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Parental Directiveness and Responsivity toward Young Children with Complex Communication Needs

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Abstract

Purpose: The aim of the present study was to determine if parent responsiveness to their children with complex communication needs (CCN) during naturalistic play changed over an 18-month period and determine if any such changes were influenced by the child's overall level of receptive and expressive language development, motor development, or differing play contexts. This longitudinal information is important for early intervention speech-language pathologists and parents of children with developmental disabilities for whom the use of parent-directed responsivity interventions may be encouraged.

Method: Over an 18-month period, 37 parents of young children who had physical and/or neurological disabilities participated in three home-based parent-child play episodes. Videotapes of each play episode were extracted and coded.

Results: Results indicated parents who were initially responsive showed a significant tendency to continue to be so. Early on, parents were significantly more likely to be directive during object play than social play and significantly more likely to interact responsively during social play than object play.

Conclusion: Parents of children with developmental disabilities were not consistently less responsive to their children based on motor or language capabilities. Previous reports of higher parental directiveness with children who have developmental disabilities may be attributable to object-based play interactions.

Researchers have documented positive developmental outcomes for children whose parents demonstrate a responsive style during parent-child interactions (Landry, Smith, Swank, Assel, & Vellet, 2001; Tamis-LeMonda, Bornstein, & Baumwell, 2001). A responsive style of interaction is one in which the parent 'responds contingently to the child's cues, follows the child's lead, and provides input and support that build on the child's focus of attention and activity' (Spiker, Boyce, & Boyce, 2002, p. 46). Contingent parental responsivity consists of communicative interactions that occur promptly after the child's behaviour and are semantically related to or an imitation of the child's preceding behaviour (Yoder, Warren, McCathren, & Leew, 1998). For example, if the child were playing with a doll on a chair, a responsive parent interaction may include imitating a child's utterance or behavior with the doll (e.g. child gives the doll a pat on the back and parent follows suit) or commenting on, rather than directing the child's play with the doll (e.g. 'Oh you put the doll in the chair. Is it time to eat?'). By contrast, parental directiveness, or 'lead-in prescriptives' as defined by Akhtar, Dunham, and Dunham (1991) consist of parent commands or statements primarily unrelated to an object or task with which the child is occupied. Parental directiveness has also been described as a more intrusive and controlling interaction style (Spiker et al., 2002). For example, if the child were playing with a ball, a directive interaction would be if the parent attempted to re-direct the child away from the play item of interest (e.g. 'Let's play with the doll now.').

For typically developing infants and children, parental responsivity has been shown to be positively associated with language development whereas directiveness has been associated with poorer language development outcomes. Shimpi and Huttenlocher (2007) found that parental responsivity was positively associated with vocabulary development for 18-month-old children. Taylor et al. (2009) found that parental directiveness with typically developing two-year-olds was associated with lower child performance on language measures such as mean length of utterance and number of different words used than parents who did not use a directive interaction style. However, not all parental directiveness is negatively associated with gains in language development (Masur, Flynn, & Lloyd, 2013; Shimpi & Huttenlocher, 2007). Akhtar et al. (1991) observed that when parents of typically developing children used a variation of directiveness, contingent directives (i.e. 'follow-prescriptives'), interactions in which the parent gave a directive regarding the object the child was already focused on, this was actually a positive predictor of the child's later expressive vocabulary. For example, if the child were playing with a ball, contingent directiveness would occur if the parent made attempts to direct the child's play with this item of interest (e.g. 'Put the ball in the basket.' or 'The ball goes in the basket now.').

Parental responsivity has been positively associated with language development for children with developmental disabilities as well (Siller & Sigman, 2008; Warren, Brady, Sterling, Fleming, & Marquis, 2010); however, the overall pattern of parental interaction has differed from that of parents of typically developing children. Parental interactions with children who have disabilities are reported to be more directive compared to those with typically developing children (Glenn, Dayus, Cunningham, & Horgan, 2001; Perez-Pereira & Conti-Ramsden, 2001). However, as with typically developing peers, not all directiveness was associated with poorer developmental outcomes for children with developmental disabilities (Guralnick, Nevill, Hammond, & Connor, 2008; Mahoney & Neville-Smith, 1996).

For children with developmental disabilities, factors that have been associated with parental interaction styles include: parent characteristics, child characteristics, type of task, and changes over time in longitudinal samples. First, parental factors include the likelihood of parental detection of the child's communicative attempts. Among parents, there were inconsistencies in which acts were recognized as communicative for 12-month-old infants (Elias, Meadows, & Bain, 2003). However, if parents were able to recognize their child's adult-directed communicative signals, responsivity was possible even with children who had severe cognitive or motor impairments (Cress, Grabast, & Burgers Jerke, 2013). Yoder and Feagans (1988) found parents of children with severe cognitive and physical disabilities did not attribute fewer communicative behaviours to their children than did parents of children with milder cognitive and/or physical impairments.

Secondly, a variety of child characteristics associated with developmental delays has been related to parent responsivity, including child initiation and response time as well as perseverative, repetitious, or stereotypical behaviours (Warren & Brady, 2007). Underscoring these observable aspects of child behaviour are the child's receptive and expressive language capacity, motor skill proficiency, cognitive skill levels, and age. Although several researchers have asked questions pertaining to the influence of parent interaction style on later skill acquisition (e.g. Masur, Flynn, & Eichorst, 2005; Warren & Brady, 2007), few have sought information related to the relationship between current child characteristics and parent interaction styles. Sterling, Warren, Brady, and Fleming (2013) found that for young children with fragile X syndrome, child communication skills, comprised of measures for both receptive and expressive language skills, were positively correlated with parent responsivity. Questions of the interactions of expressive language and motor skills with parent interaction style are particularly relevant for children at risk for being nonspeaking. Cress, Moskal, and Hoffmann (2008) found a positive correlation between parent use of physical directiveness and limited child motor skill development. Parental use of directiveness increased overall with children who had severe cognitive impairments when compared with parent directiveness with children who exhibited less severe cognitive impairments (Guralnick et al., 2008). However, Barrett, Roach, and Leavitt (1996) found that parental directiveness changed with child age such that early on, mothers showed a more responsive interaction style and then became more directive in their communication style over time.

