Journal of Clinical Child & Adolescent Psychology
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/hcap20

Language Production in Children With and At Risk for Delay: Mediating Role of Parenting Skills

Dainelys Garcia [a] , Daniel M. Bagner [a] , Shannon M. Pruden [a] & Kristin Nichols-Lopez [a]
[a] Department of Psychology , Florida International University
Published online: 30 Apr 2014.

To cite this article: Dainelys Garcia , Daniel M. Bagner , Shannon M. Pruden & Kristin Nichols-Lopez (2014): Language Production in Children With and At Risk for Delay: Mediating Role of Parenting Skills, Journal of Clinical Child & Adolescent Psychology, DOI: 10.1080/15374416.2014.900718

To link to this article: http://dx.doi.org/10.1080/15374416.2014.900718

Journal of Clinical Child & Adolescent Psychology, 0(0), 1–12, 2014

ISSN: 1537-4416 print/1537-4424 online
DOI: 10.1080/15374416.2014.900718

Routledge
Taylor & Francis Group

Language Production in Children With and At Risk for Delay: Mediating Role of Parenting Skills

Dainelys Garcia, Daniel M. Bagner, Shannon M. Pruden, and Kristin Nichols-Lopez
Department of Psychology, Florida International University

The current study examined the effect of Parent-Child Interaction Therapy (PCIT), a parent-training intervention for child behavior problems, on child language production. Participants were 46 children (ages 20–70 months) with externalizing behavior problems and with or at risk for developmental delay. Parent–child dyads were randomly assigned to a waitlist control or immediate treatment group. Parenting skills learned during PCIT (i.e., "do skills") and children's word tokens and word types were measured at baseline and 4 months later. Findings suggest an indirect effect of parent do skills on the relation between group and child word types, such that more parent do skills predicted more child word types for families receiving PCIT. The present study found that mothers' use of child-directed skills played an important role in the growth and improvement of child language. Results suggest that parent-training interventions targeting child behavior problems may also foster child language production.

Language acquisition in early childhood is a dynamic process and provides an important foundation for subsequent language and literacy skills (McCoy, 2008). Typically developing children tend to acquire many of the necessary language components by 3 years. However, children with developmental delay display a variety of difficulties in communication, including problems conversing, initiating interactions, and using multiword utterances (e.g., Marfo, 1984; Yoder, Spruytenburg, Edwards, & Davies, 1995). These delayed early language milestones can have significant consequences on a child's developmental trajectory (Romski et al., 2010), including behavior problems and poor academic outcomes (Baker & Cantwell, 1987), as well as language and literacy difficulties later in life (e.g., Preston et al., 2010).

BEHAVIOR PROBLEMS AND LANGUAGE DIFFICULTIES

Behavior problems, in particular, are common in children with developmental delay (Dekker, Koot, van der Ende, & Verhulst, 2002). Research has found significantly higher rates of emotional and behavioral difficulties among 2- to 3-year-old children with developmental delay (Emerson & Einfeld, 2010). Specifically, findings suggest that 3-year-old children with developmental delay are 3 to 4 times as likely to have a total Child Behavior Checklist for 1½-to 5-Year-Olds (CBCL) score within the clinical range than their nondelayed peers (Baker, Blacher, Crnic, & Edelbrock, 2002). The increased prevalence of behavior problems in children with developmental delay may be due, in part, to the child's difficulty in communication. For example, young children with language difficulties or language delays may display aggressive behavior due to frustration with communication or lack of social-cognitive skills (Baker & Cantwell, 1983; Crowley, 1992). A recent review revealed that 71% of children diagnosed with an emotional or behavioral disorder displayed significant language deficits, and more than half (57%) of the children diagnosed with language deficits also were diagnosed with an emotional or behavioral disorder (Benner, Nelson, & Epstein, 2002). These findings highlight a potential bidirectional relation between behavior problems and language difficulties, suggesting the need for interventions that can impact both problems simultaneously (Van Daal, Verhoeven, & Van Balkom,

Correspondence should be addressed to Daniel M. Bagner, Department of Psychology, Florida International University, 11200 SW 8th Street, AHC I Room 241, Miami, FL 33174. E-mail: dbagner@fiu.edu

2007). If left untreated, behavior problems may exacerbate language difficulties (Rutter & Lord, 1987), which also can impede speech and gains from speech therapy (Baker & Cantwell, 1987). Alternatively, language difficulties may have a negative impact on behavior, resulting in increased rates of inattentiveness, aggression, or social withdrawal (Tempel, Wagner, & McNeil, 2008). Given the proposed bidirectional relation between behavior problems and language difficulties, it is important to consider shared etiological influences as a potential target for intervention, such as parent–child interactions (Hart & Risley, 1995).

PARENT–CHILD INTERACTIONS

Both child language difficulties and behavior problems are associated with the type and quality of parent–child interactions, especially among children with development delay (Campbell, 1995). For example, parents who are less responsive have difficulty providing a language-rich environment for their children (Delaney & Kaiser, 2001). Frequent use of directive and corrective statements (e.g., commands, criticisms) are associated with delays in children's language abilities (e.g., Barnes, Gutfreund, Satterly, & Wells, 1983; Hart & Risley, 1995; Vibbert & Bornstein, 1989). In fact, language development is enhanced when parents engage in a conversational and child-directed speech style (e.g., commenting on the child's actions and focus of attention; Chapman, 2000; Hart & Risley, 1995). On the other hand, there is evidence that supportive directive acts (e.g., parental control that follows the child's goal) predict better social skills for children with developmental delay. However, mothers of children with developmental delay typically use more interfering than supportive directives, and more interfering directives predict lower adaptive and social skills for children with developmental delay (Green, Caplan, & Baker, 2013). Overall, evidence suggests the use of nondirective play and following the child's lead may help to improve language skills in children with developmental delay (Koegel, Koegel, & Surratt, 1992).

Furthermore, the quality of the parent–child interaction is associated with child behavior (e.g., Campbell, 1995; McMahon, Long, & Forehand, 2011). A model by Crnic, Hoffman, Gaze, and Edelbrock (2004) suggests that the presence of early developmental delay is strongly associated with family climate and parent–child relationships, which in turn influences children's self-regulatory behavior and the emergence of behavior problems. Although family functioning and parent–child interactions do not completely account for children's problematic outcomes, they represent important factors that can be targeted in treatment, especially for children with or at risk for developmental delay (Crnic et al., 2004).

THE ROLE OF PARENTS IN TREATMENT

Given the role of parent–child interactions in the development of both behavioral and language difficulties, parent–child interactions are an important target for treatment (Delaney & Kaiser, 2001). Teaching parents to be child centered in their interactions has yielded a significant, positive influence on receptive and expressive language skills among children with and without intellectual disabilities (e.g., Roberts & Kaiser, 2011). Similarly, promoting child-centered play in parent training can be effective in reducing early childhood behavior problems (Eyberg, Nelson, & Boggs, 2008; Kaminski, Valle, Filene, & Boyle, 2008; Webster-Stratton, Reid, & Hammond, 2004). Many of these child-centered language and behavioral parent-training interventions share components, such as home activities, following the child's lead, and adult contingent social responsiveness (Dunst, Raab, & Trivette, 2011). In the present study, we targeted parent–child interactions because evidence suggests encouraging more parental responsiveness and less directiveness increases opportunities for the child to interact more positively and develop enhanced language skills (e.g., Tannock, Girolametto, & Siegel, 1992).

