



Published in final edited form as:

J Dev Behav Pediatr. 2017 June ; 38(5): 339–344. doi:10.1097/DBP.0000000000000445.

The Influence of Maternal Pragmatics on the Language Skills of Children with Autism

Yael S. Stern, BS, Nell Maltman, MA, and Megan Y. Roberts, PhD, CCC-SLP

Roxelyn and Richard Pepper Department of Communication Sciences and Disorders,
Northwestern University, Evanston, IL

Abstract

Objective—This study examined the relationship between mothers’ pragmatics and child language in autism spectrum disorder (ASD) and non-ASD language delay (LD) mother-child dyads.

Methods—Participants consisted of 20 dyads of mothers and their toddlers aged 24 to 48 months, with ASD (n = 10) or non-ASD LD (n = 10). Groups were matched on child chronological age, language, and cognition. Maternal pragmatic language was qualified based on the degree of pragmatic violations during a semistructured interview, and was examined in relation to both child language, as measured by the Preschool Language Scale-4 and maternal use of language facilitation strategies during play.

Results—Lower rates of maternal pragmatic violations were associated with higher expressive language scores in children with ASD, and with higher receptive language scores for children with non-ASD LD. Within ASD dyads, maternal pragmatic violations were negatively related to mothers’ use of linguistic expansions.

Conclusion—These findings indicate that parental pragmatics likely contribute to early language learning, and that the effects of maternal pragmatics on early language in ASD may be indirect (e.g., through parents’ use of facilitative strategies). Parent-mediated language interventions for ASD should therefore consider parent pragmatics, especially given that pragmatic differences have been identified in unaffected family members of individuals with ASD.

Index terms

pragmatics; autism spectrum disorder; language facilitation; language development

Characteristics of parent language related to quantity,¹ quality,² and contingency³ of child-directed input promote optimal language learning in children. However, a parent’s use of these facilitative language characteristics may be related to a parent’s natural pragmatic language (i.e., social language) style. Given the significant relationship between parent

Address for reprints: Megan Y. Roberts, PhD, CCC-SLP, Roxelyn and Richard Pepper Department of Communication Sciences and Disorders, School of Communication, Northwestern University, 2240 Campus Drive, Evanston, IL 60208; megan.y.roberts@northwestern.edu.

Disclosure: The authors declare no conflict of interest.

language input and child language development,³ it is essential to consider how differences in parent pragmatic styles may shape the language input a child receives.

Parental pragmatic language style is particularly relevant with respect to language development in children with autism spectrum disorders (ASDs). Pragmatic differences comprise an aspect of the broad autism phenotype (BAP), a cluster of subclinical language and personality features that have been identified in some unaffected family members of children with ASD.⁴⁻⁸ Specifically, the rate of pragmatic violations, or deviations from conversational norms, is higher in parents of children with ASD as compared to parents of typically developing children and parents of children with Down syndrome.^{6,9} As such, it is important to evaluate how these pragmatic language differences may impact parents' ability to effectively deliver meaningful language input within the context of parent-mediated language interventions for young children with ASD.

ROLE OF ADULT PRAGMATICS IN CHILD LANGUAGE DEVELOPMENT

Topic Contingency

The ability to maintain a topic of conversation is essential to adult pragmatics.¹⁰ In parent-child interactions, topic maintenance can be conceptualized as parental verbal responses that are related to a child-selected topic. Maternal language tied to referents of a child's focus is related to child expressive^{11,12} and receptive language¹³ and mean length of utterance.¹⁴ Maternal comments that redirect away from the child's focus are negatively associated with expressive vocabulary development,^{11,12} as well as with later receptive language.¹⁵ These findings highlight the importance of building on language related to the child's focus of attention, which may be reflected in adult pragmatics more broadly.

Temporal Contingency

In adult pragmatics, response contingency is essential for conversational turn-taking. Turn-taking in parent-child interactions manifests as immediate parental response to child vocalizations. Turn-taking is a pragmatic skill that preserves the trajectory of discourse and ensures that a conversation is truly characterized by dialog rather than monolog. As demonstrated for topic contingency, adult temporal contingency, particularly verbal temporal contingency,¹⁶ is related to several aspects of child language development. In temporally contingent interactions, infants are more likely to produce motorically complex speech-like sounds¹⁷ and increase their rate of vocalization¹⁸ than in interactions that are not temporally contingent. Evidence also suggests that parental adherence to turn-taking contributes to the development of this skill in infants.¹⁹ By maintaining temporal conversation rules, parents may foster an effective platform for language development.