Next, the type of task can affect parental responsiveness. The use of directives increased with teaching tasks or object-centered play tasks when compared with feeding and/or social-play tasks (Guralnick et al., 2008). For parent-child interaction that occurred during play settings in which the parents were allowed unrestricted choices between social and object play, Cress et al. (2008) noted that parents of children with physical or cognitive limitations were no more directive than what would be expected for parents of children who were typically developing.

Finally, parental interaction styles may be influenced by time, either over longitudinal samples of child behaviour or in response to treatment. For instance, children who produce more easily interpretable communicative attempts later in development may provide greater opportunities for parents to respond to that child's communication over time. Parents of 63 preschool children identified as having mild developmental delays who participated in a 2-year longitudinal study were shown to increase their proportions of statements during free-play tasks and used fewer instances of directives over time (Guralnick et al., 2008). Parents of children who had Down syndrome interacted with their infants similarly at eight weeks to parents of typically developing children (Slonims & McConachie, 2006). However, by 20 weeks parents of the infants with Down syndrome were observed to be more remote, less likely to initiate or respond to interactions, which was interpreted as the parents' deliberate intent to allow more time for their infants to initiate.

The purpose of this study was to further examine the longitudinal patterns of interaction styles of parents of young children with developmental disabilities, specifically those children with complex communication needs (CCN). These interaction style patterns may be associated with child factors such as (a) language skills, particularly receptive language abilities which are closely related to cognitive development in young children with developmental disabilities (see DeVeney, Hoffman, & Cress, 2012; Ross & Cress, 2006), and (b) motor skill/physical capabilities. Findings in the literature would suggest the prediction that parents of children with cognitive and/or physical impairments would exhibit higher directiveness (see Glenn, Dayus, Cunningham, & Horgan, 2001; Perez-Pereira & Conti-Ramsden, 2001), but these child factors may be mediated by other task, time, or parent factors. In addition, the type of task may affect parental response between teaching and object-centered play tasks, but not during feeding or social play activities.

The following research questions were addressed:

a. Are directiveness and responsivity associated with children's motor or receptive or expressive language skills for children with CCN?
b. Do parental directiveness and responsivity skills change over time for parents of children with CCN?
c. Do parental directiveness and responsivity skills change by task (object-play versus social play) for parents of children with CCN?

Method

Participants

Thirty-seven children were participants in this study, 13 girls and 24 boys, derived from their involvement in a larger study focused on communication development in children with neurological and/or physical developmental disabilities who were at risk for being nonspeaking over time (Cress, 1995). Only 37 of the 42 children in the complete longitudinal study could be participants for the present study, because five children did not have observable moments of play with a parent or caregiver present during one of the three observational visits. At time one, the children had a mean age of 18 months (range 9-27 months), at time two they averaged 27 months (range 18-38 months), and at time three they averaged 34 months (range 26-47 months). When applicable, ages were corrected at all time points for number of months prematurity for any children born at before 37 weeks gestation age. See table I for individual information on demographics of the child participants.

All participants had physical and/or neurological impairments associated with cerebral palsy (n = 17), acquired brain injury/illness (e.g. meningitis, glutamic acidurea, or traumatic brain injury; n = 9), congenital conditions (e.g. Opitz syndrome, achondroplasia, microcephaly; n = 5), or neuromotor conditions (e.g. speech motor impairment, vocal fold paralysis; n = 6). At time 1, all the children met risk criteria for long-term non-speaking status, including at least two of the following four risk characteristics: a) birth anoxia, prematurity, or other prenatal factors; b) feeding difficulties or persistent oral-motor control problems; c) delayed onset of vocalizations or speech; or d) evidence of neuromotor deficits associated with speech (McDonald, 1980). While these characteristics were the original inclusion criteria for the longitudinal study and therefore not subject to change after completion, they are consistent with more concise criteria for nonspeaking children such as no more than 10 spoken words (Warren & Brady, 2007) and the congenital risk factors described for children with developmental disabilities who rely on AAC (Beukelman & Mirenda, 2013, pp. 203-224).

Children were administered the Battelle Developmental Inventory (BDI: Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984), at all three time intervals during the longitudinal sampling process. At time one on the BDI, the 37 participants had a mean developmental age of 9.9 months (range 2-21 months), a mean receptive communication age of 14.2 months (range 5-30.5 months), and a mean expressive communication age of 10.2 months (range 1-21.5 months). All children demonstrated spoken expressive language skills that were at least 1 standard deviation below the mean for their corrected chronological ages and had diagnoses of severe expressive communication impairments. When signed or other non-vocal symbolic strategies were included as expressive communication modalities, some children scored near corrected chronological age expectations on expressive language.

The families participating in the study were recruited from educational and clinical agencies in the US Midwest that provided services for children with developmental disabilities. All children were receiving early intervention services through school-based and/or private service delivery agencies. Of the participants, 16 % were from ethnic minority groups (3% Asian, 3% Hispanic, 5% African American, and 5% reported ‘other’). Of primary wage earners in each family, 12 held a 4-year or higher college degree, 11 had some college, 14 had high school diplomas, and one did not complete high school. Three parents reported they were the only parent in the household, and two children had grandparents as primary caregivers during the time intervals of this study. Parental occupations were evaluated using the International Socio-Economic Index of Occupational Status (ISEI) categories (Ganzeboom & Treiman, 1996). The average occupational score was 44.11 (standardized midpoint = 40).