TARGETING BEHAVIOR AND LANGUAGE SIMULTANEOUSLY

Despite the common elements of child-centered language and behavioral parent-training interventions (e.g., home activities, following child's lead, etc.), most interventions do not target both child language difficulties and child behavior problems simultaneously. However, some studies examining interventions aimed at targeting child behavior problems also have found intervention effects on child language (Bierman et al., 2008; Lunkenheimer et al., 2008). For instance, the Family Check-Up (FCU), a brief motivational intervention for toddlers at risk for problem behaviors, was examined in a meditational model testing the indirect effects of the FCU on children's language skill and inhibitory control. Findings revealed that the FCU was related to changes in positive behavior support, which predicted changes in children's language skill over time (Lunkenheimer et al., 2008). Similarly, Head Start REDI (Research-based, Developmentally Informed), an enrichment preschool curriculum promoting school readiness in Head Start classrooms, found significant effects on child vocabulary and parent reports of child language at home (Bierman et al., 2008). However, these studies did not examine the

improvement of specific parenting skills (e.g., praise) as a mediator between treatment and child language among children with and at risk for developmental delay.

Only two child-centered interventions have been designed to target both child problem behaviors and language performance, and research providing support for these interventions is limited. First, the Blended Communication and Behavior Support program is an intervention designed to teach parents to model developmentally appropriate language, respond to their child's communication, and provide contingent consequences for compliance and noncompliance. Blended Communication and Behavior Support has been examined using single-subject methodology with nine 36- to 46-month-old children with language delays and emergent problem behaviors across two different studies (Delaney & Kaiser, 2001; Hancock, Kaiser, & Delaney 2002). Postintervention changes observed included positive changes in parenting behavior (e.g., increased consequences for compliance and noncompliance) and child behavior (e.g., increased percentage of compliance and noncompliance), although only modest changes in child language performance. However, significance testing was not conducted due to the single subject design of both studies. In addition to the limited improvement in child language skills, the small sample decreases generalizability of the findings, and the lack of a control group limits the ability to rule out internal threats to validity (e.g., regression to the mean).

The second intervention called Success in Parenting Preschoolers (SIP2) is a parent-training program targeting language facilitation, behavior management, and family stress among economically disadvantaged families with typically developing children. In a randomized trial with 40 children and their parents (Fanning, 2008), children randomized to receive SIP2 displayed significant increases in receptive language, daily behavior, nonverbal intelligence, and memory compared to children randomized to a control group. Despite the demonstrated improvements in both language and behavior, SIP2 was not developed for children with developmental delay. In addition, children in this study were identified as at risk for behavior problems and did not exhibit clinically significant levels of behavior problems. Therefore, further examination of parent-training programs targeting both behavior problems and language is important in order to streamline intervention efforts for children with clinically elevated behavior problems and with or at risk for developmental delay.

PARENT–CHILD INTERACTION THERAPY

Parent-Child Interaction Therapy (PCIT) is an evidence-based behavioral parent-training intervention for treatment of disruptive behavior in young children that incorporates the use of nondirective play to increase positive parent-child interactions (Eyberg, Nelson, & Boggs, 2008). Treatment is divided into two distinct phases, Child-Directed Interaction and Parent-Directed Interaction. During Child-Directed Interaction, parents are taught to increase their use of "PRIDE" skills and direct them toward appropriate child behavior and ignore inappropriate child behavior. Specifically, the PRIDE skills stand for *Praising* (statements expressing positive evaluation of the child), *Reflecting* (statements with the same meaning as a preceding child verbalization), *Imitating* (imitating the child's appropriate play), *Describing* (statements describing the child's current actions), and *Enjoyment* (enjoying play time with the child). To assess parent skill acquisition during each session, the therapist codes the frequency of each "do skill," defined as the number of praises, reflections, and descriptions the parents use, and indicates whether the other PRIDE skills (i.e., imitation and enjoyment), as well as ignoring (if applicable), were "satisfactory" or "needs practice." During Parent-Directed Interaction, parents learn to use direct commands and consistent consequences for child compliance and noncompliance initially during play and eventually learning to generalize the skills throughout the day and in other settings (e.g., public). PCIT has been shown to be effective in two large randomized trials for typically developing preschoolers with disruptive behavior disorders (Nixon, Sweeny, Erickson, & Touyz, 2003; Schuhmann, Foote, Eyberg, Boggs, & Algina, 1998), as well as among children with and at risk for developmental delay (Bagner & Eyberg, 2007; Bagner, Sheinkopf, Vohr, & Lester, 2010). However, to our knowledge, no research has examined whether PCIT is associated with improvements in child language outcomes.

PCIT utilizes many of the key components known to foster language development. For instance, Hart and Risley (1995) identified parenting behaviors that closely resemble the PRIDE skills (e.g., "they listened"). In fact, research has demonstrated that parenting style and children's receptive language at 3 years shared 61% of the variance and that parenting style was longitudinally associated with child receptive language at age 9 (Hart & Risley, 1995). Core components of PCIT (e.g., PRIDE skills) are similar to "parallel talk" procedures that are used in speech-language interventions, suggesting that PCIT may also lead to improvements in language in addition to already established decreases in child disruptive behavior. In a conceptual publication, Tempel et al. (2008) reviewed the PCIT and language development literatures to demonstrate how parents receiving PCIT can learn the necessary skills to help decrease child disruptive behaviors and simultaneously foster child language production. However, no empirical research

to date has examined the effect of PCIT on child language production.

DO SKILLS AS A POTENTIAL MEDIATOR OF CHILD LANGUAGE IMPROVEMENTS

Taken together, the studies just reviewed suggest that promoting positive parent–child interactions is associated with improvements in child language and behavior. However, the mechanisms driving this relation remain unclear. It is possible that the extent to which parents utilize skills taught in both language and behavioral interventions (e.g., parallel talk and child-directed speech style; Hart & Risley, 1995) mediates the relation between treatment and improvements in behavior and language. Preliminary work suggests that increases in parent do skills following PCIT mediated changes in child disruptive behavior among children with developmental delay (Bagner & Eyberg, 2007). However, the mediating role of parent skill acquisition on child language in PCIT has not been examined.

THE CURRENT STUDY

The current study is one of the first to examine the effect of a behavioral parent-training intervention on language production with children with and at risk for developmental delay. Based on previous research indicating that the frequency and quality of the parent–child interaction play a crucial role in the child's later language ability, we predicted that children randomized to receive PCIT would demonstrate greater gains in language production as measured by the child's different words (i.e., ''word types'') spoken during child-directed play than children randomized to the waitlist control group. Different words and total words were chosen as markers of child language production given evidence suggesting that young children who experience more child-directed speech by the caregiver, the primary focus of the Child-Directed Interaction phase in PCIT, become better at processing familiar words and as a result have larger expressive vocabularies (Weisleder & Fernald, 2013). In addition, we hypothesized that there would be a mediating effect of the use of parent do skills on the relation between group and child language. Specifically, mothers in the PCIT group were expected to use more do skills than mothers in the control group, and an increase in the use of do skills would predict increases in child language production as measured by the child's different words during a child-directed play. Overall, the goal of this study was to examine the extent to which a parent-training intervention targeting child behavior problems can simultaneously help to foster language production among children with and at risk for developmental delay, which would have implications for streamlining child behavioral and language interventions.

