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Effects of Parent-Child Interactions on Language Development in Children with Autism

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Introduction

Language development and communication skills are major areas of concern in children with a diagnosis of autism spectrum disorder (ASD) (Sigman & Siller, 2002). Typically, deficits in early social-communication abilities, language development, and play skills are the main criteria for an ASD diagnosis; however, several factors that play a role in the severity of the disorder. There are many aspects that influence the characteristics of ASD in regard to how they manifest during development. Although much research has shown a significant biological factor involved in ASD, recent studies have revealed that environmental factors also have a substantial effect on the development of language in children with ASD (Deleau, Grandgeorge, Hausberger,Lazartigues, Lemonnier, & Tordjman, 2009). Specifically, studies have shown that parent-child interactions and increases in parental verbal responsiveness, maternal sensitivity, and parental verbal input have a significant impact on the improvement of language in children with ASD (Goodlin-Jones, Ono, Solomon, & Timmer, 2008; Baker, Grantz, Lyons, Messinger, & 2010; McDuffie & Yoder, 2010;Haebig, McDufie, & Weismer, 2013). It is pertinent for speech language pathologists (SLPs) to understand the research supporting the vital role that parents and caregivers play in the development of children with ASD. Additionally, it is imperative that SLPs understand intervention techniques that encourage parents and caregivers to implement them within the home environment in increasing interactions between the parent and the child.

Developmental Milestones of Typically Developing Language

To better understand the characteristics of a language delay in children with ASD, it is helpful to know and understand the language milestones of a typically developing child. Many theorists have differing views regarding the overall development of language; however, the time at which language develops among the typically developing population is consistent across the

human race and milestones are expected to be met by certain ages and age ranges (Cusson, 2002). Research explains that the first 18 months of life are crucial for the spoken language to emerge and the stage of infancy is often referred to as the pre-linguistic period (Cusson, 2002). Typically, milestones are met in an orderly fashion in that the milestones continue to build on preceding foundational skills, particularly in regard to language development.

During infancy, there are many factors involved with typical language development and research indicates that there are certain physiological processes that must be intact for language development to occur (Cusson, 2002). For example, a typically functioning respiratory system is crucial for language development in that it facilitates phonation and is vital for speech production (Cusson, 2002). The speech control centers in the cerebral cortex, which are responsible for language and speech tasks, play an equally important role in the development of language during infancy and throughout all stages of life. However, for children with ASD, research suggests that they lack certain neurological processes necessary to develop and learn language properly. Chomsky, a language development theorist, believed that language development is only achieved by an innate ability and proposed that language is a biological process that he called a *language acquisition device (*Cusson, 2002). Although the role of the neurological processes plays in the development of language is a vital one, it is one of many factors that facilitate in the development of language. Vygotsky for example, developed a sociocultural theory that emphasizes the fundamental role of social interaction in the development of language and cognition (Kaderavek, 2011). Vygotsky believed strongly that interaction with adults and/or other children play a central role in the process of early development including language and cognition (Kaderavek, 2011).

After the first year, appearance of the first word begins to surface. Without the typically functioning physiological processes previously discussed, it's evident that words would become difficult to produce. By 18 months of age, word usage and comprehension develops rapidly, with the ability to respond to simple questions, identification of body parts, and a vocabulary of 3 to 50 words (Cusson, 2002). A language explosion occurs between 18 months and 2 years where a child's vocabulary has expanded to 250-300 words (Cusson, 2002). By this age, a child can put together simple 2 to 3 word phrases and is participating in more communication. Although over half of their language produced is understood, a child's comprehension continues to exceed their expressive language ability (Cusson, 2002). By the time a child is 3 years of age, 75% of their expressive language is intelligible. A 3-year-old child is now using 3 to 4 word sentences with a vocabulary of around 1,000 words (Cusson, 2002). Beyond age 4 – 5 years, all of a child's speech should be intelligible using a vocabulary of several thousand words. Their ability to create and use a complete sentence structure is intact by this age as well (Cusson, 2002).