Procedures

Data collection. The data are derived from home-based assessment in a longitudinal study of communication in children with neurological and/or physical developmental disabilities at risk for becoming nonspeaking (Cress, 1995). The children and their parents received 2- to 3-hour assessment visits in their homes for each sampling interval, during which a range of measures for cognitive and communicative development were obtained for each family. Each family received six visits at three-month intervals, for a total period of 18 months between time one and the final visit. Data from this study were analysed only from first visit, fourth visit (approximately 9 months later), and sixth visit (approximately 18 months later) due to limited test/retest reliability of the BDI. Throughout this article, these selected visits will be referred to as Time 1, Time 2, and Time 3, respectively. The sessions were videotaped in the homes of the participants and included footage of the child with the parent or researcher engaging in a variety of social and object-centered play activities.

The parent-child play samples were recorded during naturally occurring opportunities within each visit and were included for all participants as part of the larger assessment protocol. The parents and their children had opportunities to play independently with toys readily accessible during times when the researcher paused between more structured assessment activities. There were no systematic directions provided to parents regarding play. Essentially, when the researcher noticed that parents were engaging in some type of play interaction with their child that may or may not have included toys (e.g, block stacking, tummy tickling), she busied herself with paperwork until the interaction naturally reached a conclusion (e.g, child tired of tickle game; parent looked to researcher for additional test-item prompts). These interactions were spontaneous, naturally occurring instances and did not occur in systematic intervals. If the parent or child spontaneously started a social routine or play activity together, structured assessment activities were suspended for a time. During these instances, the researcher engaged in other activities (e.g. sort paperwork, gather materials) so as not to disturb the natural interaction when possible. The objective was to decrease the probability that these play episodes were intentionally produced for any type of exhibition for observers. Also, the parent was asked about the child's favorite toys or familiar routines and the parent was given opportunities to play with the toys or routines during naturally occurring breaks. This unstructured method of encouraging parent-child play was considered important to obtain natural free play for parent-child dyads of children whose physical and/or neurological impairments may contribute to an atypical style or pattern of play. By relying on spontaneous, naturally occurring opportunities, there was wide variability in the amount of parent-child play at each time period (1,2,3) including some parent-child time segments that were relatively short.

The research sessions were videotaped and all segments of the parent-child interactions were aggregated from a particular assessment visit and dubbed onto coding DVDs. A video segment for parent-child interaction averaged 17.3 minutes total play per visit for each dyad across all three time periods (s.d. 11.6, range = 2.3-43.0 minutes). Of all play sessions included, two were less than three minutes in length (both at Time 2), and nine sessions were less than five minutes in length. No parent-child dyad had more than one session with less than five minutes of play. This average length of play interaction meets or exceeds the 10-minute play samples typical of other parent responsivity research for toddlers (e.g. Haebig, McDuffie, & Ellis Weismer, 2013). Because parents and children were free to spontaneously choose their own form of play interactions, it was difficult to equally balance object and social play contexts. Object and social play episodes were interspersed among each other activities as initiated spontaneously by the parents, without researcher dictates to change the type of play at any point. In these parent-selected play contexts, during Time 1 object and social play were relatively equal (58% object, 42% social), but during Time 2 and Time 3 observations, participants engaged in twice as much object play as social play (68% object, 32% social at both times). In each session, there was less than 1% ‘mixed’ play; consequently, these numbers were excluded in the above percentages. Given the spontaneous and self-selected nature of the parent-child play interactions; there was relatively limited likelihood that the length or order of object and social play samples had a cumulative or systematic effect on parent behaviors during those activities.

The children in the samples played primarily with their mothers, with the exceptions of two participants who played with both mothers and fathers and two participants who played with grandmothers who were their primary caregivers. For simplicity, we will refer to all primary caregivers as ‘parents’. During the play dyads, children were not observed to use formal or aided AAC systems or devices; rather only unaided, natural communication interactions between parents and children were included in the sample.

Data Coding

Episodes of parent-child play were extracted from 2-3 hours of parent-child videotaped assessment and consisted of naturally occurring opportunities taking place between more structured assessment activities. Viable play opportunities were segments during which the parent and child were engaged in a mutual activity together with no more than tangential comments from the experimenter. Other siblings could be involved and the task could be social or object-centered play or a feeding task. If the parent was talking or interacting with another adult or sibling, but still could have been interacting with the child simultaneously, the segment was included (e.g. parent holding a toy loosely and waiting for the child to show interest as she talked with the experimenter). Segments were not included if the child or parent was interacting solely with the researcher, the parent or child was off-camera, or the parent was observing someone else interact with the child.

The coding scheme used in this study was adapted from Cress et al. (2008) coding of parent behaviours, which included verbal and physical directiveness, verbal and nonverbal initiations, contingent and non-contingent responses, imitation, as well as the communicative situation (e.g. physical contact, holding, and face-to-face position). Behaviours produced by the child were not coded in this study. For the purposes of this study, verbal and physical directiveness were combined into a total directiveness score, and verbal and nonverbal contingent and non-contingent responses were combined into a total responsivity score. This binary distinction in parental behaviors uses the same types of criteria as multiple other studies addressing parental responsivity and directiveness in typically developing children (e.g. Flynn & Masur, 2007; Guzell & Vernon-Feagans, 2004; Masur, et al., 2013), and children with disabilities (Haebig et al., 2013; Yoder & Warren, 1999). The only difference reported in other reported responsivity and directiveness schemes from the aggregate responsivity or directiveness scales in the present study was the use of the term 'intrusive directiveness' (Flynn & Masur, 2007) to distinguish the term directiveness as coded for this study from follow-in prescriptions or responsive directiveness coded by other researchers (e.g. Akhtar et al., 1991). Other scored behaviors from this coding scheme were not included in the present analysis. A complete coding scheme for these behaviours is available in Appendix A.