METHOD

Participants

Participants included 46 children (76% male) who were, on average, 45.09 months old ($SD = 14.40$; range = 20–70 months) and presented with elevated externalizing behavior problems and also had or were at risk for developmental delay. All child participants were accompanied by their mothers ($M = 35.63$ years, $SD = 6.66$ years; range = 25–55). The racial or ethnic composition of the child participants was 82% Caucasian, 7% African American, 9% biracial, and 2% Hispanic. The racial or ethnic composition of the primary caregiver, which was the mother in all families, was 92% Caucasian, 4% African American, and 4% biracial. The mean IQ for the child participants was 67.59 ($SD = 30.53$), and most (73.9%) children had IQ scores at or less than 80. Research suggests that a higher cutoff of 80 for developmental delay can be used in young children due to the more favorable sensitivity and specificity values at 1.5 SD below the mean (Elbaum, Gattamorta, & Penfield, 2010). Participants enrolled in this study were referred to an outpatient psychology clinic for treatment of behavior problems primarily by pediatric health care professionals (84%), with an additional 5% referred by teachers, 3% referred by staff at state-funded early intervention programs, and 8% self-referred. Parent–child dyads included in the present study participated in one of two pilot randomized clinical trials and were randomly assigned to either a treatment or waitlist control group.

In Study A, the sample consisted of children with developmental delay and were between the ages of 36 and 70 months ($n = 21$). Dyads were randomly assigned to receive PCIT in an immediate treatment (IT) group ($n = 10$) or wait 4 months to receive treatment in a waitlist (WL) control group ($n = 11$). Inclusion criteria included a parent-completed cognitive screening measure called the Wonderlic Personnel Test (Dodrill, 1981), along with a parent rating of the child's externalizing behavior problems using the CBCL (Achenbach & Rescorla, 2001). Mothers obtaining a standard score of 75 or higher on the Wonderlic Personnel Test, and children scoring above the borderline clinically significant range (i.e., T score > 64 on the Aggressive Behavior subscale) on the CBCL were included in the final sample. Parent–child dyads were excluded when evidence of a major sensory impairment (e.g., deafness, blindness), autism spectrum disorder, or significant motor impairment (e.g., cerebral

palsy) in the child was reported. The dropout rate for Study A was 47%, with seven dropouts form the IT group and three dropouts from the WL control group.

In Study B, the sample included children who were at risk for a developmental delay due to premature birth (i.e., < 37 weeks gestation) and were between ages 20 and 60 months ($n = 25$). The entire sample of children born premature was included in the current study because of their increased risk for developmental delay given evidence for deficits in physical, cognitive, and socio-emotional functioning that may emerge later in childhood (i.e., school age; Bennett, 1988), as well as evidence highlighting language deficits in later childhood when compared to full-term children (Crnic, Ragozin, Greenberg, Robinson, & Basham, 1983). The literature emphasizes that many of these difficulties (e.g., physical, cognitive, and socio-emotional functioning) do not emerge in children born premature until school age, when it is necessary for children to use higher level skills (e.g., language, visual–spatial, and social competencies; Browne, 2003; Censullo, 1994; Spittle, Orton, Doyle, & Boyd, 2007). In addition, the use of IQ testing with children born premature may not adequately assess for developmental delay. Research suggests that IQ scores mask subtle deficits that may not be detected using standardized testing and that the emergence of difficulties in school-age preterm children might be due to these underlying subtle cognitive deficits (Aylward, 2002). Although some children were not below an IQ score of 80 at the time of testing, this does not mean that they were not at risk for subsequent delay, and therefore were included in the analyses. Nevertheless, the model described next yielded comparable results when excluding children above 80 from the analyses.

Dyads in Study B also were randomly assigned to receive PCIT in an IT group ($n = 11$) or wait 4 months to receive treatment in a WL control group ($n = 14$). Inclusion criteria included a parent-completed cognitive screening measure called the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999), as well a parent rating of the child's externalizing behavior problems using the CBCL (Achenbach & Rescorla, 2001). Mothers obtaining a standard score of 75 or higher on the WASI, and children scoring above the borderline clinically significant range (i.e., T score ≥ 60 on the Externalizing Problems scale) on the CBCL were included in the final sample. Parent–child dyads were also excluded when evidence of a major sensory impairment (e.g., deafness, blindness), autism spectrum disorder, or significant motor impairment (e.g., cerebral palsy) in the child was reported. The dropout rate for Study B was 21%, with three dropouts form the IT group and no dropouts from the WL control group.

Families that completed both Time 1 and 2 assessments ($n = 46$) from Studies A and B were included in the current study (79% of the original samples). Across both studies, dyads were randomly assigned to an IT group ($n = 21$) or WL control group ($n = 25$). Dropout rates were not different across the two studies. In addition, families that completed treatment did not differ on any demographic or baseline variables from families that dropped out of treatment. The main behavioral outcome results for these two randomized controlled trials are reported elsewhere (Bagner & Eyberg, 2007; Bagner et al., 2010), and similarly found that PCIT led to significant improvements in children's disruptive behavior in children with and at risk for developmental delay. Furthermore, data from Study A suggests that do skills mediated improvements in child behaviors. However, the primary outcome papers did not examine the effect of parenting skills on child language production.

Screening Measures

Maternal cognition screener. The Wonderlic Personnel Test (Dodrill, 1981), used in Study A, and the WASI (Wechsler, 1999), used in Study B, are short and reliable measures of adult cognition that were used to exclude mothers with cognitive impairment (i.e., IQ estimate <75).

Child cognition screener. The Wechsler Preschool and Primary Scale of Intelligence–Third Edition (Wechsler, 2002) was administered to assess cognitive functioning in children 3 years of age and older in Studies A and B, whereas the Bayley Scales for Infant and Toddler Development–Third Edition (Bayley, 2006) was administered to assess cognitive ability in children younger than 3 years in Study B. Both tools are reliable and widely used to assess cognitive functioning in young children. For Study A, the child was required to have a developmental delay (IQ score < 75 on a measure of cognitive functioning). In Study B, child IQ data were collected for descriptive purposes. Child IQ was included as a covariate in the analyses in the current study.

Child autism screener. The Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988) was administered to identify children with symptoms of autism in Study A. The Modified Checklist for Autism in Toddlers (Robins, Fein, Barton, & Green, 2001) was administered to identify children with symptoms of autism in Study B. Parent report was used in conjunction with clinical judgment for identification of autism in children older than 48 months. Both measures were used to exclude children with symptoms of autism spectrum disorder.

Child behavior screener. The CBCL (Achenbach & Rescorla, 2001) is a 99-item parent-report checklist

designed to assess 18- to 60-month-olds' frequency of behavioral and emotional problems with excellent psychometric properties. Children with a *T* score greater than 64 on the Aggressive Behavior subscale or a *T* score at or greater than 60 on the Externalizing Problems scale were included in the final sample.

