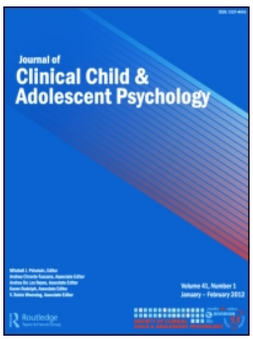

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Child-Directed Interaction Training for Young Children With Autism Spectrum Disorders: Parent and Child Outcomes

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This study examined the efficacy of the Child-Directed Interaction Training (CDIT) phase of Parent–Child Interaction Therapy for children with an Autism Spectrum Disorder (ASD). Thirty mother–child dyads with children ages 3–7 years with a diagnosis of ASD participated in this randomized controlled study. Following manualized CDIT, statistically significant and meaningful improvements in child disruptive behavior and social awareness as well as maternal distress associated with child disruptive behavior occurred. Across 8 sessions, mothers learned to provide positive attention to their children's appropriate social and play behaviors. Both child and parent changes were maintained at 6-week follow-up. A relatively brief, time-limited, and accessible intervention may be efficacious for improving child and parent behaviors in families of young children with ASD. By decreasing child disruptive behaviors, CDIT may also help to prepare children to benefit further from future interventions.

Autism Spectrum Disorders (ASD) are estimated to affect one in every 68 children in the United States (Centers for Disease Control and Prevention, 2014). Children with ASD have a complex presentation of social skill deficits, communication delays, and restricted interests that often manifest in disruptive behavior and relational problems. Further, parents of children with ASD report higher parenting stress than parents of typically developing children (Smith, Oliver, & Innocenti, 2001), which has been related to both lower parental engagement in treatment and poorer child response (Osborne, McHugh, Saunders, & Reed, 2008). However, evidence-based treatments for ASD do not always include a parent component, and access to these treatments (such as ABA Discrete Trial Training; Rogers & Vismara, 2008) can be limited due to length, cost, and therapist availability, especially for low-income families (Thomas, Ellis, McLaurin, Daniels, & Morrissey, 2007). There is increasing need for inexpensive, available treatments that address the child's symptoms and the family's stress and functioning.

Parent-training interventions are a relatively new development in the treatment of ASD. These interventions tend to focus on cost effectiveness and cross-setting generalizability of new learning outside the treatment session (McConachie & Diggle, 2007). Studies report that parent involvement in ASD treatment leads to improvements in both parent stress and parenting competence, as well as more positive parent–child interactions (Brookman-Frazee, Stahmer, Baker-Ericzén, & Tsai, 2006). Child outcomes have included increased receptive and expressive language (Dawson et al., 2010; Warren et al., 2011), decreased autism symptom severity (Ono, McConachie, & Honey, 2013) improved social responsiveness and communication (Ingersoll & Wainer,

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2013), and reduced levels of disruptive behavior (Howlin et al., 1987). Research to date has been promising, although as noted in the Ono et al. (2013) and McConachie and Diggle (2007) reviews, much of the research in this area remains limited by weak research design and few randomized control trials. Furthermore, examination of existing evidence-based interventions for disruptive behavior disorders, which address many similar child and family problems, has been uncommon. Most evidence-based interventions for disruptive behavior have undergone continuous research and refinement for decades (Eyberg, Boggs, & Jaccard, 2014) and may be particularly promising for ASD families.

Parent–Child Interaction Therapy (PCIT) is an evidence-based parent training intervention for young children with disruptive behavior disorders. This treatment has been applied successfully to behavior problems in a number of other diagnostic groups including children with intellectual disorder (Bagner & Eyberg, 2007). Improved parenting skills and reduced parental stress and depression both immediately after treatment and at 1- and 2-year follow-up have also been documented (Eyberg et al., 2014). 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.

