

## Research Article

# Fathers' and Mothers' Verbal Responsiveness and the Language Skills of Young Children With Autism Spectrum Disorder

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**Purpose:** In this observational study, we examined the interactions of 16 young children with autism spectrum disorder (ASD) and their parents to investigate (a) differences in verbal responsiveness used by fathers and mothers in interactions with their children with ASD and (b) concurrent associations between the language skills of children with ASD and the verbal responsiveness of both fathers and mothers.

**Method:** Parent verbal responsiveness was coded from video recordings of naturalistic parent-child play sessions using interval-based coding. Child language skills were measured by the Preschool Language Scale-Fourth Edition (Zimmerman, Steiner, & Pond, 2002).

**Results:** For both fathers and mothers, parent verbal responsiveness was positively associated with child language skills. Mothers' responsiveness was also significantly

associated with child cognition. After controlling for child cognition, fathers' verbal responsiveness continued to be significantly related to child language skills.

**Conclusions:** Although other studies have documented associations between mothers' responsiveness and child language, this is the 1st study to document a significant concurrent association between child language skills of children with ASD and the verbal responsiveness of fathers. Findings of this study warrant the inclusion of fathers in future research on language development and intervention to better understand the potential contributions fathers may make to language growth for children with ASD over time as well as to determine whether coaching fathers to use responsive verbal strategies can improve language outcomes for children with ASD.

A defining feature of autism spectrum disorder (ASD) is impairment in the development of social communication (American Psychiatric Association, 2013). An integral component of communication intervention for children with ASD is parent involvement (National Research Council, 2001). Consistent with others (Warren & Brady, 2007), our rationale for parent involvement in communication interventions for children with disabilities, including ASD, is grounded in a transactional model that describes how children develop increasingly sophisticated means to express themselves and interact with others through facilitative interactions with adults (Vygotsky, 1978). To date, however, research on parent-child interactions and parent-mediated intervention for children with ASD has focused primarily on mothers. For example, a recent systematic review

(Flippin & Crais, 2011) of parent-implemented communication intervention studies revealed that only three studies specifically included fathers in parent training for children with ASD, and only one of those studies involved more than one father (Elder, Valcante, Yarandi, White, & Elder, 2005). This emphasis on mothers limits researchers' understanding of the facilitative roles that fathers and other communicative partners may play in the language development of children with ASD. Multiple and complex barriers likely exist to involving fathers, specifically, in communication intervention and research for children with ASD. For example, fathers typically spend more time working outside the home and less time with their children than mothers, presenting challenges to scheduling research or intervention sessions to include them (Hoffreth, Pleck, Stueve, Bianchi, & Sayer, 2002; Lamb, 2010; Phares, Fields, & Binitie, 2006). Also, the fact that more than 95% of all speech-language pathologists and 97% of preschool teachers are women (American Speech-Language-Hearing Association, 2012; Bureau of Labor Statistics, U.S. Department of Labor, 2014-2015) may mean that the workforce involved in early intervention is more comfortable in working with mothers than fathers (Lazar, Sagi, & Fraser, 1991).

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The focus of the current research on mothers' roles in language outcomes for children with ASD is an important start to understanding the potential for parent-child interactions to have a positive impact on children's language development. However, within a family systems framework (Seligman & Darling, 2009), each of a child's communicative partners (e.g., mother, father, grandparents, aunts, sitters, siblings) likely influences communicative outcomes. Although not all families comprise two-parent couples, understanding the potential contributions of fathers represents a logical next step in expanding the research on caregiver facilitation of language outcomes for children with ASD for several reasons. First, fathers overall are increasingly involved in childrearing (Pleck & Masciadrelli, 2004). Second, whether a child is among the approximately 64% of children (including children with ASD) in the United States who reside in a two-parent household (Freedman, Kalb, Zablotsky, & Stuart, 2012), or is in a home with a nonresident father, high-quality paternal involvement with children is related to improved child outcomes, accounting for variance beyond that accounted for by mother-child relationship variables (e.g., Adamsons & Johnson, 2013; Feldman, Bamberger, & Kanat-Maymon, 2013; Washington et al., 2014). The generalizability of these findings for fathers of typically developing children to fathers of children with ASD is unknown at this time. A third reason to examine father-child interactions involving children with ASD is that learning how to effectively engage fathers in communication intervention for this population may have systemic benefits for families, including improved parenting and coparenting quality as well as reduced parental stress. For example, Tehee, Honan, and Hevey (2009) hypothesized that high levels of maternal stress are a consequence of mothers of children with ASD taking on dual roles as both caregivers and intervention providers. Thus, there are strong theoretical, empirical, and clinical reasons for including fathers in observational and intervention research involving children with ASD. In considering the potential contributions of fathers to language outcomes for their children, it is important to note that fathers show several differences from mothers in parent-child interaction styles and language models, suggesting that findings related to mother-child interactions may not generalize consistently to father-child interactions.