Procedure

Both studies were approved by the affiliated hospital Institutional Review Board and included a randomized, controlled trial to evaluate the efficacy of PCIT compared to a WL comparison group. Families were asked to complete a screening assessment, and once eligibility criteria were met, they were randomly assigned to either the PCIT group or the WL comparison group at the baseline assessment. Mothers were videotaped with their child during a 5-min session of child-directed play at the initial baseline assessment (Time 1), and at a second assessment 4 months later (Time 2) after the PCIT families had completed treatment and the WL families had completed the 4-month waitlist period. Each 5-min child-directed play period was conducted in the clinic, using age-appropriate toys (e.g., blocks, farm house). Within each study, the same toys were used for both assessments and were different from the toys used during treatment sessions. The toys were strategically placed in the same spot in the playroom (e.g., on floor, table), and mothers were instructed to follow their child's lead in play.

Coding and Reliability

The Dyadic Parent-Child Interaction Coding System–Third Edition (Eyberg, Nelson, Duke, & Boggs, 2004) is a reliable and valid measure of the quality of parent–child interactions. This measure was used to video code parent and child behaviors by recording the frequency of their occurrence (in real time). As previously described, do skills were calculated by adding the total number of behavior descriptions, reflections, and praises the mothers used during the 5-min child-directed play during the Time 1 and 2 assessments. Undergraduate research assistants were trained to 80% agreement with a criterion tape and were uninformed of group status. Half of the observations were coded a second time for reliability, and average Kappa scores were adequate (range = .61–.76).

The Child Language Data Exchange System (MacWhinney, 2000) was used to transcribe parent and child language use during the child-directed play periods. The Child Language Data Exchange System consists of three sections: (a) Database of language transcripts, (b) Codes for Human Analysis of Transcripts (CHAT), and (c) Computerized Language Analysis (CLAN). The CHAT program provides a standardized way of creating language transcripts, whereas the CLAN program allows users to analyze language transcripts (Parker & Brorson, 2005). We transcribed children's use of language during both Time 1 and 2 assessments using CHAT and analyzed children's language ability (i.e., total words and different words) using CLAN. Two trained undergraduate research assistants, uninformed to group status, transcribed child language. Twenty percent of the transcripts were transcribed by a second research assistant, and interrater reliability estimates were 85% for different words and 89% for total words.

Child language measures analyzed in the current study included the number of total words used (i.e., "word tokens") and the diversity of words used (i.e., number of different words or "word types"). Total words is a measure of overall words produced and is calculated by counting up the number of actual words used. Different words is a measure of lexical diversity that refers to the number of "unique" words used. For example, a child who says, "Mommy, mommy, mommy, can you give me my drink" produced nine total words and seven different words ("mommy" was used three times but is counted only once in the different words calculation). Both total number of words and different words were calculated individually for each child at each time point. In the following analyses, the child's total amount of words used was included as a covariate to provide a more accurate estimate of different or new words.

RESULTS

Preliminary Analyses

Demographic characteristics for study participants are presented in Table 1, and descriptive statistics for the study variables are presented in Table 2. Participants were compared on all demographic variables, and there were no statistically significant differences between IT

TABLE 1
Demographic Characteristics of Groups

	M (SD) or %		
Characteristic	*IT*[a]	*WL*[b]	t/χ^2
Child Age (Months)	46.1 (13.9)	44.2 (15.1)	*t*
Child Sex (% Male)	81.0	72.0	χ^2
Child Ethnicity (% Minority)	19.0	20.0	χ^2
Child IQ	71.1 (18.7)	64.7 (37.9)	*t*
Mother Age	35.0 (7.4)	36.2 (6.1)	*t*
Mother Ethnicity (% Minority)	14.3	4.0	χ^2

Note: No difference approached statistical significance. IT = Immediate Treatment; WL = Waitlist Control.
[a] $n = 21$.
[b] $n = 25$.

TABLE 2
Descriptive Statistics for Child Language and Parenting Skills Measures

	M (SD) or %			
Characteristic	*IT*[a]	*WL*[b]	*t(44)*	*p*
Different Words Time 1	31.00 (28.49)	43.72 (30.57)	1.45	.154
Different Words Time 2	36.48 (24.62)	45.44 (25.66)	1.20	.236
Total Words Time 1	60.57 (68.74)	86.76 (74.38)	1.23	.225
Total Words Time 2	72.57 (57.92)	90.40 (74.01)	0.90	.375
Parent Do Skills Time 1	5.48 (4.07)	6.52 (3.70)	0.91	.367
Parent Do Skills Time 2	17.05 (9.58)	5.80 (6.63)	−4.69	<.001

Note: IT = Immediate Treatment; WL = Waitlist Control.
[a]$n = 21$.
[b]$n = 25$.

and WL groups (see Table 1). In addition, there were no significant group differences at Time 1 different words, total words, and parent do skills (see Table 2). These results suggest successful randomization.

Outliers. Prior to analysis, the data were evaluated for multivariate outliers. Both model-based and nonmodel-based outlier analyses were pursued. For nonmodel-based outlier analyses, a leverage score was calculated for each individual, and an outlier was defined as any participant having a leverage score 4 times the value of the mean (Jaccard & Wan, 1993). One outlier was evident using this criterion. Model-based outliers were examined using limited information regression analyses for each of the linear equations dictated by the path models tested (Bollen & Long 1993). Standardized *df* beta values for each individual, predictor, and intercept were examined in order to isolate unusually influential individuals in parameter estimation. One outlier was defined as having an absolute standardized *df* beta larger than 1.0. Another outlier was evident using this criterion. Analyses were conducted both with and without the outliers and yielded comparable results. Therefore, all results reported included outliers.

Normality. Multivariate normality was evaluated using Mardia's index (Mardia, 1970). The multivariate Mardia coefficient yielded a statistically significant result (critical ratio = 5.48, $p < .05$). The data were also examined using univariate indices of skewness and kurtosis. This revealed skewness and kurtosis absolute values of 3.47 and 17.46, respectively, for the measures of child IQ, which was expected based on the sample of developmentally delayed and at-risk children. Nonnormality was evident at both the multivariate and univariate level; therefore, the model was evaluated using bootstrapping with 2000 bootstrap replicates and bias corrected interval estimation as implemented in AMOS. The *p* value for the overall fit of the tested models was calculated using the Bollen-Stine bootstrap approach in place of the traditional chi-square statistic (Bollen & Stine, 1992). All significance tests and confidence intervals reported are from the bootstrap analyses (Table 3).

Covariates. Child IQ was included as a covariate given that children in Study A had significantly lower IQ scores than children in Study B, $t(44) = 4.19$, $p < .001$. Child age was also included as a covariate because the age criterion differed for children in Study A (36–70 months) than children in Study B (20–60 months). IT and WL families were compared on all other demographic variables, maternal do skills, child total words, and child different words. No other statistically significant differences emerged.