Similar to the developmental, naturalistic therapies used to treat children with ASD, such as Early Start Denver and Project ImPACT (Dawson et al., 2010; Ingersoll & Wainer, 2013), the CDI phase of PCIT creates an environment in which the child views play, as well as parent–child interactions, as positive, rewarding experiences and promotes social and communication learning as well as skill generalization (Masse, McNeil, Wagner, & Chorney, 2007). Several components of CDI (e.g., parent implementation, naturalistic environment, modeling, differential reinforcement) have been established as evidence-based practices for children with ASD (Wong et al., 2013), suggesting that CDI is a promising intervention for reducing disruptive behavior and improving social-communication skills in children with ASD.

Pilot studies using PCIT or adaptations of PCIT with high-functioning children with ASD have shown gains in prosocial verbalization (Abner et al., 2008), positive affect and imitation (Allen, Harrington, & Cooke, 2011; Solomon, Ono, Timmer, & Goodlin-Jones, 2008), and reduced aggression and noncompliance (Masse et al., 2007). Decreased parenting stress and improved parenting skills have also been reported in a single-subject case study (Budd, Hella, Bae, Meyerson, & Watkin, 2011). The present study is the first randomized controlled trial to examine outcomes for children with ASD and their mothers following the CDI phase of PCIT (CDIT) alone. We hypothesized that children in CDIT would show fewer behavior problems as well as increases in language, social awareness and responsiveness, and that their caregivers would show improvements in parenting behaviors and decreases in parenting stress at both posttreatment and 6-week follow-up.

We also examined potential mediators of treatment change in ASD families. Fewer than 20% of articles examining interventions for children with ASDs include a discussion of possible mediating variables (Wolery & Garfinkle, 2002). In parent training interventions, changes in parenting behavior are expected to mediate child behavior change. In the PCIT literature, Bagner and Eyberg (2007) found that changes in observed parenting behaviors learned during the CDI phase of PCIT mediated behavior changes in children with intellectual delays. Thus, we hypothesized that changes in observed parenting behaviors would function in a similar way in CDIT with the ASD population.

METHOD

Participants

Participants were 30 families with children ages 3 years, 0 months to 7 years, 11 months with a previous diagnosis of an ASD from a healthcare professional. To participate in the study, children had to demonstrate cognitive functioning at the 2-year-old level or higher and speak a minimum of three words or word approximations. Children with dual diagnoses of ASD and intellectual disability were not excluded. Primary caregivers had to agree to attend all scheduled sessions. To ensure they would have the capacity to learn treatment skills, they had to attain a standard score of 75 or higher on a cognitive screening measure or have completed at least 2 years of college. Exclusion criteria for this study included change in behavioral medication type or dosage during the month preceding the start of treatment or any time during study involvement. Children receiving additional behavioral treatments (e.g., ABA Discrete Trial Training) were excluded.

Children in the sample had a range of ASD symptom severity (Childhood Autism Rating Scale [CARS] T score range = 30–48) and intellectual functioning (Differential Abilities Scale [DAS] GAC score range = 50–134). All primary caregivers were female, and 50% of families participated with a secondary caregiver. See Table 1 for additional participant demographic information.

Families were randomly assigned to an immediate treatment (IT) group ($n = 19$) or a waitlist control (WL) group ($n = 20$). The 30 families that completed both their Time 1 and 2 assessments were included in analyses (see Figure 1). Overall, the study dropout rate was 23%, and treatment dropout rate was 5%, which is

TABLE 1
Demographic Characteristics of Immediate Treatment and Waitlist Groups

	Immediate Treatment[a]		*Waitlist Control*[a]				
Characteristic	*M*	*SD*	*M*	*SD*	*t(28)*	χ^2	*p*
Child Age (Years)	4.32	1.16	5.12	1.39	1.55	—	0.10
CARS-II Severity	49.67	7.16	48.40	6.80	−0.49	—	0.62
Child Sex (% Male)	80.00	—	80.00	—	—	0.00	1.00
Child Ethnicity (% Caucasian)	86.70	—	80.00	—	—	0.00	1.00
Receiving Other Interventions During Participation (%)							
Occupational Therapy	33.30	—	60.00	—	—	2.80	0.09
Speech Therapy	73.30	—	53.30	—	—	0.42	0.52
Psychiatric Medication	28.60	—	28.60	—	—	0.00	1.00
Diagnosis (%)							
Autistic Disorder	46.70	—	33.30	—	—	0.56	0.46
Asperger's Syndrome	6.70	—	6.70	—	—	0.00	1.00
PDD-NOS	46.70	—	60.00	—	—	0.54	0.46
Maternal Age (Years)	34.67	9.14	38.93	7.11	1.43	—	0.17
Maternal Education (% Completed ≥2 Years College)	80.00	—	86.70	—	—	0.24	0.62