### ***Father-Mother Differences in Communication and Interaction Styles***

Research on typically developing children indicates the language that fathers use with their children is generally more complex and directive than the language used by mothers. Specifically, fathers tend to use higher level syntax and vocabulary as well as more attention-getting utterances and imperatives when interacting with their children (Bernstein Ratner, 1988; Clarke-Stewart, 1978; Gleason, 1975; Masur & Gleason, 1980; Pancsofar & Vernon-Feagans, 2006; Rowe, Coker, & Pan, 2004; Walker & Armstrong, 1995). Fathers are also more likely than mothers to direct

questions to their children and, specifically, to use "wh" questions, which are more linguistically complex than the "yes/no" questions more frequently used by mothers (McLaughlin, Schultz, & White, 1980; Walker & Armstrong, 1995). Fathers' higher level language models arguably play an important role in having an impact on communication outcomes. For example, children who are typically developing use higher level language when engaging with their fathers, including more advanced narratives as well as longer and more complex utterances (Masur & Gleason, 1980; Rondal, 1980; Tomasello, Conti-Ramsden, & Ewert, 1990). In addition, fathers' vocabulary use at 24 months has been shown to predict levels of child expressive language at 36 months (Pancsofar & Vernon-Feagans, 2006), whereas mothers' language did not account for a significant portion of the variance. Gleason (1975) hypothesized that fathers' complex language provides the child with a bridge from the supportive language of home to the more complex linguistic demands of the outside world.

Research pertaining to father-mother differences in communicative interactions with children with ASD is limited, but it suggests that parental language models used with these children reflect several larger patterns of mother-father differences shown with children who are typically developing. For instance, Wolchik (1983) found that mothers of children with typical development and mothers of children with ASD were more active conversationalists than fathers across all language categories studied, using more requests, questions, expansions, and object labels than fathers. Conversely, compared with mothers, fathers in both groups engaged in more "other behaviors," such as sitting quietly, sighing, talking on the phone, and laughing. Konstantareas, Mandel, and Homatidis (1988) also reported father-mother differences in parent communication style with children with ASD. Fathers in their sample asked an equal percentage of questions as mothers, but they used a smaller percentage of prompts and a greater percentage of directive statements. These father-mother differences, similar to those seen for parents of children who are typically developing, indicate that researchers and interventionists working with children with ASD should consider the potential contributions of each of the child's early communication partners, as different caregivers may influence a child's social communication skills in different ways. In examining the possible contributions of fathers' language models to communication skills for children with ASD, one potentially important aspect of father-child communication to examine is parent responsiveness.

### ***Parent Responsiveness***

*Parent responsiveness* is broadly defined as "parents' use of affectively positive and contingent reactions to children's acts of play and communication" (Ruble, McDuffie, King, & Lorenz, 2008, p. 158). *Parent verbal responsiveness* refers to parents' use of responsive language input that follows the child's lead and maps to the child's focus of attention (Landry, Smith, & Swank, 2001; Spiker, Boyce, &

Boyce, 2002; Warren & Brady, 2007). Examples of responsive parent verbal strategies to scaffold child communication may include attempting to establish a joint focus of attention, interpreting a child's ambiguous requests, using verbalizations that linguistically map to the child's focus of attention, and shaping more appropriate communicative attempts from a child's limited language repertoire. The use of these responsive verbal strategies by mothers has been linked to achievement of earlier language milestones and better cognitive and social-emotional outcomes in studies of children who are typically developing as well as children who are at-risk for poor outcomes (Landry, Swank, & Smith, 2006; Tamis-LeMonda, Bornstein, & Baumwell, 2001). Responsive fathering also is a strong predictor of better emotional regulation, cognition, and language development for both children with typical development and those who are at-risk (Shannon, Tamis-LeMonda, London, & Cabrera, 2002; Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004). Maternal responsiveness has also been shown to predict language development in children with developmental disorders, including developmental delay and Fragile X syndrome (Brady, Marquis, Fleming, & McLean, 2004; Brady, Warren, Fleming, Keller, & Sterling, 2014; Hauser-Cram, Warfield, Shonkoff, & Krauss, 2001; Landry, Smith, & Swank, 2006). For children with ASD, several studies have documented better long-term language outcomes among children whose mothers use more responsive strategies (Haebig, McDuffie, & Ellis Weismer, 2013; McDuffie & Yoder, 2010; Siller & Sigman, 2002, 2008). Other studies have shown that coaching mothers to use responsive strategies results in communication gains for children with ASD (Aldred, Green, & Adams, 2004; Green et al., 2010; Greenspan & Wieder, 1997; Mahoney & Perales, 2003; McDuffie et al., 2013).

Collectively, findings from these studies, conducted almost exclusively with mothers, add to the growing body of evidence that maternal responsiveness is a predictor of later language development and that interventions to increase maternal responsiveness result in better language outcomes for children with ASD. Although findings from studies with mothers may generalize to fathers, an alternative possibility is that the specific features of father-child communicative interactions may have unique associations with child language skills. Thus, as a first step toward expanding researchers' understanding of the influences different caregivers may have on child language skills for this population, this study examines the concurrent relationships between the language skills of children with ASD and the responsive verbal behaviors of both mothers and fathers. Specifically, the current study examines the following research questions related to children with ASD:

1. Are there significant differences in the frequency and types of leads initiated by children in play with their mothers and fathers?
2. Are there significant differences in the use of parent verbal responsiveness by mothers and fathers?