Structural Equation Modeling

A single model, depicted in Figure 1, was used to examine the effects of PCIT on the number of child different words, both directly and indirectly through maternal do

TABLE 3
Intercorrelations Between Model Variables

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Group	—								
2. DoSkillsT1	−0.14	—							
3. DoSkillsT2	0.58**	0.31*	—						
4. DiffWordsT1	−0.21	0.43**	−0.05	—					
5. DiffWordsT2	−0.18	0.36**	0.09	0.87**	—				
6. TotalWordsT1	−0.18	0.41**	−0.05	0.95**	0.84**	—			
7. TotalWordsT2	−0.13	0.34*	0.06	0.87**	0.94**	0.91**	—		
8. Age	0.07	−0.12	−0.06	0.12	0.12	0.12	0.16	—	
9. IQ	.11	0.06	−0.21	0.26	0.22	0.26	0.22	0.01	—

Note: Intercorrelations are Pearson correlations with the exception of group and all continuous variables, which are Point-Biserial correlations. T1 = Time 1; T2 = Time 2.
*$p < .05$. **$p < .01$.

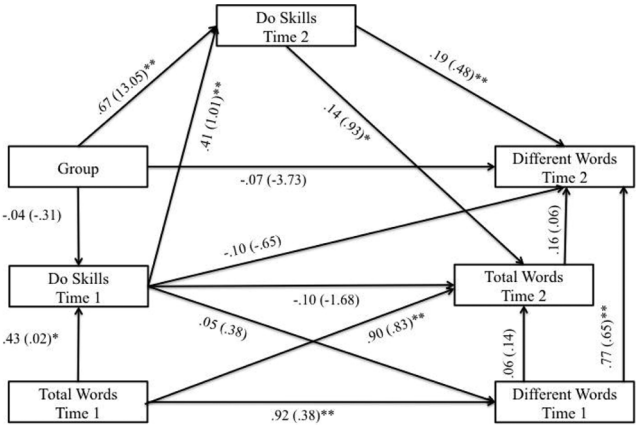

FIGURE 1 Path model for effects of mother Time 2 Do skills on children's use of Different words at Time 2. *Note*: The covariates of age and IQ as well as the correlations between exogenous variables were excluded from the figure to avoid clutter. Unstandardized values are in parentheses. $^{*}p < .05$. $^{**}p < .01$.

skills. Intercorrelations between model variables are presented in Table 3. A dummy variable (scored 1 or 0) for the two treatment conditions (IT vs. WL) was defined and was assumed to impact the outcome in question. Six covariates were included in the analysis: (a) Time 1 child different words, (b) Time 1 maternal do skills, (c) Time 1 child total words, (d) Time 2 child total words, (e) child IQ, and (f) child age. Given that Time 1 maternal do skills and Time 1 child different words were entered as covariates, the analysis reflected the effect of PCIT on covariate-adjusted change in child different words as mediated by change in maternal do skills. Time 1 and 2 child total words were also entered as covariates in order to provide a more accurate representation of the use of child new and different words, after controlling for total language production. The residual terms for Time 2 child different words and Time 2 total words were correlated, to allow for common unexplained variance. By including child language at Time 1 and Time 2, child age, and child IQ as covariates, we can account for possible differences in language skills and IQ across the combined sample. To ease interpretation, covariates of child age and child IQ, as well as the correlations between exogenous variables, were excluded from Figure 1. Also, although the do skills variables and the language outcome variables represent counts, they were treated as continuous variables because the means and variability of each of the variables were considerably high.[1]

Following the recommendations of Bollen and Long (1993), a variety of indices of model fit were evaluated. All indices examined suggested a good fitting model. The Bollen-Stine bootstrapped chi-square test was not significant ($p = .676$). The root mean square error of approximation was $<.001$. The p value for the test of close fit was .67. The comparative fit index was 1.00. The standardized root mean square residual was 0.02. More focused analyses revealed no absolute standardized residuals greater than 1.96 and no modification indices. Figure 1 illustrates the standardized parameter estimates, with unstandardized coefficients in parentheses. All residuals and correlations are in standardized metrics.

TABLE 4
95% Confidence Intervals for Unstandardized Path Coefficients

Path	*Unstandardized Coefficient*	*95% CI*
Total Words Time 1 to Do Skills Time 1	.023	[.008, .041]*
Total Words Time 1 to Different Words Time 1	.383	[.336, .465]**
Group to Do Skills Time 2	13.047	[9.253, 17.310]**
Do Skills Time 1 to Do Skills Time 2	1.051	[.380, 1.727]**
Total Words Time 1 to Total Words Time 2	.832	[.363, 1.345]**
Do Skills Time 2 to Different Words Time 2	.484	[.151, .885]**
Do Skills Time 2 to Total Words Time 2	.933	[.120, 1.677]*
Different Words Time 1 to Different Words Time 2	.649	[.395, 1.319]**

Note: Only significant paths are included in the table. CI = confidence interval.
$^{*}p < .05$. $^{**}p < .01$.

Model effects. The joint significance test paradigm was used to test the mediation hypothesis. The joint significance method for testing mediation is recommended over other methods as it offers low Type I error rates while maximizing statistical power (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). This method simultaneously examines the significance of the paths from the focal independent variable to the intervening variable and from the intervening variable to the dependent variable. Results revealed that group (i.e., IT vs. WL) was a statistically significant predictor

[1]The main paths of importance are the paths from group to Time 2 maternal do skills and from Time 2 maternal do skills to Time 2 different words. The path from Time 2 maternal do skills to Time 2 different words reflects contemporaneous change, as each of these variables were measured at the same point in time. We therefore ran analyses two ways, once where the paths flowed from Time 2 maternal do skills to Time 2 different words and once where paths flowed in the reverse direction. In both models, changes in maternal do skills covary with changes in different words, with the only difference being the direction of the effects. The paths between Time 2 maternal do skills and Time 2 different words were significant only in the model where paths flowed in the direction of do skills to different words. Because this result suggests the effects flow in the direction of the initial hypothesis, which is also consistent with previously conducted research (Weisleder & Fernald, 2013), we presented results using this model (see in Figure 1).

of maternal do skills at Time 2; mothers in the IT group used on average 13.17 more do skills at Time 2 than mothers in the WL group. In addition, maternal do skills at Time 2 was a significant predictor of different words at Time 2. In particular, a 1-unit increase in maternal do skills used at Time 2 predicted a .48 unit increase in a child's use of different words. The joint significance of these paths provides support that maternal do skills at Time 2 mediates the effect of PCIT on child language production (after controlling for child age, IQ and the total words used at both Times 1 and 2). In addition, when examining the bias corrected confidence intervals associated with the effects just mentioned, the confidence intervals did not contain zero, providing further evidence for mediation (see Table 4). Finally, the direct path from group to different words at Time 2 was not significant when examined within the context of the model including the mediator.

DISCUSSION

Consistent with our hypothesis, findings revealed a mediating effect of maternal do skills on child different words, such that children whose mothers increased their use in do skills had a significant increase in child different words between Time 1 and 2. This is true even after controlling for child total words, IQ, and age, which increased confidence that findings were not merely due to an increase in total number of words over time. In addition to age being covaried in the analyses, age also was not correlated with IQ, providing further confidence that age did not impact the effect of parenting skills on child language. Findings revealed no significant direct effect of treatment condition on child different words at Time 2 after accounting for mediation.