Segments of videotape were coded in 15-second intervals of parent-child interactions for presence or absence of any of the 16 items on the coding scheme. Also, the type of task in each 15-second segment was coded as social (at least 5-seconds of a 15-second interval), object-oriented (at least 5-seconds of a 15-second interval), feeding (at least 5-seconds of a 15-second interval) or mixed (at least 5-seconds of any two types of play in 15-second time). A ‘mixed’ segment, for example, may have included both 5 seconds of social and 5 seconds of feeding.

Training for inter-rater reliability involved written definitions of codable behaviours and play contexts as well as a listing of variety of examples for each. The written definitions and examples were verbally discussed prior to the introduction of training tapes, which involved pilot parent-child play interactions from dyads that were ineligible for inclusion in the analysis for this study. After initial coder scoring of behaviors from the training tapes, segments with coder disagreements were re-watched and discussed. Training lasted for several weeks before initial inter-rater reliability was established on training tapes at 80% or better among the first and second authors and three independent coders. The first author coded 20% of the experimental videotapes for each of the three independent coders to establish inter-rater agreement (coding agreements divided by the total agreements plus disagreements). The overall agreement between all behaviour categories was 93% (range: 89%-96%). The overall Cohen’s Kappa to provide agreements that were corrected for chance was .830. For individual coders, scores of k = .87, .95, and .91 were calculated, indicating ‘near perfect’ strength of agreement (Landis & Koch, 1977, p. 165).

Results

The authors compared parent responsivity and directiveness at Times 1, 2, and 3 to the participants’ motor and receptive skills as well as type of play task they were engaged in during Times 1, 2, and 3 (see table II for parent mean behaviours coded). The first research question asked whether parental directiveness and responsivity were associated with the motor or receptive language skills of children with developmental disabilities. Since the distributions approximated normality, Pearson Product-Moment correlations (*r*) were computed to estimate the magnitude and direction of the associations between the following four pairs of variables: parent directiveness and responsiveness with children's motor skills, and parent directiveness and responsiveness with children's receptive language skills. The results, displayed in table III, indicated no significant association between parent responsiveness and child motor skills at Time 1 ($r = .115$; $p = .505$), Time 2 ($r = -.056$; $p = .742$), or Time 3 ($r = -.055$; $p = .756$). No significant association between parent responsiveness and receptive language skills was noted at Time 1 ($r = .060$; $p = .726$), Time 2 ($r = -.005$; $p = .977$), or Time 3 ($r = -.023$; $p = .898$). These results indicated parents were not any more or less responsive to children based on their child's motor or language capabilities.

As a post hoc analysis, the researchers also conducted two-tailed Pearson product-moment correlation coefficients (Pearson *r*) to estimate the strength and direction of the association between the participants' expressive language skills and parent interaction style across time. This additional analysis indicated no significant association of parent responsiveness with child expressive language skills at Time 1 ($r = .158$; $p = .357$), Time 2 ($r = .057$; $p = .739$), or Time 3 ($r = .066$; $p = .712$). In addition, no significant association of parent directiveness and expressive language skills was noted at Time 1 ($r = -.048$; $p = .782$), Time 2 ($r = .075$; $p = .659$), or Time 3 ($r = .132$; $p = .458$).

The second research question asked whether parental directiveness and responsivity changed over time for parents of children with developmental disabilities. Repeated measures analysis of variance was used to evaluate the degree and statistical significance of change in parent responsivity and directiveness (dependent variables) across Time 1, Time 2 and Time 3 (independent variable). The analysis provided an omnibus test of the differences in means at different time points, which indicated whether or not significant change had occurred. Results indicated no significant difference in parent responsivity ($F_{(2, 64)}$ = 0.13; *p* = .881) or directiveness ($F_{(2, 64)}$ = 0.09; *p* = .914) across time. To explore this further, we computed correlations between time points and found a moderate, significant positive correlation between parent responsivity at Time 1 and Time 2 (*r* = .549; *p* = .001) and from Time 1 to Time 3 (*r* = .359; *p* = .04). Parents who were initially responsive to their children in interactions continued to be so across sampling times.

A different pattern emerged for parental directiveness. The magnitude of the correlations for parental directive behaviours across time were small to moderate and non-significant indicating that perhaps some mechanism was moderating change over time. Using the same repeated measures ANOVA framework, we looked for an interaction effect (moderation) between change over time and the infant's initial receptive language, expressive language, and motor skills. The interaction with receptive language was statistically significant ($F_{(2, 62)}$ = 4.15; *p* = .020) indicating that parental directiveness changed differentially over time for parents of infants with different levels of receptive language at time 1. At time 1, parents of children with low receptive language engaged in significantly higher rates of directiveness, but by time 2, all parents, regardless of their child's receptive language, engaged in similar rates of directiveness. Figure 1 depicts the change in parental directiveness over time at different levels of infant receptive language (low, medium and high receptive language). Note that the analysis was conducted treating the moderator as a continuous variable; however, to facilitate the graphical representation of the interaction effect, the distribution of receptive language had to be divided into categorical groups. Therefore, we created three roughly equal groups based on the distribution of Time 1 receptive language scores (children were grouped into low [bottom ~33%], medium [middle 33%] and high receptive language [top 33%]). The other two hypothesized interactions between directiveness and motor skills ($F_{(2, 62)}$ = 0.90; p = .414) or expressive language skills ($F_{(2, 62)}$ = 0.12; p = .890) were non-significant.