Parental Acquisition of Strategies for Promoting Child Language Development

In parent-implemented language interventions, parents are coached to enhance qualities of parent-child interaction, including content and temporal contingency.²⁰ It is important that in parent-implemented language interventions for young children with ASD, there seems to be significant variability in parental acquisition of treatment strategies within the same treatment study. Some studies have demonstrated positive concurrent and longitudinal

effects of parent-implemented interventions on both parents and their children with ASD.^{21–23} Yet, in a number of studies of parent-implemented interventions for ASD there were no significant differences in the use of intervention strategies between parents in the intervention and control conditions, and subsequently no significant differences between groups in child language skills.^{24,25} Variability in parents' fidelity of intervention has been shown to mediate child outcomes, highlighting a significant challenge in implementation of parent-mediated language interventions for ASD.²⁶ The lack of uniformity in parent acquisition of treatment strategies suggests that consideration of parent profiles may be important for understanding the effects of these interventions.

One possibility for this reported variability in parent outcomes is that researchers have failed to consider and account for differences in parent personality and communication profiles at baseline. Recent studies provide support for the influence of parental traits on both parent and child outcomes in parent-implemented interventions for young children with ASD. For example, Parr et al.²⁷ demonstrated that the presence of parental broad autism phenotype (BAP) features was associated with lower parental use of intervention strategies, as well as less growth over time in both parents' use of strategies and in children's receptive vocabulary. Similarly, Siller et al.²⁸ found that only those mothers who were better able to describe their child's communicative intent and behavioral state showed increases in responsivity following a parent-mediated intervention. These findings suggest that the variable effects of parent-mediated interventions on child language outcomes may be a result of the mixed rates of parent acquisition of treatment strategies.^{24,26,28,29} Variable parent outcomes indicate a need for consideration of baseline parent factors, such as pragmatic profiles, which may influence parental success with implementation of intervention strategies.

Aims of This Study

This study aims to integrate evidence of the facilitative effect of parent pragmatic language on child language growth. This goal is achieved through exploration of the following questions: (1) do pragmatic profiles differ between mothers of children with ASD and children with non-ASD language delay given the presence of pragmatic language differences associated with the BAP, (2) how do these maternal pragmatic profiles relate to child language profiles early in development, and (3) are parent pragmatic skills related to parent use of language support strategies before participation in a parent-implemented language intervention? An understanding of the relationship between parent pragmatics, pretreatment child language profiles, and parental use of language facilitation strategies, will offer a new perspective on parental factors that may impact the implementation of parent-mediated language interventions for children with ASD.

METHODS

Participants

Families were recruited through the state early intervention system and with local advertisements. Participants consisted of 20 dyads (19 mothers and 20 toddlers given that 1 mother had 2 children enrolled in the study). Children in the dyads either had a diagnosis of

autism spectrum disorder (ASD-M; $n = 10$), or non-ASD language delay (LD-M; $n = 10$). These mother-child dyads were part of a larger longitudinal study of children with LDs (R324A090181 from the Institute of Education Sciences). This study was approved by the University's Institutional Review Board, and written informed consent was obtained from all caregivers before their participation. Mother-child dyads were eligible for participation in this study if children were between 24 and 42 months, had expressive and/or receptive language scores 1.33 SD below the mean on the Bayley Scales of Infant and Toddler Development, Third Edition (BSID-3),³⁰ and spoke English as the primary language. Exclusion criteria were intellectual disability (Cognitive Scale Composite Score of less than 80 on the BSID-3). Diagnoses of toddlers with ASD were confirmed using the Autism Diagnostic Observation Schedule, First Edition (ADOS-1).³¹ Mother-child dyads were matched on 5 criteria, such that the ASD-M and LD-M groups did not differ on these factors: child age, child language profile and cognitive level, maternal education, and household income. Table 1 summarizes mother-child dyad characteristics.

Procedure

Child language skills were measured using the Pre-school Language Scales, Fourth Edition (PLS-4)³²; see Table 2. The PLS-4 is a structured assessment of language abilities, appropriate for use with children between birth and 8 years. The measure consists of 2 scales, expressive communication and auditory comprehension, and also yields a standard score of total language ability. During administration of the PLS-4, the child is prompted to complete expressive and receptive tasks using pictures and objects. In instances in which the target behavior cannot be elicited, items are scored using parent report.