Consistent with past research, the present study found that mothers' use of child-directed skills played an important role in the growth and improvement of child language (e.g., Girolametto & Tannock, 1994). This study replicated and extended previous findings by examining the mechanisms by which changes in parenting lead to child language improvements. Study results revealed findings that were consistent with our hypotheses. Although PCIT did not directly lead to increased child language production, an indirect group effect emerged, meaning the mother's use of child-directed play skills (do skills) mediated the relation between PCIT and child language production. In other words, PCIT led to improved parenting skills, which in turn led to improved child language as measured by child different words. The use of randomized controlled trial methodology in the current sample has numerous strengths, particularly the ability to observe changes in child language above and beyond what is expected over time. Rapid language changes occur in early childhood, and children show enormous growth in productive vocabulary over time during these early years (Pan, Rowe, Singer, & Snow, 2005). Therefore, the changes observed in child language production following PCIT and mediated by maternal do skills are over and above what is expected in normal development.

To date, several interventions have been developed that target either child language (e.g., Girolametto & Weitzman, 2006) or child behavioral problems (e.g., Webster-Stratton et al., 2004). However, behavior problems may exacerbate difficulties with language and vice versa, thus impeding interventions individually targeting behavior or language (Baker & Cantwell, 1982; Rutter & Lord, 1987). To our knowledge, only two interventions were developed to treat both problems simultaneously, although research examining the effectiveness of these interventions has been limited (Delaney & Kaiser, 2001; Fanning, 2008; Hancock et al., 2002). Our results suggest that PCIT, which was initially designed to treat child behavior problems, can also help to improve child language development through the use of parenting skills. Specifically, the parent's use of child-directed play skills in the context of a behavioral intervention can have a positive impact on child language. Therefore, behavioral parenting-training interventions like PCIT can be an optimal treatment approach for children with and at risk for developmental delay given the high prevalence of comorbidity in this population. It is possible that the findings are specific to PCIT, which is more intensive than other parent-training interventions because of the use of in vivo coaching to prompt and reinforce parents' use of new skills during parent–child practice. Feedback through in vivo coaching may be an important mechanism of change given that it can be important for mastery of the PCIT skills. Therefore, it is important for future research to examine whether these findings extend to other evidence-based behavioral parent-training interventions.

The current study has some limitations, and it is important to interpret the results in light of these limitations. First, the sample included children with developmental delay or at risk for developmental delay, so the findings may not generalize to typically developing children with behavior problems. However, this study was an important first step in examining the effect of a behavioral parent-training program on child language. Second, the sample size was relatively small given that only treatment completers were included in the current study. This, in turn, limits power to detect effects. Therefore the data presented should be interpreted as preliminary. However, we used appropriate methods for small sample size situations (e.g., bootstrapping and bias-corrected confidence intervals; Fritz & MacKinnon, 2007) and did find significant effects despite limited

power. Future studies should examine the mediating role of parent skill use on child language outcomes with a larger sample, as it may yield results that we may have been unable to detect, such as the direct effect of the intervention on language outcomes.

Third, data were collected only from the primary caregiver, which was the mother in all cases. Although we would not expect findings to differ given that both mother and father engagement directly relate to child language outcomes (Tamis, LeMonda, Shannon, Cabrera, & Lamb, 2004), future research should investigate if a mediating role of parenting skills on child language exists with fathers and other caregivers. A fourth limitation of the current study was the use of only two time points. Although mediation analyses can be tested with two data points, at least three time points are preferable for demonstrating mediation (Cole & Maxwell, 2003). Ultimately, conclusions involving the temporal direction of the observed associations among variables should be interpreted with caution. Nonetheless, the results provide preliminary support to the idea that the improvement in parenting skills following PCIT may help foster language production. Future studies should utilize at least three time points to verify the directionality of effects. Finally, the study used a limited number of language measures. However, the language measures used were more ecologically valid than other measures of child language development (e.g., standardized tests; Iacono, 1999). In addition, the use of a control group allowed us to rule out time as a confounding variable. Nevertheless, futures studies should examine both expressive and receptive language using additional instruments that assess child language.

Despite these limitations, the present study addressed a relatively unexplored research question and provided preliminary findings that have important clinical implications. Findings suggest that behavioral parent-training interventions may be used as an effective method in targeting comorbid behavioral and language difficulties in children with and at risk for developmental delay. This can be particularly useful for community-based clinicians, who typically provide services for children with comorbid behavior and language disorders (Steele, Elkin, & Roberts, 2008). By targeting both the child's behavior and language, PCIT can potentially serve as a cost-efficient treatment approach for children with and at risk for developmental delay.

FUNDING

This study was funded by NIMH (F32 MH068947), NICHD (F32 HD056748), and NIMH (K23 MH085659). We acknowledge Abby Araya, Sasha Regalado, and Leili Anassori for their contributions to this study.

REFERENCES

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA preschool forms & profiles*. Burlington: University of Vermont, Research Center for Children, Youth, & Families.

Aylward, G. P. (2002). Cognitive and neuropsychological outcomes: more than IQ scores. *Mental Retardation and Developmental Disabilities Research Reviews*, *8*, 234–240.

Bagner, D. M., & Eyberg, S. M. (2007). Parent–child interaction therapy for disruptive behavior in children with mental retardation: A randomized controlled trial. *Journal of Clinical Child and Adolescent Psychology*, *36*, 418–429.

Bagner, D. M., Sheinkopf, S. J., Vohr, B. R., & Lester, B. M. (2010). Parenting intervention for externalizing behavior problems in children born premature: An initial examination. *Journal of Developmental and Behavioral Pediatrics*, *31*, 209.

Baker, B. L., Blacher, J., Crnic, K. A., & Edelbrock, C. (2002). Behavior problems and parenting stress in families of three-year-old children with and without developmental delays. *American Journal on Mental Retardation*, *107*, 433–444. doi:10.1352/0895-8017(2002)107

Baker, L., & Cantwell, D. P. (1982). Psychiatric disorder in children with different types of communication disorders. *Journal of Communication Disorders*, *15*, 113–126. doi:10.1016/0021-9924(82)90025-9

Baker, L., & Cantwell, D. P. (1983). Developmental, social, and behavioral characteristics of speech and language disordered children. *Annual Progress in Child Psychiatry and Child Development*, 205–216. doi:10.1007/BF01812585

Baker, L., & Cantwell, D. P. (1987). Comparison of well, emotionally disordered, and behaviorally disordered children with linguistic problems. *Journal of the American Academy of Child and Adolescent Psychiatry*, *26*, 193–196. doi:10.1097/00004583-198703000-00012

Barnes, S., Gutfreund, M., Satterly, D., & Wells, G. (1983). Characteristics of adult speech which predict children's language development. *Journal of Child Language*, *10*, 65–84. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/616739168?accountid=10901

Bayley, N. (2006). *Manual for the Bayley Scales of Infant Development* (3rd ed.). San Antonio, TX: The Psychological Corporation.