The third research question addressed the differences in parental directiveness and responsivity by task (object-play versus social play) for parents of children with developmental disabilities. To this end, paired-samples t-tests were computed for each time point comparing the rate of responsivity and the rate of directiveness (dependent variables) between social-play and object-play conditions (independent variables). Cohen's *d* effect size estimates (for dependent samples; Morris, & DeShon, 2002) were also computed for significant inferential tests. Based on general guidelines, Cohen's *d* estimates between 0.10 and 0.29 are considered small, 0.30 and 0.49 are considered moderate, and estimates greater than 0.50 are considered large (Cohen, 1988). At Time 1, there were no significant differences for responsivity ($t_{(27)}$ = 1.56, p = .131) or directive behaviours ($t_{(28)}$ = 1.26, p = .217) between social-play and object-play conditions. At time 2, there was no difference for responsivity ($t_{(28)}$ = 1.43, p = .163), but there was a significant difference for directive behaviours ($t_{(30)}$ = -2.06, p = .049, d = -0.31) with parents engaging in more directive behaviours during object-play conditions (1.03 vs. 0.64 behaviours per minute). At Time 3, there was a significant difference for responsivity behaviours ($t_{(26)}$ = 2.85, p = .008, d = 0.53) with parents engaging in more responsivity during social-play than object play conditions (2.33 vs. 1.73 behaviours per minute). There was no difference in directive behaviours between conditions at Time 3 ($t_{(26)}$ = -1.03, p = .314).

Discussion

In the present study, the authors found the type of play tasks (e.g. object-play versus social play) the parent-child dyads were engaged in was associated with differing parent interaction styles. More specifically, parent directiveness was not significantly associated with young children's motor, expressive or receptive language skills, when the dyad was observed in naturally occurring social play episodes rather than in object-play tasks in which parents were much more likely to engage in prompted play when presented with a collection of toys. Most previous research addressing parent directiveness (e.g. Guralnick et al., 2008) observed dyads in a laboratory setting surrounded by toys, with parent instructions to 'play with your child as you usually play', including an implicit assumption that the parent would focus on the available play objects in their interactions. During object-play tasks, 'because children with physical impairments routinely have difficulty independently controlling objects in toy play, parents would typically need to increase their active involvement with the objects to help the children successfully control the toys' (Cress et al., 2008; p. 105). In the present study, even limited play skills of children with poor physical, language, or cognitive abilities were not associated with parents' attempts to try to tell their children *how* to play in a directive manner.

Although no significant differences were noted when examined as a group, parents at early sessions tended to be more directive with children who had lower receptive language skills (e.g. receptive language scores equivalent to or below 10 months of age at Time 1). Later, they tended to be more directive with children who had higher receptive language skills (e.g. receptive language scores equivalent to greater than 10 months of age at Time 1). Initially, parents may try to direct play to help children understand and be successful with play, particularly object-based play. Later, parents may perceive that children who are not able to physically access toys respond better to other ways of playing with these toys. Consequently, parents may use a toy or object in a social way rather than try to show the child how to interact with the toy.

For the second research question, responsive parents did not significantly alter their interaction style over time, and this is consistent with experimental predictions of consistency in parent responsivity across time. Instead, parents who began the study interacting responsively to their child were significantly likely to continue using this interaction style. These findings are consistent with Yoder and Warren's (2001) parent intervention study, where they found mothers who began the intervention program with high pretreatment responsivity levels continued to exhibit high responsivity levels following treatment. The present study findings are also consistent with Broberg, Ferm, and Thunberg (2012) findings. These investigators studied 39 parents of young children with CCN, 33 of whom entered into an 8-week training course on using a responsive style with AAC when interacting with their child and six who did not participate in the program. Although the parents who participated in the training program did increase their responsive interactions with their children, even parents who did not enter the training program maintained their level of responsivity over the 8-week period with comparable pre-treatment (M = 13.42; SD = 2.79) and post-treatment (M = 13.37; SD = 1.71) scores.

Conversely, parent directiveness in the present study did change significantly over time, indicating parents were not 'locked in' to a predominately directive interaction style. The interaction between receptive language and change in directiveness over time suggests that the parents who had the highest directiveness at Time 1 were parents of children with the lowest receptive language skill, which is used for this population as a representation of overall mental age (Deveney, Cress, & Hoffmann, 2012). Over Times 2 and 3, this population notably reduced directiveness compared to parents of children with moderate or high receptive language skills who increased directiveness modestly over time. A salient interpretation of these results is that parents initially perceived that the children with low receptive language needed more help to be successful in play, but realized over time that children were not able to complete goal-directed tasks with verbal prompting. This finding is consistent with Spiker et al. (2002), where parents were more directive with younger or less developmentally skilled children, but that directiveness tended to decrease over time with increasing child play and communicative skill.

For the third question, parents used significantly different interaction styles with different types of play tasks. Specifically, parents interacted more responsively during social play opportunities and more directively during object play, particularly during later sessions. During Time 2, parents were significantly more likely to use directive interactions during object play activities than social play activities. For Time 3, they were significantly more likely to engage in responsive interactions during social play tasks than object play tasks. Social play opportunities tend to include more natural turn taking opportunities in which parents are likely to recognize and focus on their child's responses without a particular goal in mind. On the other hand, object play typically is more goal-directed in which parents tend to direct the child in ways an object works and get the child to use the toy as intended. In previous research (e.g. Tamis-LeMonda et al., 2001), parent responsivity and directiveness have been evaluated through primarily goal-directed object play tasks (e.g. puzzle activities, push-button items) that likely encourage parents to work toward task success (e.g. finishing puzzle, activating toy) and motivate parents to turn the play opportunity into teaching tasks. These results suggest that parents may be more naturally inclined to use responsive styles during social play activities, and that interventions aimed at increasing parent responsivity in this population should include social play as an opportunity for parents to interact with their children in more open-ended contexts.

Limitations and Future Research

Various factors could potentially constrain the populations to whom the present results may be relevant. The present study is limited by the relatively small number of participants involved and would benefit from inclusion of more participants within this targeted population.