3. Are there significant concurrent associations between the language skills of children and the verbal responsiveness of mothers and fathers?

## Method

### Participants

Sixteen children with ASD (12 boys and four girls) and their fathers and mothers participated in this study. Child participants met the following inclusion criteria: (a) chronologic age between 40 and 69 months; (b) diagnosis of ASD as confirmed by the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2000); (c) no severe sensory or motor impairments; and (d) no identified metabolic, genetic, or progressive neurological disorders. In addition, each child was required to have two biological parents, residing with the child continuously since birth. Table 1 provides demographic information for participating parents and children.

### Overview of Design and Procedure

This observational study examined concurrent associations between child language skills and the responsive verbal behaviors used by parents. Most participants were recruited from two larger research projects, and, with the exceptions noted below, scores from the Mullen Scales of Early Learning (MSEL; Mullen, 1995) and the ADOS were shared from these larger studies. For all participating children, language measures, parent-child play observations, and demographic questionnaires were completed in a single day. Sessions were scheduled on weeknights and Saturdays to allow both fathers and mothers to participate. Upon completion of the assessments and observations, each participating family received \$25 for travel expenses.

**Table 1.** Demographic information for participating families.

| Variable               | Mothers | Fathers                         | Children |
|------------------------|---------|---------------------------------|----------|
| Age <sup>a</sup>       |         |                                 |          |
| <i>M</i>               | 38.0    | 39.6                            | 53.3     |
| <i>SD</i>              | 4.5     | 5.7                             | 9.6      |
| Range                  | 30–47   | 31–56                           | 40–69    |
| Race/ethnicity (%)     |         |                                 |          |
| White/non-Hispanic     | 69      | 63                              | 56       |
| Hispanic               | 13      | 19                              | 0        |
| Asian                  | 19      | 19                              | 19       |
| Mixed                  | 6.25    | 0                               | 25       |
| Education (%)          |         |                                 |          |
| Associate's            | 6.25    | 18.75                           |          |
| Bachelor's             | 18.75   | 18.75                           |          |
| Master's               | 62.5    | 37.5                            |          |
| Doctorate/professional | 12.5    | 25                              |          |
| Household income       |         |                                 |          |
| <i>Mdn</i>             |         | \$80,000–\$99,999               |          |
| Range                  |         | \$20,000–\$39,999 to >\$100,000 |          |

<sup>a</sup>Age values for mothers and fathers are presented in years; for children, age values are presented in months.

## Standardized Measures and Questionnaires

The ADOS is a semistructured, play-based measure in which the participant's social, communication, and repetitive behaviors can be observed. The ADOS comprises four modules on the basis of a participant's particular expressive language level. For two children, staff members working with the current project administered the ADOS during the family's visit for this study, and for one child, the ADOS was administered by the area agency determining Part C eligibility rather than by research staff. For 13 children, ADOS revised algorithm scores (Gotham et al., 2008) obtained within 6 months of this study were shared from two larger studies to confirm entry diagnosis. These scores were used to calculate calibrated severity scores (CSS), which allow comparisons across different ADOS modules, according to Gotham, Pickles, and Lord (2009). ADOS CSS were used as the metric of autism symptom severity.

The MSEL is a comprehensive measure of development for young children from birth to 68 months of age. The test comprises five subscales: Gross Motor, Visual Reception (VR), Fine Motor, Receptive Language, and Expressive Language. Each subscale yields a standard T score with  $M = 50$  and  $SD = 10$ . The MSEL is recommended as a standardized measure for evaluating verbal and nonverbal development for young children with autism (Akshoomoff, 2006). The VR subscale measures visual processing skills, spatial organization, and visual memory. For three children, the VR subscale was administered on the day of the family's visit for the current study, and for 13 children, VR scores obtained within 6 months were shared from larger projects to establish a measure of children's nonverbal cognitive skills. Because seven of the 16 participating children achieved the lowest possible standard score of 20 on the VR subscale, VR raw scores were used as a measure of nonverbal cognitive level for analyses.

The Preschool Language Scale–Fourth Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002) was administered to assess child language skills. The PLS-4 is a standardized measure of language skills for children ranging in age from newborn to 6 years, 11 months. The test is composed of two subscales: Auditory Comprehension and Expressive Communication. The PLS-4 yields norm-referenced scores for each subscale as well as a total score computed from the two subscales. For PLS-4 standard scores,  $M = 100$ , and  $SD = 15$ . Because five of 16 children in this study obtained the lowest possible total language standard score of 50 on the PLS-4, total language raw scores were used as the metric of child language skills. Means, ranges, and standard deviations for the ADOS, VR standard and raw scores, and PLS-4 standard and raw scores are provided in Table 2.

Parent-child naturalistic play observations were videotaped as children engaged in a 15-min naturalistic play session with each parent. Two different standard parallel sets of age-appropriate toys were assembled so that toys would be equally novel to each child in play sessions with mothers and with fathers. Each toy set included masculine (male figures, trucks, and cars), feminine (female figures

and baby dolls), and gender-neutral (blocks and twirlers) categories. At the start of each session, parents were directed to

Play as you would normally play at home. Feel free to use some or all of the toys. We ask that if you are going to sit, parents sit in the larger blue chair so that it is easier to see the child on video.