Note: PDD-NOS = Pervasive Developmental Disorder Not Otherwise Specified.
[a]$n = 15$.

substantially lower than the 27% to 47% attrition rates of previous PCIT efficacy studies (Lyon & Budd, 2010).

Measures

Childhood Autism Rating Scale, Second Edition. The CARS-2 (Schopler, Van Bourgondien, Wellman, & Love, 2010) is a 15-item observational rating screener developed to distinguish children with ASD from children with other developmental disabilities. This measure was used to confirm diagnosis.

Differential Abilities Scale, Second Edition. The DAS-II (Elliott, 2007) is a brief, comprehensive measure of 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.

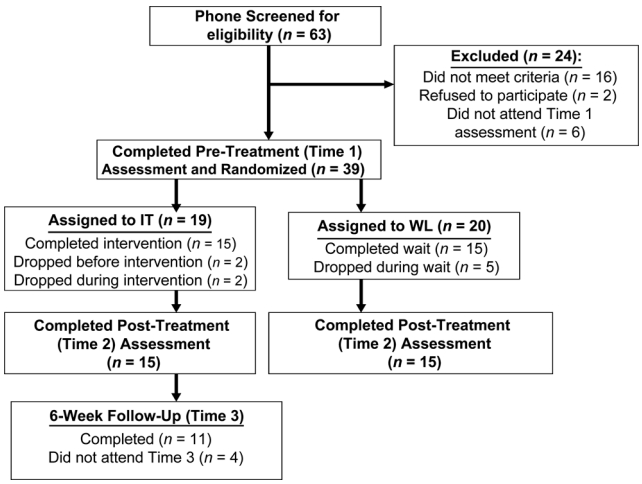

FIGURE 1 Participant flow diagram.

Peabody Picture Vocabulary Test, Third Edition (PPVT-III). The PPVT-III (Dunn & Dunn, 1997) is a well-standardized measure of receptive language in individuals' ages 2.6 years through adulthood. It was used as a proxy screening measure for adult intellectual functioning as well as a child outcome measure.

Eyberg Child Behavior Inventory (ECBI). The ECBI (Eyberg & Pincus, 1999) is a 36-item parent rating scale of disruptive behavior. In this sample, internal consistency estimates for the Intensity and Problem Scales were .91 and .83, respectively. Raw scores of higher than 132 on the Intensity Scale and higher than 15 on the Problem Scale (T scores of 60 or higher) are clinically significant. For the study, the ECBI Intensity Scale score was used as an outcome measure of child behavior and the Problem Scale score was used as a measure of parental distress.

Dyadic Parent–Child Interaction Coding System (DPICS-III). The DPICS (Eyberg, Nelson, Duke, & Boggs, 2004) is a behavioral observation coding system that measures the quality of parent–child social interaction during three 5-min standard situations that vary in the degree of parental control (i.e., child-led play, parent-led play, and clean-up). Only the child-led play situation was conducted and video recorded during study assessments. To examine changes in parenting skills taught in CDIT, two DPICS composite categories

were used. *Positive Following* contains the verbal skills (behavior descriptions, reflections, labeled praises) that parents were taught to use during CDIT interactions. *Negative Leading* contains intrusive verbal behaviors (questions, commands, critical statements) parents were taught to avoid during CDIT.