Mother-child dyads participated in a 20-minute naturalistic play session in the clinic. During this play session, mothers played with a standard set of toys and were instructed to play as they usually would. Trained research staff coded parent language facilitation strategies during this play session. Research staff completed observational coding to assess mothers' natural use of language facilitation strategies. Strategies of interest were skills typically taught in an evidence-based, parent-mediated language intervention³³ that facilitate optimal communication between young children with language impairments and their caregivers. This study focused on 2 strategies that parents may intuitively use without receiving any coaching: responsiveness and expansions. Responsiveness was coded as the percentage of child utterances during the play session to which the mother provided a temporally contingent response (i.e., within 3 s from child's utterance). Expansions were coded as the percentage of child utterances during the play session to which the mother responded by repeating the child's utterance, and building on that utterance with the addition of a new word. Reliability was calculated for 20% of these parent-child interaction sessions; point-by-point interobserver agreement exceeded 90% for each parent strategy code.

At baseline, an examiner conducted a "Family Story" (FS) interview with each mother. The FS is a semi-structured conversation about a parent's experience raising their child, and was used to build rapport at the outset of the study and to gather information about caregiver attitudes and needs. Although this conversation is facilitated by the examiner and guided by an outline of suggested standardized questions, the mother is given the opportunity to raise

related topics, as would occur in a natural conversation. Topics covered in the FS include life before the birth of the child, the child's developmental history, parenting challenges, and therapy goals. The FS interviews averaged 41.85 minutes in length ($SD = 24.22$ min).

We used the Pragmatic Rating Scale (PRS)⁹ to assess the pragmatic quality of parent language during the FS. The PRS was used to retrospectively code the FS as a naturalistic conversation sample; the PRS coding categories were not part of the original implementation of the FS. The PRS was originally designed to compare pragmatic language profiles of parents of individuals with ASD with control parents, and has been frequently used in studies of broad autism phenotype characteristics.^{4,6-8} The PRS is a set of 26 operationally defined codes for aspects of conversational style and behavior including, for example, overly detailed responses and rate/rhythm of speech. Items on the PRS are scored as "0" (absent), "1" (mild), or "2" (present). A graduate student coder independently rated every mother on each of the 26 PRS codes by considering her cumulative behavior across the interview. Scores across the 26 PRS items were summed to yield a total score for pragmatic violations. Reliability between the primary coder and a second independent coder was calculated for 20% of all interviews. Percent agreement within 1 point on the 3-point scale was 100% for all 26 individual PRS codes.

Analysis Plan

We used a paired samples *t* test to analyze the difference between PRS total scores between groups of mothers. We also examined the relationships between PRS total scores, child language profile, and maternal use of language facilitation strategies using correlations.

RESULTS

The initial question addressed was regarding the between-group differences in Pragmatic Rating Scale (PRS) total scores. Table 2 shows the descriptive statistics for PRS total scores. The PRS total scores of the mothers of children with autism spectrum disorder (ASD) were higher than those of the mothers of children with non-ASD language delay (LD), $t(9) = 2.35$, $p < .05$, $d = 1.06$, reflecting more pragmatic violations in the language of the mothers of children with ASD.

Table 3 summarizes the results of analyses regarding the relationship between PRS scores and child language. Within the ASD-M group, PRS total score was significantly negatively correlated with Preschool Language Scale (PLS) Expressive Communication Standard Score, $r(10) = -.68$, $p < .05$. No significant correlation was observed between PRS total score and PLS Auditory Comprehension Standard Score for the ASD-M group, $r(10) = -.12$, $p = .66$. In the LD-M group, although no significant correlation was observed between PRS total score and PLS Expressive Communication Standard Score, $r(10) = -.01$, $p = .97$, PRS total score was significantly negatively correlated with PLS Auditory Comprehension Standard Score, $r(10) = -.71$, $p < .05$.

We explored the relationship between maternal pragmatic profiles and maternal use of language facilitation strategies using partial correlations, controlling for age; see Table 3. In the ASD-M group, no significant correlation was detected between PRS total score and

mothers' use of the responsive strategy, $r(7) = .17, p = .67$. However, PRS total scores were significantly negatively correlated with maternal use of expansions, $r(7) = -.68, p < .05$. In the LD-M group, no significant correlation was observed between PRS total score and mothers' use of either the responsive strategy, $r(7) = -.40, p = .29$, or the expansions strategy, $r(7) = -.27, p = .49$.