In general, however, children with CCN represent a small population that is often difficult to recruit. When conducting investigations involving this particular population of young children, researchers need to be creative when soliciting sufficient group members. For example, in order to obtain an adequate number of participants for this data set, participants were recruited within three different US states over the course of several years.

The generalization of these results is also limited by the sample itself, including the population's heterogeneity and the recency of the data collection. Children have complex communication needs due to physical, sensory, cognitive, language, and/or speech limitations, and any combination of those developmental concerns is possible among children who rely on AAC. Within this sample, children presented with a variety of impairments and wide-ranging skill levels. Although a more uniform group would be ideal, a hallmark of this population is its heterogeneity. Other investigators researching similar populations have reflected corresponding variability in participant etiologies and/or skill levels (Brady, Marquis, Fleming, & McLean, 2004; Yoder et al., 1998). Further, the data were collected almost 20 years ago as part of a longitudinal research project that supplemented children's existing early intervention services addressing a wide variety of physical, play, and communication goals. Over time, parent-child interaction styles may have evolved in ways that could not be controlled in the longitudinal data collection, thus limiting the generalization of the data set. Types of intervention goals and strategies applied to children with CCN at these ages are likely to have changed in the field from that interval, given the continuing development of early intervention techniques in AAC.

A third limitation of the present study involves limited standardization of play sampling lengths and diversity across participants. Because the researchers deliberately avoided experimentally suggested play goals and encouraged instead spontaneous, naturally occurring parent-child play opportunities, it was difficult to standardize the amount and type of playtime across families and experimental settings. Consequently, parent-child samples per family averaged 17.3 minutes per sample, a play sample length well within literature standards for preschool children (Haebig et al., 2013), but the sample length for nine sessions was under 5 minutes; however, no parent-child dyads had more than one session across the three time intervals with less than five minutes of play. Future research could conduct repeated samples of parent-child play on several days within a given time period, if a targeted length of parent play was not recorded during initial assessment activities. In addition, the current study did not systematically control for type of play between object and social play. It is unlikely, but possible that the increased volume of object play in the current study may have influenced the opportunity for parents to show differing amounts of directiveness and responsivity. Future research could involve systematic, standardized directions for parents regarding type of play to investigate the robustness of the present findings beyond spontaneous parent-child play interactions.

Another limitation involved the number of inferential tests undertaken, and specifically the potentially inflated type I error rate which means that the probability of a false-positive result (i.e. determining that an effect exists when, in fact, there is no effect in the population) is likely greater than the conventional 5% level (i.e. alpha equals .05). While this represents a significant limitation, the exploratory nature of the study seems to warrant a trade-off between statistical power and type I error rate, so we did not adjust for multiple comparisons. That is, we decided to accept the risk of a higher family-wise type I error rate because that meant we would maintain the statistical power of individual tests for which the null hypothesis was false (in the population). Tests for which the null hypothesis is false (in the population) do not contribute to the family-wise type I error rate since a type I error can only occur when the null hypothesis is true in the population, so the cumulative effect of multiple tests on the conditional probability of a type I error is not solely a function of the number of tests undertaken (see Nickerson, 2000 for a layman discussion of conditional probabilities of type I errors). However, given the potentially high family-wise type I error rate, the findings should be viewed with caution and in need of replication with other samples.

A final limitation involves the scoring of only parent behaviors and not child behaviours during spontaneous play sessions. In the present study, researchers related parent interaction styles to the child's receptive and expressive language performance on standardized assessments obtained during the same data collection session. However, standardized assessment tools like the BDI provide a general measure of language function, which could be different from the types of prelinguistic behaviours a child might display during free play interactions with parents. Therefore, performance on a standardized measure would not necessarily predict child behavior during the types of spontaneous, naturalistic play scenarios used in the present study. Lack of association noted between parent behaviors and children's various receptive and expressive language skills may be limited by the fairly restrictive range of standardized language skills represented for young children with CCN.

Additional research directions could further extend the findings from this study. Contrasting types of play objects and different levels of task difficulty for children may offer insight into ways in which object play may encourage more directive interaction styles. Also, a more detailed analysis of specific sub-types of play tasks within these broad groups would further extend the findings of the current study.

Clinical Implications

The current study provides some support for the natural association of parent responsivity with social play in children with CCN. The present findings suggest that a parent may naturally be more responsive and, therefore, more encouraging of expressive language development, during social activities for children who have limited motoric, communicative, or play initiation during object-based play. Given natural opportunities for parents and children to freely interact, early responsive patterns in parents are likely to continue over time from infancy to preschool years within this population, regardless of their child's receptive and expressive language capabilities or motor skill proficiency. For speech-language pathologists (SLPs), this de-emphasis on child skill level is notable in that SLPs can assist parents in interpreting a variety of behaviours as communicative and; consequently, worthy of responding to, even if the child's behavioural skill set is quite limited due to language and/or motor impairments.

Resources are available for those SLPs working with parents who may require more explicit instruction on ways to maximize their natural responsive tendencies with young children who have CCN. Several researchers have documented the success of therapeutic approaches that included teaching responsive interaction techniques to parents of young children with communication deficits (see Broberg et al., 2012; Fey, Yoder, Warren, & Bredin-Oja, 2013). Kaiser and Wright (2013) outlined the incorporation of AAC into naturalistic settings to enhance partner responsivity, an important consideration for parents of children with CCN who may be at-risk for long-term AAC use.

In addition, parents and SLPs may be cautious about relying only on object-based interactions in children with physical and neurological impairments (e.g. puzzle activities, toy activation activities, goal-oriented object play such as 'Give me the ____' toy play) when promoting parent responsivity for children with developmental disabilities. SLPs should include treatment strategies for increasing social play opportunities and be aware of parental tendencies to be directive during early object play for children with physical or neurological impairments.