Undergraduate student coders were trained to 80% reliability and were uninformed of treatment status (IT or WL) prior to coding. Interrater agreement for parent DPICS codes ranged from 77 (behavior descriptions) to 93% (information questions) and Cohen's kappa ranged from .73 (indirect commands) to .92 (information questions).

Word Count. Word Count (Abner et al., 2008) was defined as the number of intelligible words spoken by the child in a 5-min period during the DPICS child-led-play situation to measure expressive language. ''Intelligible'' was defined as words that were distinct and separate from one another, although the words could be repeated. Interrater reliability of 92% was obtained on this measure. Word Count was coded from video recordings at each assessment and used as an outcome measure of child expressive language.

Social Responsiveness Scale (SRS). The SRS (Constantino & Gruber, 2005) is a 65-item rating scale for children ages 4 to 18 that measures the severity of ASD symptoms as they occur in natural social settings, such as interactions with parents or peers. The SRS composite score and Social Awareness subscale score were included as child outcome measures. In our sample, internal consistency for the Total Score was .84.

Parenting Stress Index–Short Form. The PSI-SF (Abidin, 1995) is a 36-item self-report scale containing three empirically derived subscales (Parental Distress, Parent–Child Dysfunctional Interaction, Difficult Child). In this sample, internal consistency coefficients for the Total Score, Parent Distress, Parent–Child Dysfunctional Interaction, and Difficult Child subscales were .88, .80, .63, and .84, respectively.

Study Design and Procedures

Families were recruited from multiple referral sources including 50% from the University of Florida Psychology and Psychiatry outpatient clinics. At the Time 1 assessment, mothers completed the demographic questionnaire, ECBI, PSI-SF, and SRS, whereas the secondary caregivers completed the ECBI and PSI-SF. The PPVT-III and the DAS-II were administered to the child, and a CARS-II was completed by the assessor to determine study inclusion. The DPICS observations were conducted in a 5-min child-led play situation with each parent.

Families were randomized into either the IT condition ($n = 15$) or the WL condition ($n = 15$). Following the Time 1 assessment, IT families began treatment within 1 week and WL families received intervention after 10 to 12 weeks. A stratified randomization approach was used to assure equal numbers of children from each of the three diagnostic groups (Autistic Disorder, Asperger's Disorder, and Pervasive Developmental Disorder Not Otherwise Specified) in the two experimental conditions.

Time 2 assessment occurred following treatment for the IT families and 10 weeks following the Time 1 assessment for WL families. The Time 3 assessment was a 6-week-follow-up for IT families and a posttreatment assessment for WL families. Time 2 and 3 assessments included administration of the ECBI, SRS, PSI-SF, and DPICS. Families were paid $20 following the Time 3 assessment.

Treatment

Families received eight CDIT sessions across a 10-week period. Sessions were 60- to 75-min long, held once per week, and conducted by one of seven clinical psychology graduate students with prior training as a PCIT lead therapist. Each CDIT session followed the standard manualized CDI session outlines (Eyberg & Funderburk, 2011) and included a CDIT Teach session followed by seven CDIT Coaching sessions, which included discussion with the parents as well as in vivo practice and coaching of the CDIT skills. Therapists tailored their coaching to the specific behavioral domains that each family reported as a primary concern (e.g., eye contact, sharing).

Of the 15 families in the IT group, mothers reported practicing the skills at home 70% of days, and 50% obtained CDIT skill mastery. Secondary caregivers were involved in 72% of the cases and participated in 45% of sessions.

Treatment Integrity

To ensure that all therapy sessions were completed with treatment integrity, 30% of video-recorded sessions from each participant family were randomly selected by trained undergraduate research assistants and checked using the CDIT manual session integrity checklists. For the 15 IT families, percentage agreement with treatment protocol items (accuracy) was 98%, and interrater agreement was 97% (range = 90–100%).

RESULTS

Analyses of covariance, with pretreatment scores as covariates, were used to determine the efficacy of CDIT

for improving parent and child functioning in families with a child with ASD. At the Time 2 assessment, differences between the 15 treatment and 15 waitlist dyads were examined. Mean scores are shown in Table 2.