Terminology

In order to gain a better understanding of the specific components of the parent-child interaction within the home environment that are effective in improving language development, it is important to know the definitions of those components and how these components are identified within the home. Many researchers believe that parent-child interactions play a vital role in the development of language in children with ASD. Goodlin-Jones et al. (2008) did not operationally define parent-child interactions; rather, the authors generally described parent-child interactions as having an overall positive affect among the parent and child dyad. The authors refer to this positive affect among the dyad as shared positive affect (SPA). Moments of SPA can

be described as both the child and parent engaged in happiness, laughter, smiling, or affectionate touch (Goodlin-Jones et al., 2008). Furthermore, the authors emphasized the importance of having synchronization within the parent/child dyad to attain a successful interaction (Goodlin-Jones et al., 2008).

Additionally, the authors of a study recently conducted sought out to identify predictors of parent-child interaction style involving children with ASD (Aldred et al., 2013). The authors of this study formulated a description of the interaction between the child and their parentwith the expectation to observe explicit characteristics within the interaction. Similar to Goodlin-Jones et al. (2008), Aldred et al. 2013 did not operationally define the dyadic interaction; rather, provided characteristics of the interaction that have been associated to gains in development. The authors label key aspects of dyadic interaction style which are as follows: parent synchrony, child initiation, and shared attention. According to Aldred et al. (2013), synchronous acts attempted by the parent are defined as communication acts which seek to support the child's current focus of attention and comment on the child's play or activity. Conversely, asynchronous acts place a demand on the child and seek to direct/redirect the child's attention (Aldred et al., 2013). The authors describe child initiations as spontaneous communication acts directed toward the parent. Additionally, shared attention is coded when the parent and the child are both attending to the same focus, activity, or conversational topic in a sustained way (i.e., different from brief instances of joint attention) (Aldred et al., 2013).

In addition, many researchers have found that parental verbal responsiveness is an important component of a parent-child interaction. Haebig et al. (2012) defined parent responsiveness as an broad set of behaviors in which parents provide prompt, affectively positive, and contingent responses to their child's acts of communication and play (Haebig,

McDuffie, & Weismer, 2012). In their later research, Haebig et al. (2013) provided two types of parental verbal responsiveness which are responsiveness to the child's focus of attention and responsiveness to child communication acts (Haebig et al., 2013).

The authors stated, in regards to responsiveness to the child's focus of attention, that verbal input from parents is thought to facilitate the earlier stages of language by providing labels that follow directly onto the object or activity to which the child is attending (Haebig et al., 2013). This type of input in verbal responsiveness is known by the authors as *follow-in commenting,* or more specifically, to follow the child's lead by corresponding to the child's current focus of attention (Haebig et al., 2013). In addition to follow-in comments, the authors name *follow-in directives* as a type of verbal input that corresponds to the child's focus of attention. Follow-in directives can be divided into two categories: follow-in directives for language (e.g., "What color is that?") and follow-in directives for behavior (e.g., "Push the car down," when the child holds a car). Unlike follow in comments, follow in directives convey an expectation that the child respond either behaviorally or communicatively to the parent's command (Haebig et al., 2013).

The authors described responsiveness to child communication acts as contingent parent verbal responses that include linguistic mapping, repetitions, and expansions (Haebig et al., 2013). The authors explained that linguistic mapping occurs when a parent attempts to linguistically encode their child's immediately preceding act of nonverbal intentional communication (Haebig et al., 2013). Linguistic mapping and follow-in commenting are similar in that both types of parent verbal input correspond to the child's current focus of attention. However, they differ by whether or not a child's communication act precedes the parent response (Haebig et al., 2013). For example, if a child is engaged in the interaction and the parent

describes the child's focus of attention, the parent is demonstrating follow-in commenting. Conversely, if a child directs a nonverbal communicative act toward the parent and the parent responds contingently to this act, it is considered to be linguistic mapping (Haebig et al., 2013). Similarly, repetitions and expansions are parent responses that are provided contingent upon a child's verbal communication act (Haebig et al., 2013); however, expansions occur when the parent includes part or all of the child's verbal communication and expand on the utterance by producing an additional word or two. Repetitions can be described as simply repeating the child's utterance in the absence of additional words (Haebig et al., 2013).

Regardless of the distinction between the researchers' views of the parent-child interaction and the terminology required to provide a description of their views, they all agree that an interaction between a parent and a child involves richness in language. As such, the majority of this literature review will focus on the use of language within the parent-child interaction and how the communication occurring between a parent and their child can ultimately increase a child's language abilities.