To contextualize the above findings, we examined whether ASD-M and LD-M groups differed in their use of language support strategies before any training or intervention. The ASD-M group used the responsive strategy more often than did the LD-M group, $t(9) = -2.80, p < .05, d = 1.06$. However, the groups did not differ in their use of the expansion strategy, $t(9) = -.109, p = .92, d = 0.04$.

DISCUSSION

This study explored the influence of parent pragmatics on child language and maternal use of language strategies. Findings provide support for previous studies that have demonstrated elevated levels of pragmatic violations in parents of children with autism spectrum disorder (ASD), as compared to control parents,⁹ which may reflect the underlying familiarity of pragmatic language differences in ASD families related to the broad autism phenotype. Notably, lower maternal Pragmatic Rating Scale scores were associated with higher expressive language scores in children with ASD, and higher receptive language scores in children with a non-ASD language delay (LD). Although maternal pragmatics were related to different domains of child language between the 2 groups, it is possible that pragmatics influence child language in a manner that is dependent on the child's developmental profile. Overall, these findings indicate that parental pragmatics likely contribute to early language learning.

Within the ASD dyads, the relationships between maternal pragmatic language, strategy use, and child language suggest that the effect of maternal pragmatics on early child language in ASD may be indirect. Previous research has demonstrated a strong relationship between parent use of expansions and expressive vocabulary development in children with ASD.³⁴ This may offer a possible explanation for the observed relationship between better pragmatic language and higher expressive language in the ASD-M dyads. Given that expansions require that a parent build on rather than redirect child attention, this strategy may require greater pragmatic skill than simply providing a child with a temporally contingent response.

Similarly, pragmatics may have also influenced mothers' implementation of the responsiveness strategy. Although the ASD-M group demonstrated more frequent use of responsiveness than the LD-M group, this finding may have been driven by mothers' pragmatic styles. Although this study's sample size was too small to examine statistical patterns of specific pragmatic violations qualitatively, most mothers in the ASD-M group met criteria for "overtalkativeness" or "tangential" pragmatic behaviors. Higher rates of talkativeness in this group would likely be observed in both adult conversations and parent-child interactions, although in the context of parent-child interactions, this style of responding would not necessarily reflect higher quality responses to the child.

Given that this study focused on maternal use of responsiveness and expansions, results do not account for maternal use of additional strategies potentially influenced by maternal pragmatics. For instance, gesture use, another element of adult social communication, likely also affected child outcomes differentially across diagnostic groups.³⁵ In addition, the reciprocal influence of parent pragmatics and child language may have further contributed to maternal strategy use in both groups of mothers.

Limitations and Future Directions

This study had a number of limitations. As the family story (FS) was focused on sensitive content related to a child's recent diagnosis and delayed developmental status, it is possible that these conversational topics influenced the pragmatic styles of parents. The content of this conversation may have caused parents to be more reserved or more agitated than if probed about neutral topics. In addition, Pragmatic Rating Scale coders were not naive to child diagnostic status given that questions in the FS reference the child's developmental profile and often led to mothers discussing their child's diagnosis.

The findings of this preliminary study highlight the need for a more nuanced approach to addressing the relationship between parental pragmatics and child language learning in autism spectrum disorder (ASD). It will be important for future work to examine how parent pragmatic profiles predict parental response to treatment. Addressing these questions could offer methods for optimizing parent-implemented language interventions for ASD.

Acknowledgments

The authors thank Dr. Ann P. Kaiser for overseeing study implementation at Vanderbilt University, as well as all participating families for their time and commitment.

Supported by the Institute of Education Sciences (R324A090181; PI: Kaiser) and the National Science Foundation (DGE-1324585; PI: N.M.).

References

1. Huttenlocher J, Haight W, Bryk A, et al. Early vocabulary growth: relation to language input and gender. *Dev Psychol.* 1991; 27:236–248.
2. Hoff E, Naigles L. How children use input to acquire a lexicon. *Child Dev.* 2002; 73:418–433. [PubMed: 11949900]
3. Tamis-LeMonda CS, Bornstein MH, Baumwell L. Maternal responsiveness and children's achievement of language milestones. *Child Dev.* 2001; 72:748–767. [PubMed: 11405580]
4. Piven J, Palmer P, Landa R, et al. Personality and language characteristics in parents from multiple-incidence autism families. *Am J Med Genet.* 1997; 74:398–411. [PubMed: 9259376]
5. Ruser TF, Arin D, Dowd M, et al. Communicative competence in parents of children with autism and parents of children with specific language impairment. *J Autism Dev Disord.* 2007; 37:1323–1336. [PubMed: 17180460]
6. Losh M, Childress D, Lam K, et al. Defining key features of the broad autism phenotype: a comparison across parents of multiple-and single-incidence autism families. *Am J Med Genet B Neuropsychiatr Genet.* 2008; 147:424–433.
7. Losh M, Adolphs R, Poe MD, et al. Neuropsychological profile of autism and the broad autism phenotype. *Arch Gen Psychiatry.* 2009; 66:518–526. [PubMed: 19414711]