Benner, G. J., Nelson, J. R., & Epstein, M. H. (2002). Language skills of children with EBD: A literature review. *Journal of Emotional and Behavioral Disorders*, *10*, 43–56. doi:10.1177/106342660201000105

Bennett, F. C. (1988). Neurodevelopmental outcome in low birthweight infants: The role of developmental interventions. *Clinics in Critical Care Medicine*, *13*, 221. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/849723157?accountid=10901

Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., … Gill, S. (2008). Promoting academic and social emotional school readiness: The Head Start REDI program. *Child Development*, *79*, 1802–1817. doi:10.1111/j.1467-8624.2008.01227.x

Bollen, K. A., & Long, J. S. (1993). *Testing structural equation models*. Newbury Park, CA: Sage.

Bollen, K. A., & Stine, R. A. (1992). Bootstrapping goodness-of-fit measures in structural equation modeling. *Sociological Methods & Research*, *21*, 205–229. doi:10.1177=0049124192021002004

Browne, J. V. (2003). New perspectives on premature infants and their parents. *Zero to Three*, *24*, 4–12.

Campbell, S. B. (1995). Behavior problems in preschool children: A review of recent research. *Journal of Child Psychology and Psychiatry*, *36*, 113–149. doi:10.1111/j.1469-7610.1995.tb01657.x

Censullo, M. (1994). Developmental delay in healthy premature infants at age two years: Implications for early intervention. *Developmental and Behavioral Pediatrics*, *15*, 99–104.

Chapman, R. S. (2000). Children's language learning: An interactionist perspective. *Journal of Child Psychology and Psychiatry*, *41*, 33–54. doi:10.1111/1469-7610.00548

Cole, D. A., & Maxwell, S. E. (2003). Testing meditational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology*, *112*, 558–577. doi:10.1037/0021-843X.112.4.558

Crnic, K., Hoffman, C., Gaze, C., & Edelbrock, C. (2004). Understanding the emergence of behavior problems in young children with developmental delays. *Infants and Young Children*, *17*, 223–235. Retrieved from http://ehis.ebscohost.com.ezproxy.fiu.edu/ehost/pdfviewer/pdfviewer?sid=a8713d7e-3e29-4da9-ac25-f4ac9b0ef340%40sessionmgr14&vid=1&hid=2

Crnic, K. A., Ragozin, A. S., Greenberg, M. T., Robinson, N. M., & Basham, R. B. (1983). Social interaction and developmental competence of preterm and full-term infants during the first year of life. *Child Development*, *54*, 1199–1210.

Crowley, M. (1992). Behavioral difficulties and their relationship to language development. In J. Law (Ed.), *The early identification of language impairment in children* (pp. 63–83). London, UK: Chapman & Hall.

Dekker, M. C., Koot, H. M., Ende, J. V. D., & Verhulst, F. C. (2002). Emotional and behavioral problems in children and adolescents with and without intellectual disability. *Journal of Child Psychology and Psychiatry*, *43*, 1087–1098. doi:10.1111/1469-7610.00235

Delaney, E. M., & Kaiser, A. P. (2001). The effects of teaching parents blended communication and behavior support strategies. *Behavioral Disorders*, *26*, 93–116. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/620004150?accountid=10901

Dodrill, C. B. (1981). An economical method for the evaluation of general intelligence in adults. *Journal of Consulting and Clinical Psychology*, *49*, 668–73. doi:10.1037/0022 006X.49.5.668

Dunst, C. J., Raab, M., & Trivette, C. M. (2011). Characteristics of naturalistic language intervention strategies. *Journal of Speech-Language Pathology and Applied Behavior Analysis*, *5*, 8–16.

Elbaum, B., Gattamorta, K. A., & Penfield, R. D. (2010). Evaluation of the Battelle developmental inventory, screening test for use in states' child outcomes measurement systems under the Individuals with Disabilities Education Act. *Journal of Early Intervention*, *32*, 255–273.

Emerson, E., & Einfeld, S. (2010). Emotional and behavioural difficulties in young children with and without developmental delay: A bi-national perspective. *Journal of Child Psychology and Psychiatry*, *51*, 583–593.

Eyberg, S. M., Nelson, M. M., & Boggs, S. R. (2008). Evidence-based psychosocial treatments for children and adolescents with disruptive behavior. *Journal of Clinical Child and Adolescent Psychology*, *37*, 215–237. doi:10.1080/15374410701820117

Eyberg, S. M., Nelson, M. M., Duke, M., & Boggs, S. R. (2005). *Manual for the dyadic parent child interaction coding system* (3rd ed.). Gainesville, PL: University of Florida. Retrieved from http://www.PCIT.org.

Fanning, J. (2008). *Parent training for caregivers of typically developing, economically disadvantaged preschoolers: An initial study in enhancing language development, avoiding behavior problems, and regulating family stress* (Doctoral dissertation, University of Oregon, 2008). Dissertation Abstracts International, 68, 3271.

Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science*, *18*, 233–239. doi:10.1111/j.1467-9280.2007.01882.x

Girolametto, L., & Tannock, R. (1994). Correlates of directiveness in the interactions of fathers and mothers of children with developmental delays. *Journal of Speech, Language and Hearing Research*, *37*, 1178. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/57532488?accountid=10901

Girolametto, L., & Weitzman, E. (2006). It takes two to talk: The Hanen Program for Parents: Early language intervention through caregiver training. In R. J. McCauley & M. E. Fey (Eds.), *Treatment of language disorders in children* (pp. 77–103). Baltimore, MD: Brookes. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/621211155?accountid=10901

Green, S., Caplan, B., & Baker, B. (2013). Maternal supportive and interfering control as predictors of adaptive and social development in children with and without developmental delays. *Journal of Intellectual Disability Research*. Advance online publication. doi:10.1111/jir.12064

Hancock, T. B., Kaiser, A. P., & Delaney, E. M. (2002). Teaching parents of preschoolers at high risk strategies to support language and positive behavior. *Topics in Early Childhood Special Education*, *22*, 191–212. doi:10.1177/027112140202200402

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore, MD: Brookes. Retrieved from http://search.proquest.com/docview/618768959?accountid=10901

Iacono, T. A. (1999). Language intervention in early childhood. *International Journal of Disability, Development and Education*, *46*, 383–420. doi:10.1080/103491299100560

Jaccard, J., & Wan, C. K. (1993). Statistical analysis of temporal data with many observations: Issues for behavioral medicine data. *Annals of Behavioral Medicine*, *15*, 41–50. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/618344907?accountid=10901

Kaminski, J. W., Valle, L. A., Filene, J. H., & Boyle, C. L. (2008). A meta-analytic review of components associated with parent training program effectiveness. *Journal of Abnormal Child Psychology*, *36*, 567–589. doi:10.1007/s10802-007-9201-9

Koegel, R. L., Koegel, L. K., & Surratt, A. (1992). Language intervention and disruptive behavior in preschool children with autism. *Journal of Autism and Developmental Disorders*, *22*, 141–153. doi:10.1007/BF01058147

Lunkenheimer, E. S., Dishion, T. J., Shaw, D. S., Connell, A. M., Gardner, F., Wilson, M. N., & Skuban, E. M. (2008). Collateral benefits of the family check-up on early childhood school readiness: Indirect effects of parents' positive behavior support. *Developmental Psychology*, *44*, 1737. doi:10.1037/a0013858