Parent-Child Interactions

Despite the discrepancies in terminology and descriptions of an interaction between a parent and a child, parent-child interactions consist of many components that facilitate overall development of children with and without ASD. As previously noted, a parent-child interaction, while maintaining a positive affect among the parent/child dyad, involves many communication acts and responses made by the parent as well as the child with ASD (Goodlin-Jones et al., 2008). However, Aldred et al. (2013) suggests that there is a range of parent-child interaction styles that influence gains in language development for different parent-child dyads, rather than

the various communicative acts being the influence on language gains exclusively (Aldred et al., 2013).

Earlier evidence suggests that a more synchronous parental interaction with their child who has an ASD diagnosis supports growth in their communication skills and language development (Aldred et al., 2013). Given the information gathered from earlier studies, the author states that further research should be done to identify how and why particular dyads take on certain patterns of interaction styles (Aldred et al., 2013). Furthermore, the authors sought to examine the variability in features of a parent-child dyadic interaction style using a large sample of parent-child pairs consisting of parents and their child with a diagnosis of ASD (Aldred et al., 2013). Within this large sample, the authors stated that they expected to observe individual differences in the scores of parental synchrony, child initiation, and shared attention in which higher levels represent a more optimal interaction style (Aldred et al., 2013). The authors utilized the Dyadic Communication Measure for Autism (DCMA) as a coding scheme and a valuable measure of proximal treatment outcome.

Participants included 151 parent-child dyads. Although most of the participating parents were mothers or female caregivers, 18 of the participating parents were fathers or male caregivers. The participating parents aged from 20 to 73 years with their children aging between 24 and 59 months at the time of assessment (Aldred et al., 2013). Ethnicity, socio-economic status, educational background, and current employment status varied across parent-child dyads (Aldred et al., 2013).

A baseline sample parent-child free-play interaction session was collected prior to initiating the study. Parents were asked to interact with their child as they would do normally at home (Aldred et al., 2013). Parents were provided with a standard set of toys in a suitcase. As the

parent and child interacted throughout the sessions, a researcher remained in the room to film the interaction for around 15-20 minutes (Aldred et al., 2013). Following the interaction, the DCMA evaluates the parent, child, and dyadic contributions during free-play interaction (Aldred et al., 2013). The coding scheme rates the frequency of parent communication acts which are synchronous and/or asynchronous, the frequency of child communicative initiations and responses, and the duration of shared attention across the interaction sample (Aldred et al., 2013).

The authors concluded that a dyadic interaction style characterized by more supportive parental communication behaviors, greater balance of active contributions from the child, and sustained periods of shared attention appear more likely to arise in dyads where children with ASD have better-developed language abilities and fewer restricted and repetitive behavior symptoms (Aldred et al., 2013). Furthermore, the authors, as well as additional research that support their conclusions, suggest that less verbal children benefit most from a sensitive parental style, while more verbal children may require greater novel language input from parents (Aldred et al., 2013). These conclusions lead to more questions regarding how these results compare to the typically developing population. Also, the authors concluded that a longitudinal study that allowed for observation during the infant and toddler years would allow for refinement of approaches to early intervention techniques that focus on the parent-child dyad. Although a parent-child interaction style has been identified as "beneficial" to a certain child's language development, the question still remains; does the identified parent-child interaction style increase language development?

Parental Verbal Responsiveness

Haebig et al. (2013) conducted research aimed at understanding the relationship between parent language input that follows into the child's focus of attention and the significant gains in receptive and expressive language three years subsequent to the study (Haebig et al., 2013). The authors also aimed to investigate parent language input that responds contingently to child communication acts as it pertains to predicting gains in receptive and expressive language three years following the study (Haebig et al., 2013). Upon initiating the study, the authors included thirty-four parent-child dyads to participate in the study as part of a larger longitudinal investigation. All the children received an ASD diagnosis at the first visit from an experienced psychologist (Haebig et al., 2013). The study was conducted involving a 15-minute parent-child play session that was completed at the first visit. The parents were instructed to play with their child as they would normally with two developmentally appropriate toys (Mr. Potato Head and a Fisher-Price farm set) that were provided for the play session (Haebig et al., 2013). The first 10 minutes of each play session was coded using a frequency based coding procedure with *Procoder DV.* The child and parent variables that were coded included child engagement, parent responses to the child's focus of attention, child communication acts, and parent responses to child communication acts (Haebig et al., 2013). Each session was videotaped and coded for each 1-s interval of a play sample. Data was recorded by coding the interval as *engaged* (e.g., actively manipulating, visually attending to or communication about an object in a play context), *not engaged* (e.g., walking around the room without manipulating, visually attending to or communication about an object, crying, engaging in self-stimulatory behavior such as peering at spinning wheels on a toy car), or *uncodable* (e.g., child is off screen). Each variable that was

coded as such, including its definition and measurable behavior, is listed in the table provided in Appendix I.