The order of mother-child and father-child sessions was counterbalanced across parents to control for order effects. Sessions were video-recorded for later coding.

Participating parents completed a demographic questionnaire to indicate ethnicity (Hispanic or non-Hispanic) and race (i.e., American Indian/Alaska Native, Asian, Black/African American, Native Hawaiian/Pacific Islander, White) as well as to measure levels of household income and parental education. Household income was measured as one of six levels: (a) <\$20,000; (b) \$20,000–\$39,999; (c) \$40,000–\$59,999; (d) \$60,000–\$79,999; (e) \$80,000–\$99,999; or (f) >\$100,000. Parental education was measured as one of six highest levels of education completed: (a) Grades 1–11, (b) high school graduate/general equivalency diploma, (c) associate's/technical degree, (d) bachelor's degree, (e) master's degree, or (f) doctorate/equivalent professional level degree.

## Coding and Reliability

Observational measures in this study were adapted from a coding schema developed by Yoder, Fey, Thompson, McDuffie, and Lieberman (2007). Using ProCoder software (Tapp, 2003), each 15-min parent-child play session was coded in 5-s intervals (180 intervals). Coding was conducted in three passes.

### Codable Intervals

On the first pass, coders determined whether each 5-s interval was either (a) codable or (b) uncodable. Codable intervals required the child to be visible on screen for the entire 5-s interval period. For all codable intervals, child leads were then coded on the second pass through the media files.

### Child Leads

On the second pass, three types of child leads were coded. If the child looked at a toy, person, or event during the 5-s interval, an attentional or "look" lead was coded. If a child physically touched a toy during the 5-s interval, a tactile or "touch" lead was coded. For intervals in which children both looked at and touched a toy, children were credited with a touch lead. Finally, "no lead" was coded if children neither touched nor looked at a toy or person during the duration of the interval. In addition, no lead was coded if the parent successfully redirected the child's focus of attention to a new object or activity; children were considered to have "adopted" the parent lead if they maintained a focus on the new object or activity for two subsequent 5-s intervals. Thereafter, they could be credited with a look

**Table 2.** Descriptive statistics for standardized child measures.

| Measure   | Age (months) | ADOS revised algorithm | ADOS CSS | VR T score | VR raw score | PLS-4 total standard score | PLS-4 total raw score |
|-----------|--------------|------------------------|----------|------------|--------------|----------------------------|-----------------------|
| <i>M</i>  | 53.3         | 15.9                   | 6.6      | 31.6       | 33.3         | 65.6                       | 65.4                  |
| Range     | 40–69        | 7–26                   | 4–10     | 20–63      | 23–47        | 50–107                     | 35–119                |
| <i>SD</i> | 9.6          | 5.4                    | 1.9      | 15.2       | 7.4          | 19.1                       | 23.7                  |

*Note.* ADOS = Autism Diagnostic Observation Schedule; ADOS CSS = ADOS calibrated severity scores; VR = Visual Reception subscale of the Mullen Scales of Early Learning; PLS-4 = Preschool Language Scale–Fourth Edition.

or touch lead if their focus on the object or activity originally introduced by the parent continued. For all intervals that contained either a look lead or tactile lead, parent responses were coded on the third pass through the media files.

### Parent Verbal Responsiveness

Parent utterances (i.e., comments and requests/directives) were coded as responsive if they (a) referenced the child’s focus of attention (e.g., object or event) and (b) had a specific semantic relationship to the child’s focus of attention, including the object, properties of the object (e.g., color, size, textures, sounds associated with the object), or qualities of the action. Parent utterances that referenced an object or action outside of the child’s focus of attention were not coded. In addition, parent use of affirmatives (e.g., “all right”; “good job”), negative response words, interjections and vocatives (e.g., “um”; “Eh?”), and routinized utterances (e.g., counting, alphabet recitation, songs, finger plays) were not coded as parent verbal responsiveness.

### Reliability

Coding of parent–child observations was completed by two coders: a primary coder with a background in public health and a reliability coder with a background in communication sciences and disorders. The primary coder was blind to the research questions and hypotheses. Both coders were trained to 80% reliability on each behavioral code on practice videos. The primary coder coded each video, and the reliability coder coded 25% of the videos, selected randomly. Intraclass correlations (ICCs) were calculated as a measure of reliability, with the following results: codable (ICC = .99; 95% CI [.88, 1.00]); touch lead (ICC = 1.00; 95% CI [.99, 1.00]); look lead (ICC = .96; 95% CI [.96, .99]); mother verbal responsiveness (ICC = .99; 95% CI [.96, 1.00]); and father verbal responsiveness (ICC = .99; 95% CI [.86, 1.00]). Thus, the lower bounds of the confidence intervals for the ICC values were uniformly more than .80 for each coded variable, exceeding the ICC value of .70 suggested to reflect acceptable reliability (Mitchell, 1979).