Maternal Parenting Behaviors

Compared to the parent–child interactions of mothers in the WL condition, mothers in the IT condition demonstrated significantly more Positive Following, $F(1, 27) = 92.45$, $p < .001$, $d = 2.60$, and less Negative Leading, $F(1, 27) = 23.84$, $p < .001$, $d = 1.78$, with their children at the Time 2 assessment.

Child Disruptive Behavior

On the ECBI Intensity Scale, mothers of children in the IT condition reported fewer disruptive behaviors at Time 2 than WL mothers, $F(1, 27) = 16.56$, $p < .001$, $d = 1.12$.

Child Receptive and Expressive Language

Group differences in child receptive (PPVT-III) and expressive (word count) language were not significant at Time 2, $F(1, 27) = 0.04$, $p = .85$, and $F(1, 27) = 0.58$, $p = .81$, respectively.

Child Social Responsiveness

Group differences on the SRS were not significant for the total score, $F(1, 27) = 2.78$, $p = .11$. However, on the Social Awareness subscale, scores for children in the IT condition were significantly higher after treatment than scores for the WL children, showing a large between-groups effect size, $F(1, 27) = 6.82$, $p = .02$, $d = 1.03$.

Maternal Stress and Distress

Total scores on the PSI-SF were lower at Time 2 for IT mothers than WL mothers, but the difference between groups was not significant, $F(1, 28) = 1.83$, $p = .19$,

TABLE 2
Mean Scores for Child Outcome Measures at Time 1 and Time 2 Assessments

			Time 1		*Time 2*				
Measure	*Group*	*N*	*M*	*SD*	*M*	*SD*	*F(1,27)*	*p*	*d*[a,b]
Eyberg Child Behavior Inventory									
Intensity	IT	15	134.67	31.09	101.20	37.19	16.56	< .001	1.12
	WL	15	135.93	24.24	134.27	19.35			
Problem	IT	12	15.92	7.18	7.75	6.57	6.73	.02	0.79
	WL	14	15.07	8.18	13.36	7.52			
Social Responsiveness Scale									
Awareness	IT	15	75.20	12.21	67.47	14.22	6.82	.02	1.03
	WL	15	78.48	8.77	78.53	5.42			
Composite	IT	15	85.53	9.60	80.53	12.23	2.78	0.11	0.17
	WL	15	82.27	9.03	82.33	8.90			
Parenting Stress Index-Short Form									
Difficult Child	IT	15	40.67	8.58	36.40	7.30	0.89	0.35	0.34
	WL	15	41.67	8.24	39.13	8.55			
Parent-Child	IT	15	30.40	4.60	28.33	5.85	0.87	0.36	0.29
	WL	15	30.47	8.00	30.40	8.23			
Parent Distress	IT	15	28.00	6.90	27.33	6.80	0.50	0.49	0.42
	WL	15	30.67	7.80	30.40	7.86			
Total Stress	IT	15	99.07	17.91	91.00	14.66	1.83	0.19	0.53
	WL	15	102.08	18.23	99.93	19.07			
Peabody Picture Vocabulary Test, 3rd Ed.									
Receptive Score	IT	15	82.60	26.72	84.00	22.25	0.03	0.85	0.42
	WL	15	98.20	24.11	93.87	24.62			
Wordcount	IT	14	132.27	88.93	166.33	73.58	0.58	0.81	0.10
	WL	15	185.33	91.56	157.14	100.03			
Positive Following Skills	IT	15	5.00	6.06	20.07	8.32		< .001	2.60
	WL	15	3.80	1.97	3.07	4.06			
Negative Leading Skills	IT	15	38.53	24.01	8.47	8.15		< .001	1.78
	WL	15	27.73	14.89	26.33	11.65			

Note: IT = immediate treatment; WL = waitlist control.
[a]Wilcoxon signed-rank test = nonparametric test for nonnormal data.
[b]Cohen's d = effect size between IT and WL groups at Time 2.