8. Losh M, Klusek J, Martin GE, et al. Defining genetically meaningful language and personality traits in relatives of individuals with fragile X syndrome and relatives of individuals with autism. *Am J Med Genet B Neuropsychiatr Genet.* 2012; 159:660–668.
9. Landa R, Piven J, Wzorek MM, et al. Social language use in parents of autistic individuals. *Psychol Med.* 1992; 22:245–254. [PubMed: 1574562]
10. Grice, P. Logic and conversation. In: Cole, P., Morgan, JL., editors. *Syntax and Semantics, III. Speech Acts.* New York, NY: Academic Press; 1975. p. 41-58.
11. Tomasello M, Farrar MJ. Joint attention and early language. *Child Dev.* 1986; 57:1454–1463. [PubMed: 3802971]
12. Akhtar N, Dunham F, Dunham PJ. Directive interactions and early vocabulary development: the role of joint attentional focus. *J Child Lang.* 1991; 18:41–49. [PubMed: 2010504]
13. Baumwell L, Tamis-LeMonda CS, Bornstein MH. Maternal verbal sensitivity and child language comprehension. *Infant Behav Dev.* 1997; 20:247–258.
14. Barnes S, Gutfreund M, Satterly D, et al. Characteristics of adult speech which predict children's language development. *J Child Lang.* 1983; 10:65–84. [PubMed: 6841502]
15. Murray AD, Hornbaker AV. Maternal directive and facilitative interaction styles: associations with language and cognitive development of low risk and high risk toddlers. *Dev Psychopathol.* 1997; 9:507–516. [PubMed: 9327236]
16. Bloom K. Quality of adult vocalizations affects the quality of infant vocalizations. *J Child Lang.* 1988; 15:469–480. [PubMed: 3198716]
17. Bloom K, Russell A, Wassenberg K. Turn taking affects the quality of infant vocalizations. *J Child Lang.* 1987; 14:211–227. [PubMed: 3611239]
18. Ramey CT, Ourth LL. Delayed reinforcement and vocalization rates of infants. *Child Dev.* 1971; 42:291–297. [PubMed: 5549512]
19. Bloom K. Patterning of infant vocal behavior. *J Exp Child Psychol.* 1977; 23:367–377.
20. Roberts MY, Kaiser AP. The effectiveness of parent-implemented language interventions: a meta-analysis. *Am J Speech Lang Pathol.* 2011; 20:180–199. [PubMed: 21478280]
21. Aldred C, Green J, Adams C. A new social communication intervention for children with autism: pilot randomised controlled treatment study suggesting effectiveness. *J Child Psychol Psychiatry.* 2004; 45:1420–1430. [PubMed: 15482502]
22. Kasari C, Gulsrud AC, Wong C, et al. Randomized controlled caregiver mediated joint engagement intervention for toddlers with autism. *J Autism Dev Disord.* 2010; 40:1045–1056. [PubMed: 20145986]
23. Pickles A, Le Couteur A, Leadbitter K, et al. Parent-mediated social communication therapy for young children with autism (PACT): long-term follow-up of a randomised controlled trial. *Lancet.* 2016; 388:2501–2509. [PubMed: 27793431]
24. Carter AS, Messinger DS, Stone WL, et al. A randomized controlled trial of Hanen's "More than Words" in toddlers with early autism symptoms. *J Child Psychol Psych.* 2011; 52:741–752.
25. Oosterling I, Visser J, Swinkels S, et al. Randomized controlled trial of the focus parent training for toddlers with autism: 1-year outcome. *J Autism Dev Disord.* 2010; 40:1447–1458. [PubMed: 20440639]
26. Coolican J, Smith IM, Bryson SE. Brief parent training in pivotal response treatment for preschoolers with autism. *J Child Psychol Psychiatry.* 2010; 51:1321–1330. [PubMed: 21073457]
27. Parr JR, Gray L, Wigham S, et al. Measuring the relationship between the parental broader autism phenotype, parent-child interaction, and children's progress following parent mediated intervention. *Res Autism Spectr Disord.* 2015; 20:24–30.
28. Siller M, Hutman T, Sigman M. A parent-mediated intervention to increase responsive parental behaviors and child communication in children with ASD: a randomized clinical trial. *J Autism Dev Disord.* 2013; 43:540–555. [PubMed: 22825926]
29. Green J, Charman T, McConachie H, et al. Parent-mediated communication-focused treatment in children with autism (PACT): a randomised controlled trial. *Lancet.* 2010; 375:2152–2160. [PubMed: 20494434]