### Results

Prior to answering the three research questions, distributions of variables were examined to determine whether

they met assumptions of normality. For both the VR raw scores and PLS-4 total language raw scores, distributions had a moderate skew to the right, reflecting that this sample included a relatively large number of children with significant cognitive and linguistic impairments; however, the skewness in standard scores was even more extreme, with 11 of the 16 children having VR standard scores more than 2 *SDs* below the mean and 10 of the 16 children having PLS-4 standard scores more than 2 *SDs* below the mean. Further, as mentioned previously, the variability in standard scores was truncated by the lowest possible standard score being 20 for VR (3 *SDs* below the mean) and 50 for the PLS-4 (3.33 *SDs* below the mean), leading us to use raw scores rather than standard scores in our analyses. However, the distribution of autism severity as reflected by the ADOS CSS (Gotham et al., 2009) was approximately normal, with scores ranging from 4 to 10. (Note that severity scores less than 4 are only applicable to children whose algorithm scores fall below the cutoffs for autism spectrum; 10 is the highest severity score on the calibrated scale.) Next, nonparametric correlations (Spearman’s rho) were computed to examine associations of levels of household income and parent education with measures of child language skills and parent verbal responsiveness. Levels of parent education and household income were not significantly associated with these other variables and therefore were not considered further. Table 3 describes individual child-by-child data. Statistical analyses were conducted using SPSS 22.0 for Mac. Further strategies for data analysis procedures are described relative to each of the three research questions below.

### *Research Question 1: Are There Significant Differences in the Frequency and Types of Leads Initiated by Children in Play With Their Mothers and Fathers?*

Paired-samples *t* tests were used to compare the frequency of look leads, touch leads, and total leads used by children in naturalistic play interactions with their mothers and fathers. Children used more touch leads ( $M = 138.3$ ,  $SD = 25.8$ ) and more total leads with their mothers ( $M = 146.8$ ,  $SD = 25.8$ ) than with their fathers ( $M = 126.3$ ,  $SD = 47.0$ ;  $M = 118.3$ ,  $SD = 48.3$ ),  $t(15) = 2.88$ ,  $p = .01$ . As can be seen in Table 3, this pattern of more leads with mothers than fathers held for 12 of the 16 triads. Look leads (i.e., child

**Table 3.** Individual child-by-child data for VR raw scores, ADOS CSS, child leads, and frequency and proportion of maternal and paternal responsiveness.

| Participant | Age (months) | VR raw scores | ADOS CSS | PLS-4 total raw scores | Child leads |     | Parent verbal responsiveness frequency |     | Parent verbal responsiveness proportion |     |
|-------------|--------------|---------------|----------|------------------------|-------------|-----|--|-----|---|-----|
|             |              |               |          |                        | Mom         | Dad | Mom                                    | Dad | Mom                                     | Dad |
| 1           | 69           | 31            | 6        | 45                     | 162         | 134 | 95                                     | 64  | .59                                     | .48 |
| 2           | 62           | 30            | 6        | 35                     | 130         | 86  | 64                                     | 17  | .49                                     | .20 |
| 3           | 68           | 27            | 6        | 62                     | 156         | 149 | 70                                     | 34  | .45                                     | .23 |
| 4           | 58           | 26            | 10       | 51                     | 132         | 97  | 83                                     | 52  | .63                                     | .54 |
| 5           | 55           | 27            | 6        | 71                     | 146         | 167 | 73                                     | 58  | .50                                     | .35 |
| 6           | 57           | 32            | 9        | 73                     | 170         | 150 | 122                                    | 97  | .72                                     | .65 |
| 7           | 41           | 37            | 4        | 76                     | 174         | 166 | 102                                    | 92  | .59                                     | .55 |
| 8           | 45           | 39            | 4        | 77                     | 169         | 179 | 140                                    | 52  | .83                                     | .29 |
| 9           | 46           | 44            | 7        | 70                     | 164         | 116 | 99                                     | 48  | .60                                     | .41 |
| 10          | 54           | 47            | 4        | 86                     | 170         | 146 | 115                                    | 82  | .68                                     | .56 |
| 11          | 43           | 27            | 6        | 41                     | 100         | 50  | 60                                     | 20  | .60                                     | .40 |
| 12          | 40           | 23            | 10       | 41                     | 147         | 162 | 57                                     | 26  | .39                                     | .16 |
| 13          | 42           | 27            | 7        | 35                     | 98          | 51  | 72                                     | 24  | .73                                     | .47 |
| 14          | 58           | 38            | 7        | 99                     | 175         | 164 | 125                                    | 98  | .71                                     | .60 |
| 15          | 52           | 34            | 8        | 66                     | 112         | 37  | 30                                     | 22  | .27                                     | .59 |
| 16          | 62           | 44            | 5        | 119                    | 145         | 167 | 70                                     | 75  | .48                                     | .45 |

Note. VR = Visual Reception subscale of the Mullen Scales of Early Learning; ADOS CSS = Autism Diagnostic Observation Schedule calibrated severity scores; PLS-4 = Preschool Language Scale—Fourth Edition.

looks at person, object, or activity without touching) were rarely used with either parent, and differences in children’s use of look leads with mothers ( $M = 8.6, SD = 7.0$ ) and fathers ( $M = 8.1, SD = 9.0$ ) were not found.