TABLE 3
Mean Scores for Measures at Time 2 and Time 3 Assessments

Measure	n	Time 2 M	Time 2 SD	Time 3 M	Time 3 SD	t(10)	z[a]	p	d[b]
Eyberg Child Behavior Inventory									
Intensity	11	94.27	31.00	101.18	23.16	−2.34	—	0.52	0.25
Problem	7	6.86	6.07	9.29	4.07	−2.28	—	0.07	0.47
Social Responsiveness Scale									
Awareness	11	66.00	15.85	70.45	8.12	−1.62	—	0.14	0.35
Composite	11	79.37	13.47	80.91	9.84	—	−0.77	0.44	0.13
Parenting Stress Index-SF									
Difficult Child	11	35.91	8.28	35.09	7.76	—	−0.36	0.72	0.10
Parent-Child	11	26.55	5.05	27.72	5.64	—	−0.15	0.89	0.22
Parent Distress	11	28.55	5.77	27.36	6.15	0.66	—	0.52	0.20
Total Stress	11	89.55	14.78	89.18	16.59	0.15	—	0.89	0.02
Peabody Picture Vocabulary Test, 3rd Ed.									
Receptive Score	11	84.72	23.59	83.73	22.21	.0.19	—	0.86	0.04
Word Count	8	113.00	65.60	112.67	83.90	—	−0.63	0.53	0.00
Dyadic Parent–Child Interaction Coding System									
Positive Following Skills	11	20.45	9.56	17.27	10.45	1.82	—	0.09	0.32
Negative Leading Skills	11	8.09	8.02	6.00	4.69	0.95	—	0.37	0.32

[a]Cohen's d = Effect size between Time 2 and 3 groups.

$d = .53$. The individual PSI-SF subscale scores were also not significant (see Table 2). Mothers in the IT group, however, reported less distress associated with child disruptive behaviors than WL mothers at Time 2 assessment, $F(1, 24) = 6.73$, $p = .02$, $d = .79$.

Clinical Significance of Mother and Child Outcomes

To determine if these changes in child disruptive behavior and social awareness and maternal distress were clinically significant, the Jacobson, Roberts, Berns, and McGlinchey (1999) criteria was applied. As shown in Table 4, a higher proportion of IT mothers reported clinically significant changes at Time 2 than WL mothers.

Changes in Treatment Effects from Posttreatment (Time 2) to 6-week Follow-Up

Paired samples t tests were conducted to assess changes in mother and child outcomes from Time 2 to the 6-week assessment for families in the IT condition. When data were not normally distributed, the Wilcoxon signed-rank test, a nonparametric test, was calculated. No significant differences between scores at posttreatment and the 6-week follow-up were found (see Table 3).

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 mediators, changes in positive and negative maternal parenting behaviors. In the first analysis, the experimental condition (IT vs. WL) was the independent variable, child disruptive behavior as measured by the ECBI Intensity Scale at the Time 2 assessment was the dependent variable, and Positive Following skills at the Time 2 assessment, controlling for pretreatment Positive Following, was the proposed mediator. Analyses revealed, with 95%

TABLE 4
Reliable Change and Clinically Significant Change in the Immediate Treatment (IT) and Waitlist (WL) Groups

Measure	Group	n	Reliable Change[a] Number	%	Clinically Sig. Change[b] Number	%
ECBI Intensity	IT	15	8	53	6	40
	WL	15	2	13	0	0
ECBI Problem	IT	12	6	50	6	50
	WL	14	1	7	1	7
SRS Awareness	IT	15	10	67	4	27
	WL	15	5	33	0	0

Note: ECBI = Eyberg Child Behavior Inventory; SRS = Social Responsiveness Scale.

[a]The reliable change index (RCI) was used to determine whether the magnitude of change exceeded the margin of measurement error. The RCI was calculated by dividing the magnitude of change between the Time 1 and Time 2 scores for each individual by the standard error of the sample difference scores. RCIs greater than 1.96 were statistically significant.