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Table I

Participant Characteristics and Developmental Skills

	Corrected age by sampling time[a]				Battelle age equivalence scores at times 1/2/3[b]					
Partic-ipant	1	2	3	Gender	Overall	Receptive language	Expressive language	Cognition	Motor	Etiology
1	18	27	33	F	6/8/8	6.5/8.5/8.5	6.5/8/8	6/10/10	6/7/8	Acquired Brain Injury
2	21	30	36	F	8.5/13/13	8.5/17.5/19.5	5/14/14	10/13/14.5	7/8/9	Microcephaly
3	20	29	36	M	12/14/21	19.5/23.5/38	14/18/21.5	14.5/14.5/32	5/6/7	Cerebral Palsy
4	17	27	32	F	8/12/13	8.5/17.5/17.5	10/13/14	7/8/12	5/9/10	Multiple Disabilities
5	19	29	37	F	2/6/6	10/17.5/17.5	4/4/14	2/7/8	2/3/3	Viral Encephalitis
6	19	29	35	M	7/10/10	8.5/15.5/15.5	6/10/11	7/9/14.5	4/5/6	Microcephaly
7	22	34	41	M	7/9/10	6.5/13.5/13.5	12/15/15	10/14.5/14.5	5/5/5	Cerebral Palsy
8	27	38	47	M	12/14/15	19.5/19.5/19.5	8/12/14	14.5/14.5/14.5	8/9/11	Cerebral Palsy
9	16	27	33	F	6/6/6	6.5/10/10	7/7/7	5/8/8	3/3/4	Brain Injury - Anoxia
10	20	30	36	F	15/21/27	19.5/30.5/35	17/21.5/31	14.5/14.5/25	10/16/24	Acquired Brain Injury

11	22	30	39	M	10/12/13	15.5/17.5/30.5	12/15/21.5	14.5/14.5/14.5	7/8/10	Cerebral Palsy
12	23	32	39	M	14/17/20	19.5/25.5/25.5	14/19/19	14.5/14.5/14.5	7/10/12	Acquired Brain Injury
13	20	29	35	M	19/29/33	17.5/30.5/33.5	15/26/29	16/27/29	18/33/35[e]	Long QT Syndrome
14	14	22	28	M	6/7/8	13.5/17.5/17.5	6/6/8	9/9/9	4/4/4	Cerebral Palsy
15	19	28	34	F	9/16/22	17.5/23.5/33.5	8/19/27	13/19.5/27	4/6/9	Cerebral Palsy
16	13	24	32	M	4/6/7	5/15.5/17.5	1/4/5	5/7/7	3/3/4	Viral Encephalitis
17	12	22	28	M	7/13/17	5/19.5/19.5	7/14/18	10/14.5/18	5/5/13	Cerebral Palsy
18	26	35	41	F	8/11/11	11.5/17.5/17.5	5/7/12	8/11/11	5/5/6	Glutamic Acidurea
19	15	24	30	M	9/13/15	11.5/23.5/23.5	10/14/14	14.5/14.5/16	4/7/8	Cerebral Palsy/Bradycardia
20	24	33	38	F	18/21.5/29	19.5/21.5/33.5	15/21.5/26	14.5/27/28	18/26/29	Childhood Apraxia of Speech
21	15	24	30	M	8/12/18	13.5/19.5/21.5	13/17/31	11/14.5/17	4/9/9	Cerebral Palsy
22	18	29	35	M	19/25/28	28.5/35/35	21.5/29/31	19.5/26/27	23/31/33[f]	Developmental Delay
23	15	23	29	M	10/13/13	21.5/25.5/25.5	3/12/12	13/16/16	6/9/9	Spina bifida /Arnold Chiari
24	17	26	32	M	4/8/8	13.5/17.5/17.5	7/11/12	3/8/10	3/4/4	Spina bifida/Meningitis
25	16	25	31	M	8/12/13	13.5/17.5/17.5	10/14/14	7/11/13	5/7/7	Cerebral Palsy

26	17	26	32	F	10/13/14	8.5/11.5/11.5	9/14/14	11/14.5/14.5	9/9/15	Bacterial Meningitis
27	14	23	30	M	5/8/8	5/10/13.5	5/12/13	5/9/9	4/4/5	Cerebral Palsy
28	20	30	36	M	15/21/28	30.5/35/41	18/28/30	14.5/32/36	10/13/18	Spina bifida/Arnold Chiari
29	21	30	36	M	15/24/28	17.5/36.5/38	13/21.5/29	10/21/26	18/24/30[e]	Hydrocephaly
30	12	21	27	F	11/17/28	17.5/27/38	11/16/28	14.5/14.5/24	13/19/27[f]	Pulmonary Hypertension
31	21	30	38	F	5/7/8	8.5/8.5/17.5	5/7/10	5/8/10	3/3/4	Cerebral Palsy
32	16	25	32	M	9/12/19	17.5/17.5/30.5	13/16/21.5	10/13/17	5/8/8	Cerebral Palsy
33	26	36	43	F	21/34/42	25.5/43.5/49	17/40/45.5	23/41/43	20/33/38	Childhood Apraxia of Speech
34	21	29	36	M	12/12/25	19.5/19.5/33.5	10/10/24	13/13/28	12/12/28	Pulmonary Venoocclusive Disease
35	15	23	30	M	8/11/13	8.5/11.5/17.5	11/14/16	12/14.5/16	5/8/11	Cerebral Palsy
36	16	23	30	M	12/18/24	17.5/19.5/27	10/14/30	14.5/19.5/25	9/18/23	Cerebral Palsy
37	9	18	26	M	6/9/9	10/19.5/19.5	4/10/10	6/11/11	3/4/4	Cerebral Palsy

[a]Chronological age was corrected by subtracting number of months of premature birth, if less than 37 months gestation. Since correction was necessary at Time 1, it was continued throughout.