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, *7*, 83–104. doi:10.1037/1082-989X.7.1.83

MacWhinney, B. (2000). *The CHILDES project: Tools for analyzing talk, vol 1: Transcription format and programs* (3rd ed.). Mahwah, NJ: Erlbaum. Retrieved from http://ezproxy.fiu.edu/login?url=http://search. proquest.com/docview/619459375?accountid=10901

Mardia, K. V. (1970). Measures of multivariate skewness and kurtosis with applications. *Biometrika*, *57*, 519–530. doi:10.1093/biomet/57.3.519

Marfo, K. (1984). Interactions between mothers and their mentally retarded children: Integration of research findings. *Journal of Applied Developmental Psychology*, *5*, 45–69. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/616920582?accountid=10901

McCoy, D. (2008). Review of milestones: Normal speech and language development across the life span. *International Journal of Disability, Development and Education*, *55*, 197–198. Retrieved from http://ezproxy.fiu.edu/login?url=http://search.proquest.com/docview/621974391?accountid=10901

McMahon, R. J., Long, N., & Forehand, R. L. (2011). Parent training for the treatment of oppositional behavior in young children: Helping the noncompliant child. In *Clinical handbook of assessing and treating conduct problems in youth* (pp. 163–191). New York, NY: Springer. doi:10.1007/978-1-4419-6297-3_7

Nixon, R. D., Sweeney, L., Erickson, D. B., & Touyz, S. W. (2003). Parent-child interaction therapy: a comparison of standard and abbreviated treatments for oppositional defiant preschoolers. *Journal of Consulting and Clinical Psychology*, *71*, 251–260. doi:10.1037/0022-006X.71.2.251

Pan, B. A., Rowe, M. L., Singer, J. D., & Snow, C. E. (2005). Maternal correlates of growth in toddler vocabulary production in low-income families. *Child Development*, *76*, 763–782. doi:10.1111/1467-8624.00498-i1

Parker, M. D., & Brorson, K. (2005). A comparative study between mean length of utterance in morphemes (MLUm) and mean length of utterance in words (MLUw). *First Language*, *25*, 365–376. doi:10.1177/0142723705059114

Preston, J. L., Frost, S. J., Mencl, W. E., Fulbright, R. K., Landi, N., Grigorenko, E., . . . Pugh, K. R. (2010). Early and late talkers: school-age language, literacy and neurolinguistic differences. *Brain*, *133*, 2185–2195. doi:10.1093/brain/awq163

Roberts, M. Y., & Kaiser, A. P. (2011). The effectiveness of parent-implemented language interventions: A meta-analysis. *American Journal of Speech-Language Pathology*, *20*, 180. doi:10.1044/1058-0360(2011/10-0055

Robins, D. L., Fein, D., Barton, M. L., & Green, J. A. (2001). The Modified Checklist for Autism in Toddlers: An initial study investigating the early detection of autism and pervasive developmental disorders. *Journal of Autism and Developmental Disorders*, *31*, 131–144. doi:10.1023/A:1010738829569

Romski, M., Sevcik, R. A., Adamson, L. B., Cheslock, M., Smith, A., Barker, R. M., & Bakeman, R. (2010). Randomized comparison of augmented and non-augmented language interventions for toddlers with developmental delays and their parents. *Journal of Speech, Language, and Hearing Research*, *53*, 350–364. doi:10.1044/1092-4388(2009/08-0156)

Rutter, M., & Lord, C. (1987). Language disorders associated with psychiatric disturbance. In W. Yule & M. Rutter (Eds.), *Language development and disorders* (pp. 206–233). Philadelphia, PA: Lippincott.

Schopler, E., Reichler, R. J., & Renner, B. R. (1988). *The Childhood Autism Rating Scale (CARS)*. Los Angeles, CA: Western Psychological Services.

Schuhmann, E. M., Foote, R. C., Eyberg, S. M., Boggs, S. R., & Algina, J. (1998). Efficacy of parent–child interaction therapy: Interim report of a randomized trial with short-term maintenance. *Journal of Clinical Child Psychology*, *27*, 34–45. doi:10.1207/s15374424jccp2701_4

Spittle, A. J., Orton, J., Doyle, L. W., & Boyd, R. (2007). Early developmental intervention programs post hospital discharge to prevent motor and cognitive impairments in preterm infants. *Cochrane Database of Systematic Reviews*, *2*, 1–59.

Steele, R. G., Elkin, T. D., & Roberts, M. C. (2008). *Handbook of evidence-based therapies for children and adolescents: Bridging science and practice*. New York, NY: Springer. doi:10.1007/978-0-387-73691-4

Tamis-LeMonda, C. S., Shannon, J. D., Cabrera, N. J., & Lamb, M. E. (2004). Fathers and mothers at play with their 2-and 3-year-olds: Contributions to language and cognitive development. *Child Development*, *75*, 1806–1820. doi:10.1111/j.1467-8624.2004.00818.x

Tannock, R., Girolametto, L., & Siegel, L. S. (1992). Language intervention with children who have developmental delays: Effects of an interactive approach. *American Journal on Mental Retardation*, *97*, 145–160. Retrieved from http://search.proquest.com/docview/618258116?accountid=10901

Tempel, A. B., Wagner, S. M., & McNeil, C. B. (2008). Parent–child interaction therapy and language facilitation: The role of parent-training on language development. *Journal of Speech Language Pathology and Applied Behavior Analysis*, *3*, 78–93.

Van Daal, J., Verhoeven, L., & van Balkom, H. (2007). Behaviour problems in children with language impairment. *Journal of Child Psychology and Psychiatry*, *48*, 1139–1147. doi:10.1111/j.1469-7610.2007.01790.x

Vibbert, M., & Bornstein, M. H. (1989). Specific associations between domains of mother–child interaction and toddler referential language and pretense play. *Infant Behavior and Development*, *12*, 163–184. doi:10.1016/0163-6383(89)90004-0

Webster-Stratton, C., Reid, M. J., & Hammond, M. (2004). Treating children with early-onset conduct problems: Intervention outcomes for parent, child, and teacher training. *Journal of Clinical Child and Adolescent Psychology*, *33*, 105–124. doi:10.1207/S15374424JCCP3301_11

Wechsler, D. (1999). *Wechsler abbreviated scale of intelligence*. San Antonio, TX: The Psychological Corporation.

Wechsler, D. (2002). *Wechsler preschool and primary scale of Intelligence* (3rd ed.). San Antonio, TX: The Psychological Corporation.

Weisleder, A., & Fernald, A. (2013). Talking to children matters early language experience strengthens processing and builds vocabulary. *Psychological Science*, *24*, 2143–2152. doi:10.1177/0956797613488145

Yoder, P. J., Spruytenburg, H., Edwards, A., & Davies, B. (1995). Effect of verbal routine contexts and expansions on gains in the mean length of utterance in children with developmental delays. *Language, Speech, and Hearing Services in Schools*, *26*, 21–32. Retrieved from http://search.proquest.com/docview/85609932?accountid=10901