[b]A child was determined to have made a clinically significant change if the child's score was in the clinically significant range at Time 1 assessment and in the normal range at Time 2 assessment, and the change in the individual's score from Time 1 to Time 2 was statistically reliable as defined using the RCI.

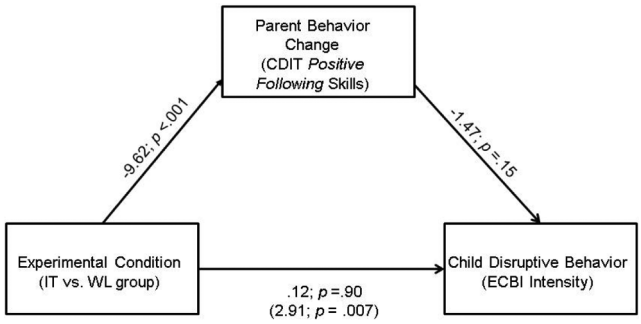

FIGURE 2 Direct effects of mediator model. Path values represent unstandardized regression coefficients and the corresponding *p* values. *Note*: Values in the parentheses represent the direct effect of experimental group on child disruptive behavior before inclusion of the proposed mediator, changes in Child-Directed Interaction Training (CDIT) Positive Following skills. IT = immediate treatment; WL = waitlist; ECBI = Eyberg Child Behavior Inventory.

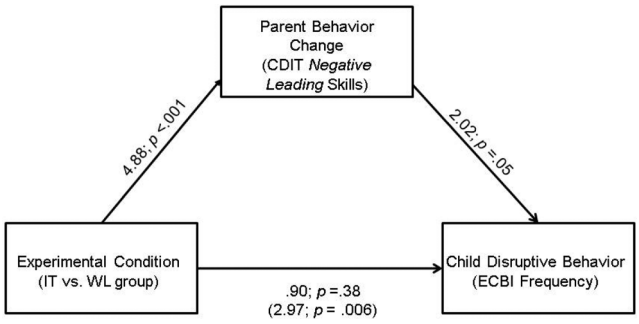

FIGURE 3 Direct effects of mediator model. Path values represent unstandardized regression coefficients and the corresponding *p* values. *Note*: Values in the parentheses represent the direct effect of experimental group on child disruptive behavior before inclusion of the proposed mediator, changes in Child-Directed Interaction Training (CDIT) Negative Leading skills. IT = immediate treatment; WL = waitlist; ECBI = Eyberg Child Behavior Inventory.

confidence, that the total indirect effect of the proposed mediator, change in Positive Following skills, was not significant, with a point estimate of 27.62 and a 95% bootstrap confidence interval of −.0252, 64.35. The second analysis examined maternal Negative Leading at the Time 2 assessment as the proposed mediator. Results indicated that the indirect effect of change in Negative Leading was significant, with a point estimate of 20.54 and a 95% bootstrap confidence interval of 6.52, 47.63 (see Figures 2 and 3).

DISCUSSION

This study is the first randomized controlled trial to examine parent and child outcomes following CDIT with children with ASD. Results demonstrate maternal skill acquisition leading to significant reductions in disruptive behavior and improved social awareness. During this eight-session intervention, maternal distress related to child disruptive behavior was significantly reduced as well. Parent and child outcomes were maintained at 6-week follow-up. These positive findings signal great promise for CDIT as a brief, economical intervention for improving child cooperation and social awareness, enhancing parent–child relations, and maximizing the child's readiness to benefit from future social and educational experiences.

Observed Maternal Parenting Behaviors

The mothers in this study showed important changes in their use of CDIT skills. These changes in parenting behaviors are similar to the results observed in other developmental, naturalistic interventions for children with ASD (e.g., Ingersoll & Wainer, 2013) and similar to changes observed in PCIT studies with other diagnostic populations (e.g., Harwood & Eyberg, 2006). The findings also indicate that mothers are able to implement CDIT skills with children with ASD to effectively to change their child's behavior with unmodified, manualized CDIT in a brief period.