**Research Question 2: Are There Significant Differences Between Mothers’ and Fathers’ Use of Responsive Verbal Behaviors?**

A paired-samples *t* test was conducted to compare frequency of responsive verbal behaviors used by mothers and fathers with their children with ASD during naturalistic play sessions. Overall, mothers used significantly more responsive verbal acts ( $M = 86.1, SD = 29.5$ ) than fathers ( $M = 53.8, SD = 28.6$ ),  $t(15) = 6.03, p = .01$ . This pattern of a higher frequency of verbal responses for mothers than fathers held for 15 of the 16 family triads. Because children in the sample used significantly more leads with mothers than with fathers, thus giving mothers more opportunities to be coded as responsive, proportion scores were also calculated (i.e., frequency of parent verbal responsive utterances divided by child leads) and were compared to examine mother–father differences in the proportion of verbal responsiveness used (see Table 3). Mothers were also found to use a significantly greater proportion of responsive verbal utterances ( $M = 0.57, SD = 0.14$ ) compared with fathers ( $M = 0.43, SD = 0.15$ ),  $t(15) = 3.30, p = .005$ . This pattern held for 15 of the 16 family triads, although in two additional families, the mothers and fathers were within 5 percentage points of one another in the proportion of leads to which they verbally responded.

**Research Question 3: Are There Significant Concurrent Associations Between the Language Skills of Children and the Verbal Responsiveness of Mothers and Fathers?**

Nonparametric correlations (Spearman’s rho) were first computed to examine associations between ADOS CSS, VR raw scores, and parent verbal responsiveness (see Table 4); ADOS CSS were not significantly related to parent responsiveness for either mothers or fathers, whereas VR raw scores were significantly correlated with the frequency of responsive verbal behaviors used by mothers ( $\rho = .54, p = .03$ ) and fathers ( $\rho = .49, p = .05$ ). VR raw scores were not significantly correlated with the proportion of verbal behaviors used by either mothers ( $\rho = .26, p = .33$ ) or fathers ( $\rho = .41, p = .12$ ).

For mothers, significant positive relationships were found between the frequency of responsive verbal behaviors and children’s total language scores on the PLS-4 ( $\rho = .62, p = .01$ ). However, the proportion of maternal responsive verbal behaviors was not significantly correlated with child language scores ( $\rho = .21, p = .44$ ). For fathers, a significant positive relationship was found between the frequency ( $\rho = .79, p < .001$ ) of responsive verbal behaviors and child language scores, and a marginally significant relationship with the proportion of paternal responsive verbal behaviors and child language scores ( $\rho = .45, p = .08$ ). As can be seen in Table 4, associations between Auditory Comprehension and Expressive Communication subscale scores on the one hand, and the frequency of parent verbal responses on the other hand, showed similar patterns to the associations found for total language scores on the PLS-4.

**Table 4.** Nonparametric correlations (Spearman's rho) between parent verbal responsiveness, child language scores, VR raw scores, and ADOS CSS.

| Variable                       | VR raw score | ADOS CSS | PLS-4 Auditory Comprehension subscale | PLS-4 Expressive Communication subscale | PLS-4 total language raw scores |
|--------------------------------|--------------|----------|---------------------------------------|---|---------------------------------|
| Mothers' verbal responsiveness |              |          |                                       |   |                                 |
| Frequency                      | .54*         | -.29     | .59*                                  | .61*                                    | .62*                            |
| Proportion                     | .26          | -.07     | .26                                   | .19                                     | .21                             |
| Fathers' verbal responsiveness |              |          |                                       |   |                                 |
| Frequency                      | .49*         | -.22     | .72**                                 | .77**                                   | .79**                           |
| Proportion                     | .41          | .15      | .44                                   | .41                                     | .45                             |

Note. VR = Visual Reception subscale of the Mullen Scales of Early Learning; ADOS CSS = Autism Diagnostic Observation Schedule calibrated severity scores; PLS-4 = Preschool Language Scale—Fourth Edition.

\* $p < .05$ . \*\* $p < .01$ .

Given the significant associations between the VR raw scores and frequency of parent verbal responsiveness, partial correlations were run to examine associations between parent responsiveness and child language skills after accounting for child nonverbal cognitive level. Associations between the frequency of mothers' verbal responsiveness and child language skills were no longer significant after controlling for VR raw scores ( $\rho = .08$ ,  $p = .39$ ), whereas the frequency of fathers' verbal responsiveness and child language skills continued to be significantly positively related ( $\rho = .56$ ,  $p = .01$ ).

## Discussion

This observational study examined differences in selected aspects of the interactions of fathers and mothers with their children with ASD. We discuss the following findings that emerged pertaining to our three research questions. First, the children with ASD initiated more leads during play sessions with their mothers than with their fathers. Second, mothers were more responsive than fathers on the basis of both frequency of verbal responses as well as verbal responses as a proportion of child leads. Third, significant first-order correlations were found between child language skills and the frequency of verbal responsiveness for both fathers and mothers; further, after controlling for children's nonverbal cognitive skills, the frequency of verbal responsiveness of fathers continued to be significantly associated with child language scores, which was not the case for mothers.