[b]Age equivalence in months as reported from the Battelle Developmental Inventory at Time 1. Non-integer scores indicate age equivalence scores between two months (e.g. Battelle score of 14-15 months was scored as 14.5 months).
[c]Raw number of words comprehended on the MacArthur Communication Development Inventory at Time 1.
[d]Percentile rank of words comprehended on the MacArthur Communication Development Inventory at Time 1.
[e]Motor scores are between 1 and 2 standard deviations of norms on the Battelle Developmental Inventory Motor subtest.
[f]Motor scores are within normal limits on the Battelle Developmental Inventory Motor subtest

Table II

Mean % of Time with Parent Responsivity and Directiveness Behaviour Across Times 1, 2, and 3 for All Contexts and in Social and Object Play

Time	**Total Directiveness*	*Social Play Directiveness*	*Object Play Directiveness*	**Total Responsivity*	*Social Play Responsivity*	*Object Play Responsivity*
Time 1	M = 0.71	M = 0.84	M = 0.73	M = 1.80	M = 2.14	M = 1.86
	SD = 0.81	SD = 1.01	SD = 0.86	SD = 0.78	SD = 0.81	SD = 0.80
Time 2	M = 0.76	M = 0.64	**M = 0.97	M = 1.85	M = 2.01	M = 1.71
	SD = 0.69	SD = 0.70	SD = 0.85	SD = 0.74	SD = 0.84	SD = 0.91
Time 3	M = 0.76	M = 0.74	M = 0.99	M = 1.85	**M = 2.29	M = 1.73
	SD = 0.69	SD = 0.97	SD = 0.78	SD = 0.74	SD = 1.05	SD = 0.63

* Total responsivity and directiveness is the % of all contexts in which these parent behaviours occurred; % time in object or social play is limited to total time spent in each specific context and does not account for time in mixed or feeding contexts

** Significant difference from other play context at $p < .05$

Table III

Correlations between Parent Interaction Style and Child Skills across Sampling Times

Time	*Parent Responsivity and Child Motor Skills*	*Parent Responsivity and Child Receptive Language Skills*	*Parent Directiveness and Child Motor Skills*	*Parent Directiveness and Child Receptive Language Skills*
Time 1	*r* = 0.115 *p-value* = 0.505	*r* = 0.060 *p-value* = 0.726	*r* = -0.032 *p-value* = 0.859	*r* = -0.309 *p-value* = 0.067
Time 2	*r* = -0.056 *p-value* = 0.742	*r* = -0.005 *p-value* = 0.977	*r* = -0.046 *p-value* = 0.787	r = 0.085 *p-value* = 0.617
Time 3	*r* = -0.055 *p-value* = 0.756	*r* = -0.023 *p-value* = 0.898	*r* = -0.109 *p-value* = 0.539	*r* = 0.289 *p-value* = 0.98

Appendix A: Parent-Child Interaction Coding Scheme

<u>Communicative:</u>

1. **Directiveness**
    a. *Verbal Directiveness* – the mother acts in a way that directs her child's attention or actions toward a new focus or augments child attention toward something the child is not yet doing in a shared activity. It might or might not be accompanied by gestures. Example: Mother says, 'Can you say 'waaah'?'
    b. *Physical Directiveness* – the mother physically directs her child's attention or actions toward a new focus or maintains or augments attention toward something of current interest. Example: Mother makes a child do patty cake motions (hand-over-hand).

2. **Initiation**
    a. *Verbal Initiation* – the mother uses novel verbal interactions that include questions, praises, and comments not preceded by a child verbal or nonverbal behavior. Example: Mother says, 'I like the big cat.'
    b. *Non-Verbal Initiation* – the mother uses non-verbal behaviors that initiate a novel interaction or activity with the child not preceded by a child verbal or nonverbal behavior. Non-verbal initiations may coincide with verbal initiations. Example: Mother drives a car up a hill of blocks.

3. **Responsivity** (must be initiated by the child)
    a. *Verbal Contingent* – the mother reacts verbally to the verbal or non-verbal behavior of the child. Her reaction was directly related to the child's needs, desires, or on-going activity. Examples: Mother says, 'Yes, it's a blue one' when the child says, 'ball'; or Mother says, 'Ow!' when the child makes a toy animal fall down.
    b. *Non-verbal Contingent* – the mother reacts non-verbally to the verbal or non-verbal behavior of the child. Her reaction was directly related to the child's needs, desires, or on-going activity. Example: Mother takes something the child hands her.
    c. *Non-contingent* – the mother recognizes but re-directs the child away from the child's immediate presumed intent (verbal or non-verbal). Example: Mother tells the child acting on a toy, 'Hey, don't chew on that.'

4. **Imitation** – the mother reduplicates or approximates the child's verbal or non-verbal behavior. Imitation is assumed to also be responsive parent behavior, but direct imitations are only scored in this category. Example: Mother claps her hands and says 'yeah' after child says/does this.

5. Count the number of mother actions or behaviors that were both responsive and directive in the same conversational turn or action (follow-in directiveness). Examples: Mother tells child, 'You wanna make it go? Push that one.'

Situational

1. **Physical Contact –** any type of touching that occurs between the mother and child. Does not include holding (non-verbal).

2. **Holding –** the mother physically holds her child (in her lap, standing, etc) (non-verbal behavior)

3. **Face-to-face positioning –** the mother positions herself so that her and her child can view each other face-to-face.

Type of task

1. **Social play –** parent and child play with each other, no toys or other objects

2. **Object play –** parent and child play with toy or other object; parent tries to engage child in playing with an object.

3. **Feeding –** parent is feeding the child.

4. **Mixed –** in a given 15-second interval, at least five seconds of any two different types (social play, object play, or feeding).

Figure 1. Interaction plot for parental directiveness over time by infant receptive language. Error bars represent standard error of the mean.