As in earlier studies (Bagner & Eyberg, 2007), changes in CDIT skills significantly mediated changes in child disruptive behavior. In our ASD sample, it was the change in mothers' Negative Leading that mediated child behavior change. Decreasing the frequency of questions and commands may have helped facilitate engagement in parent–child play by reducing child overstimulation, which can occur in children with autism, especially when provided with multiple questions or commands in a short period without having the time to process the language. Unexpectedly, the relationship between maternal use of CDIT Positive Following skills and child disruptive behavior was not significant. It is possible that mothers' use of a specific skill (i.e., behavior description) or maternal imitation of child behavior that is taught in CDIT but not captured in the DPICS coding program may be the mechanism for change.

Child Outcomes

The improvement in child behavior after only 8 weeks in treatment is noteworthy especially given that disruptive behaviors in children with ASD can often impede the efficacy of other interventions (e.g., occupational therapy) and contribute to significant parenting stress (Osborne et al., 2008). Forty percent of the treated children showed clinically significant changes in disruptive behavior after treatment, even though disruptive behavior was not a requirement of study inclusion and only 63% fell into the clinical range before treatment. More than half the

treated children demonstrated reliable changes in disruptive behavior and in social awareness as well. All children scored in the clinical range of social awareness before treatment, and 27% moved to the nonclinical range by the end. An additional 27% moved from the severe to the mild-moderate range of social awareness. Changes in both disruptive behavior and social awareness were maintained at the 6-week follow-up, likely due in part to the mothers' maintenance of their CDIT skills.

The treated children did not show the changes in receptive or expressive language that we expected following CDIT. Although these results are surprising, the lack of observed language acquisition may have been specific to our sample, of which 86% had average or advanced receptive language abilities and good word-use with an average of 132 words in the 5-min child-led play situation at study entry. However, maladaptive speech most characteristic of ASD, such as echolalia, repetitive, or stereotyped speech, was not assessed.

Parent Report of Stress and Distress

Maternal reports of stress did not change as a result of treatment. One possible explanation may be that the PSI-SF did not adequately capture or describe the unique stressors experienced by parents of children with ASD (e.g., lack of access to services). Zaidman-Zait et al. (2010) found that the PSI-SF had low discriminative validity across several subscales when administered to parents of young children with ASD. However, parent distress associated with child disruptive behavior decreased to levels below the clinical cutoff at posttreatment. Because maternal stress is often strongly associated with child disruptive behavior, it is appropriate that mothers would report concurrent decreases in child disruptive behavior as well as their own stress associated with these behaviors. Of importance, this finding likely suggests increased maternal self-efficacy in their ability to manage their child's behavior following treatment.

Study Limitations and Future Directions

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. Follow-up data analysis was also limited by a reduced sample size at the 6-week assessment ($n = 11$) due to difficulty contacting the families or changes in child behavioral or medication treatments during this time. A larger sample in future studies would allow for supplementary data analyses including moderator analyses to continue to determine and the families for whom CDIT may be most appropriate.

The majority of children (80%) were diagnosed within the past year, and this may have impacted multiple family variables, including maternal stress. Although this study excluded families who were participating in other behavioral treatments (i.e., ABA) to ensure that the behavioral changes assessed were due to the impact of this intervention alone, we recognize that this may have limited the generalizability of our findings given the large proportion of families who receive multiple behavioral therapies. Future studies will benefit from a comparison of CDIT alone compared with CDIT in combination with other behavioral therapies in order to increase study outcome generalizability and assess the added benefits of multiple treatments.

Another important consideration is the selection of outcome measures and questionnaires to ensure results capture changes unique to the ASD population across both raters and settings. Additional measures to consider for future study inclusion would be teacher-report measures or observational coding of child social awareness and play behaviors (e.g., joint attention and imitation skills). It will also be important to sample children with less advanced language abilities in future studies. Although clinically, reductions in repetitive speech and improved back-and-forth conversation skills were noted, future studies will need to more directly evaluate these changes. Finally, future studies should assess the efficacy of CDIT for parents and children after non-time-limited CDIT.

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