30. Bayley, N. Bayley Scales of Infant Development III. San Antonio, TX: Psychological Corporation; 2005.
31. Lord, C., Rutter, M., DiLavore, PC., et al. Autism Diagnostic Observation Schedule. Los Angeles, CA: Western Psychological Services; 2001.
32. Zimmerman, IL., Steiner, VG., Pond, RE. Preschool Language Scale. 4. San Antonio, TX: Psychological Corporation; 2002.
33. Kaiser, AP. Parent-implemented language intervention: an environmental system perspective. In: Kaiser, A., Gray, D., editors. Enhancing Children's Communication: Research Foundations for Intervention. Baltimore, MD: P.H. Brookes; 1993. p. 63-84.
34. McDuffie A, Yoder P. Types of parent verbal responsiveness that predict language in young children with autism spectrum disorder. *J Speech Lang Hear Res.* 2010; 53:1026–1039. [PubMed: 20605942]
35. Talbott MR, Nelson CA, Tager-Flusberg H. Maternal gesture use and language development in infant siblings of children with autism spectrum disorder. *J Autism Dev Disord.* 2015; 45:4–14. [PubMed: 23585026]

Table 1

Mother-Child Dyad Characteristics

Characteristic	Group			
	ASD (n = 10)		LD (n = 10)	
	Mean	SD	Mean	SD
Child chronological age	2.67	0.52	2.70	0.31
Child measures				
Cognitive Scale Composite Score, BSID-3 ^a	87.5	6.77	90.0	4.08
Receptive Communication Scaled Score, BSID-3	5.70	1.83	5.90	1.66
Expressive Communication Scaled Score, BSID-3	5.10	1.66	5.50	0.71
Household income	76,800	29,873	76,419	44,394
Mother's education ^b				
High school or GED	10		10	
Some college or 2-yr degree	30		10	
Undergraduate degree	50		70	
Some graduate school or graduate degree	10		10	

^aBSID-3, Bayley Scales of Infant and Toddler Development, Third Edition (composite score with a mean of 100 and an SD of 15; scaled score with a mean of 10 and an SD of 3).

^bData are expressed as %.

ASD, autism spectrum disorder; LD, language delay.

Table 2

Descriptive Statistics of Performance on Measures

Measure	Group				d
	ASD (n = 10)		LD (n = 10)		
	Mean	SD	Mean	SD	
Maternal measures					
Pragmatic language, PRS ^a	4.80	4.13	1.60	1.51	1.06*
Strategy use: responsiveness	96	3	88	9	1.06*
Strategy use: expansions	3	4	3	4	0.04
Child measures					
Expressive Communication, PLS-4 ^b	76.60	10.79	78.50	5.84	0.22
Auditory Comprehension, PLS-4 ^c	70.30	13.78	70.30	12.42	0.00

* $p < .05$.

^aTotal score on the PRS, Pragmatic Rating Scale.

^bExpressive Communication Standard Score on the PLS-4, Preschool Language Scale, Fourth Edition.

^cAuditory Comprehension Standard Score on the PLS-4, Preschool Language Scale, Fourth Edition.
ASD, autism spectrum disorder; LD, language delay.

Table 3

Correlations of PRS Total Score with PLS Scores and Maternal Strategy Use

	ASD	LD
	PRS Total Score	PRS Total Score
PLS-4 Expressive Communication Standard Score	-.68*	-.01
PLS-4 Auditory Comprehension Standard Score	-.12	-.71*
Strategy use: responsiveness	.17	-.40
Strategy use: expansions	-.68*	-.27

* $p < .05$.

ASD, autism spectrum disorder; LD, language delay; PLS, Preschool Language Scales; PRS, Pragmatic Rating Scale.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript