior, learning, or social relationships changed):
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

7. Special Education Classes:
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

8. Repeated or Skipped Grades:
__________________________________________________________________
__________________________________________________________________

1. Current ASD Behaviors/Behavior Problems (Problem, Current frequency, When it began, What usually sets it off, what usually stops it):
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
III. Discipline:

A. Who disciplines:

B. What is used? (What else? What else?)

For each, how often; how effective:

C. Spanking: (If parents haven’t mentioned spanking, ask specifically how often (per day/wk/or month, and make note of their attitudes about it):
D. Other Concerns/Problems Not Yet Addressed:

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

________
CDIT Phone Screener:
This is … calling from U of Fl, I’m returning your call about possibly enrolling your child in CDIT for ASDs. I’d like to give you some info about the study and also ask some questions to see if it sounds like you and your child would be a good fit for our treatment. **May I ask you a series of questions regarding your child’s medical and psychiatric history? Your answers will be kept confidential and will be used only to help determine if you qualify for this research study. We will destroy any information provided if you do not participate in this study. **

___Yes ___No

### Confirm the following information:

<table>
<thead>
<tr>
<th>Screening date:</th>
<th>Child Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent Name:</td>
<td>Child DOB/Age:</td>
</tr>
<tr>
<td>Address:</td>
<td>Between the ages of 3 and 7? ___No__Yes</td>
</tr>
<tr>
<td>City/Zip:</td>
<td>Male/Female?:</td>
</tr>
<tr>
<td>Email:</td>
<td>Referral Source:</td>
</tr>
<tr>
<td>1 or 2 parent family?</td>
<td>Child resides in your home?: ___No__Yes</td>
</tr>
<tr>
<td>Phone 1:</td>
<td>OK to leave message? ___No__Yes</td>
</tr>
<tr>
<td>Phone 2:</td>
<td>OK to leave message? ___No__Yes</td>
</tr>
</tbody>
</table>

### Provide the following information about the study** (check the small box when done):

- **For children ages 3-7 w/ a previous diagnosis of ASD**
  - You may be assigned to immediate or wait-list groups
- **CDI training is at no charge**
  - Attend a 3 hour pre assessment
- **Primary caregiver is required to participate, but other caregivers can also participate**
  - May be a 3 month wait before training starts
- **Child must reside in the primary caregivers home**
  - Training is weekly for 8 weeks
- **Child can not have history of severe sensory impairment (i.e. deafness)**
  - You will be paid for assessment 2 and 3
- **Child must be stable on other medication or interventions throughout the duration of their study participation**
  - PHI will be secure if participate or destroyed if not eligible

**Ask parent to rate the child on the following behaviors:** where Yes (Y) = presence of behavior, No (N) = absence of behavior

<table>
<thead>
<tr>
<th>Child makes appropriate eye-contact during social interactions</th>
<th>Child demonstrates delayed spoken language skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child has developmentally appropriate social relationships</td>
<td>Child demonstrates repetitive and stereotyped use of language</td>
</tr>
<tr>
<td>Child spontaneously engages others in social interactions</td>
<td>Child engages in repetitive or stereotyped behaviors or mannerisms</td>
</tr>
<tr>
<td>Child demonstrates social/emotional reciprocity</td>
<td>Child is inflexible in their adherence to routines or rituals</td>
</tr>
<tr>
<td>Child engages in make believe play</td>
<td>Child exhibits a preoccupation with a pattern or interest that is abnormal in focus or intensity</td>
</tr>
<tr>
<td>Child is able to initiate conversation with others</td>
<td>Child is preoccupied with parts of objects</td>
</tr>
</tbody>
</table>

The onset of these behaviors before age 3
LIST OF REFERENCES


BIOGRAPHICAL SKETCH

Nicole Christina Ginn was born in Orlando, Florida to James and Renee Ginn and her older brother, Jimmy. She graduated summa cum laude with a Bachelor of Arts degree in psychology and sociology in May 2008 from the University of North Carolina Chapel Hill. In the fall of that year, Nicole enrolled in the University of Florida’s Department of Clinical and Health Psychology doctoral program. At the University of Florida, Nicole served as a graduate research assistant in the Child Study Lab under the mentorship of Sheila Eyberg, Ph.D. and Stephen Boggs, Ph.D. and was awarded the University of Florida Florence Shafer Memorial Award for Excellence in Psychotherapeutic Counseling. Nicole will be completing her pre-doctoral internship at the Mailman Center for Child Development in Miami, Florida beginning in September 2012. She will receive her Ph.D. from the University of Florida in 2013 and her future plans include continuing to evaluate and provide effective interventions for children with Autism Spectrum Disorders.