### Child Leads

Children in the study used significantly more leads in interactions with their mothers than with their fathers. One possible interpretation of this difference in child leads across parent gender is that it may reflect mothers' more extensive history of interactions with their children; that is, a stronger history of interaction between mothers and children may create contexts in which children are more likely to lead (by focusing their attention on objects and events in the play context) with their more familiar play

and communication partner. Another possible explanation for fewer leads with fathers is drawn from more general patterns of father-child interactions. For example, fathers have been observed to be more directive than mothers in their interactions with young children who are typically developing (Gleason, 1975; Goldberg, Clarke-Stewart, Rice, & Dellis, 2002; Masur & Gleason, 1980). Although we did not specifically code directive or redirective behaviors (*redirective* being defined as a behavior that seeks to change the child's focus of attention) of parents in the current study, a higher frequency of redirective behaviors on the part of a parent could restrict the number of leads provided by the child. That is, if fathers of children with ASD were using more redirectives in their interactions with their children than mothers did, and they were succeeding in redirecting their children's attention, these redirective behaviors could override their children's opportunities to provide leads (i.e., until the child either met the two-interval criteria for adopting the parent's lead or initiated a new focus of attention).

A further finding warranting mention is that most child leads were touch leads. This may be advantageous in promoting parent responsiveness in general because of the ease of observing what a child is touching versus possible ambiguity in determining what a child is looking at. Although the coders demonstrated a high level of agreement in coding look leads, the operational definitions for look leads required that coders be able to confidently determine the object of a child's gaze, which may have further contributed to the limited number of look leads identified.

### Mother Versus Father Verbal Responsiveness

Regardless of the possible alternative explanations for differences in child leads during play with mothers versus fathers, our findings indicate that fathers were less responsive than mothers, at least in terms of providing contingent verbal responses to the child's focus of attention. These differences held whether we compared frequency of parent responsiveness or proportion of child leads to which parents responded. Our findings are consistent with previous findings comparing maternal versus paternal contingent

responsiveness in other populations (e.g., Calzada, Eyberg, Rich, & Querido, 2004; Ganadaki & Magill-Evans, 2003; Kochanska & Aksan, 2004). This consistency at the group level, reinforced by the pattern of differences among most of the individual triads in our sample, suggests that differences in parent responsiveness (as defined in this study and many others) are very common in U.S. families, regardless of whether a child has an identified disability.

### ***Associations of Father and Mother Verbal Responsiveness With Child Language Skills***

Although associations between child language skills and responsiveness have been previously documented in studies with mothers, to our knowledge, this is the first study to demonstrate a significant positive association between the language skills of children with ASD and the use of responsive verbal behaviors by fathers. In this observational study, children with ASD tended to show stronger language skills when both fathers and mothers used more responsive verbal utterances. Given that this study examined concurrent relationships, it is not possible to know whether (a) fathers and mothers used more responsive strategies with children with higher language skills, (b) children showed higher language skills because parents used more responsive verbal strategies, or (c) transactional processes of interactions between parents and children served to either promote or curtail children's language development. As in all parent-child communication, it is likely that transactional effects are operating, and parents and children have dynamic bidirectional influences on the communicative behaviors of one other (McLean, 1990; Sameroff & Fiese, 2000).

After partialing out the variance associated with child nonverbal cognitive skills, the correlation between verbal responsiveness and child language skills was no longer significant for mothers; however, a significant positive association remained between paternal verbal responsiveness and child language skills. Thus, even though as a group fathers were less responsive than mothers, the variability in fathers' responsiveness had a moderately strong association with child language levels. Our interpretation of this finding is that the potential contributions of paternal responsiveness in promoting child communication development are not necessarily less important than those of maternal responsiveness despite the overall lower levels of paternal responsiveness.

Our finding that mothers' verbal responsiveness was no longer related to child language skills after accounting for its association with child nonverbal cognitive skills was unexpected in light of previous research. Several larger, longitudinal studies have documented mothers' verbal responsiveness as a strong predictor of language outcomes (McDuffie & Yoder, 2010; Siller & Sigman, 2002, 2008) and have shown significant relationships between child language skills and maternal responsiveness after controlling for cognition of children who are at risk ( $n = 183$ ; Hauser-Cram et al., 2001) and of children with developmental

disabilities, including Fragile X syndrome ( $n = 55$ ; Brady et al., 2014). Possibly, the statistical power of the current study ( $n = 16$ ) was too limited to show the associations between maternal verbal responsiveness and child language skills after controlling for nonverbal cognitive skills that have been found with larger samples.

In summary, our findings—which are related to mother-father differences in verbal responsiveness and in the associations of parent responsiveness of both mothers and fathers with concurrent child language skills in young children with ASD—support an assumption that the transactional patterns of interactions between parents and children in this population are largely consistent with those seen in other populations. By studying the verbal responsiveness of fathers of children with ASD, we have added to the empirical and theoretical support for greater inclusion of fathers in future studies of language outcomes for children with ASD.

### ***Potential Clinical Implications***

Evidence from this study provides early empirical support for research on the possible benefits of engaging fathers of children with ASD more actively in their child's clinical services. It is important to note that we do not interpret our findings as indicating that we should design and test an intervention program that endeavors to make father-child interactions more like mother-child interactions or vice versa. Fathers are not mothers, and understanding father-mother differences and the possible unique influence of each parent on language outcomes for children with ASD is an important first step in more effectively engaging varied caregivers in communication intervention.

With that caveat in mind, the first potential clinical implication of this study is that coaching fathers to use responsive verbal strategies may be beneficial for language outcomes for children with ASD. Findings from this study suggest that both fathers' and mothers' use of responsive verbal strategies is associated with higher language skills for children with ASD. Thus, interventions to increase father responsiveness may offer benefits to child communication skills that have been documented in other studies targeting maternal responsiveness. A second possible clinical implication of this study may be to teach fathers to follow their child's lead more and to initiate less. Children in this study used fewer leads in play with their fathers, possibly because fathers preempted child leads by redirecting the child's attention (although that possibility has not been directly demonstrated by this study). Should this prove to be the case, coaching fathers to let children take the lead more often in play may be beneficial for children with ASD. However, it is also important to recognize that fathers in general tend to be more directive in interactions with their children than mothers and, thus, may benefit from coaching strategies that reflect their interaction patterns. For instance, Elder et al. (2005) reported that fathers were not successful in learning an expectant waiting strategy, but they did learn to use a more active responsive strategy—that is, imitating



with animation. Understanding which responsive strategies are both beneficial to children with ASD and amenable to the interaction styles of fathers may be an important component of developing effective father-implemented interventions.

### **Study Limitations**

Results from this study have provided some early evidence regarding the concurrent associations between language skills of children with ASD and the verbal responsiveness of fathers as well as mothers; however, several limitations must be highlighted. The first limitation of this study is the small sample size ( $n = 16$ ). Although appropriate analyses were planned and conducted, some findings from this study may be specific to this particular sample, with limited generalizability. Second, given that this study examined associations between parent-child variables at a single time point, definitive answers to the questions of whether parents were more responsive because their children had higher level language skills, or whether children had higher level language skills because their parents provided responsive verbal models, were not achievable within the constraints of the study design. Third, the sample varied racially and ethnically but had predominantly middle to high socioeconomic status, which may have affected results. Fourth, mothers and fathers who participated in this study may differ in important ways from parents who do not choose to participate in research, and thus, findings from this sample may not generalize to all parents of children with ASD. Finally, because of the nature of the research questions, participating parents were married and living together. This reflects the family structure of a little less than two thirds of U.S. children with ASD overall, with children who are in African American and/or Hispanic families less likely than those in White families to reside in two-parent homes (Freedman et al., 2012). Meeting the needs of a more diverse range of families will require testing the generalizability of these findings to mothers and fathers who are caring for their children in family structures other than two-parent homes and to other primary caregivers who play important roles in the lives of children with ASD.

### **Future Directions**

The long-term goal of this program of research is to develop a social-communication intervention for children with ASD that can be effectively delivered by both mothers and fathers. As a first step toward this goal, the current observational study sought to fill several gaps in the existing knowledge on the role of parent responsiveness for children with ASD by examining associations between child language skills and the verbal responsiveness of both fathers and mothers. Future observational studies should focus on examining whether father responsiveness predicts child language skills over time, as has been found for mothers, and identifying which aspects of father verbal responsiveness (e.g., follow-in directives, follow-in comments) may uniquely

predict language outcomes for children with ASD. We also want to address the question of whether any features associated with more directive styles of fathers in interacting with children (e.g., orienting/attentional cues that accompany directives or redirectives) have as yet unidentified positive effects on the outcomes of children with ASD. Determining whether father-child interaction variables (i.e., verbal responsiveness or other variables) account for additional variance in child language outcomes beyond that predicted by mother-child interaction variables, or whether paternal and maternal variables have an impact on different aspects of child language outcomes, would be particularly informative regarding the distinctive roles that fathers and mothers may play in language development for children with ASD. In addition, future intervention research should focus on determining whether coaching fathers to use more responsive verbal strategies results in functional changes in child language skills.

A related question is whether the features of father versus mother verbal responsiveness have differential effects depending on the developmental level of the child. This latter possibility is suggested by findings of a study of mothers and their toddlers with ASD (Haebig et al., 2013). Findings indicated that the type and developmental timing of responsive verbal acts may help to explain differential impact of parent verbal responsiveness on child language. Specifically, mothers' use of follow-in comments predicted language comprehension 1 year later for children who were initially minimally verbal, but this was not related to later language skills for children who initially had higher level language skills. However, regardless of the child's initial language level, Haebig et al. (2013) found that parents' use of follow-in-directives for language (i.e., directing the child to respond verbally about the child's current focus of attention) accounted for unique variance in later language comprehension and expression. Given that fathers tend to use more directive language than mothers overall (Gleason, 1975; Goldberg et al., 2002; Masur & Gleason, 1980), it may have been the case in the current study that paternal verbal responsiveness included more follow-in directives than maternal verbal responsiveness and that follow-in directives helped promote child language development across the wide range of language levels represented in this study (from minimally verbal to verbally fluent). Follow-in directives were not coded separately from follow-in comments in the present study, however, leaving a more nuanced examination of the types of verbal responsiveness used by fathers versus mothers for future research.

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