The results of this study revealed a positive and significant correlation between parent follow-in directives for language and language gains; however, other talking and redirects were negatively related to gains in language comprehension. Additionally, follow-in comments and responses to child communication acts (expansions, repetitions, and linguistic mappings) were not significantly correlated to language gains. Despite the negative correlations found, the authors revealed that only certain types of responsive verbal language input that are provided by the parents can influence increases in children's language development (Haebig et al., 2013). Not only is the investigation targeting the effects of parental verbal responsiveness on language development in children with autism, but additionally the effects of a specific type of parent verbal input that influences gains in language development. The findings of this article revealed a positive correlation between gains in language development and parental responsiveness to a child's focus of attention (i.e., follow-in comments and follow-in directives).

Types of Parental Verbal Responsiveness

As previously discussed, parent verbal responsiveness is comprised of two types of responses: responsiveness to a child's focus of attention and responsiveness to communication acts. Furthermore, the two types of parent verbal responsiveness that have been discussed include specific components to a parent response that distinguish the types of verbal input. McDuffie et al. (2010) examined each type of parent verbal responsiveness to determine which type accounts for unique variance in predicting later lexical status. Additionally, the authors

examine any significant bivariate associations between the five types of parent verbal responsiveness and how the associations influence later lexical status (McDuffie & Yoder, 2010)

The authors examined thirty-two children (27 boys and 5 girls) with a diagnosis of ASD. This study is part of a larger study and participants had received intervention sessions three times weekly for six months, and measurement procedures were completed at pre-treatment, post-treatment, and six–month follow-up. In this study, the parent responsiveness variables were coded and data was derived from measurement sessions at the post-treatment time point (McDuffie & Yoder, 2010). Each parent-child interaction was video-taped and coded for the five variables representing parent verbal responsiveness.

The authors concluded that there is a positive association with increases in spoken vocabulary for parent utterances that followed in the child's focus of attention during play (McDuffie & Yoder, 2010). However, the authors stated that the effectiveness of either type of parent verbal responsiveness for enhancing spoken language development for children with ASD will depend on opportunities for the parent to provide these types of input (McDuffie & Yoder, 2010). Although a positive association with gains in language development and responsiveness to child's focus of attention (i.e., follow-in comments and follow-in directives) was found, the authors explained that the opportunities for parents to provide follow-in comments or follow-in directives depend on the frequency or length of time during which the child explores, manipulates, or engages in actions with a variety of objects (McDuffie & Yoder, 2010). Clinical implications can be drawn from these findings and easily be put into practice. By maintaining engagement between a child and parent, parent interaction and communication that follows into the child's focus of attention can enhance the process of pairing labels with objects, actions, and

events which will in turn facilitate increases in spoken language development in children with ASD.

Shared Positive Affect

Researchers have identified many components of a parent-child interaction that could potentially be related to increases in the overall development of a child with ASD. Shared Positive Affect (SPA) is one component that Goodlin-Jones et al. (2008) defined as moments of happiness, laughter, smiling, or affectionate touch within the interaction between the parent and their child (Goodlin-Jones et al., 2008). Regarding the study of SPA, Goodlin-Jones et al. (2008) reported from a previous study that higher levels of parent and child synchronization led to superior joint attention and language development up to 16 years later in children with ASD (Goodlin-Jones et al., 2008). The authors of this study claim that SPA would increase over the course of therapy and hypothesized that there would be a positive relationship between SPA and improvements in child and parent functioning (Goodlin-Jones et al., 2008).

Parent-child shared affect was assessed using a 5-min segment of free play where the parent and child were seated at a table and were asked to select from three choices of toys (Goodlin-Jones et al., 2008). Parents and children were coded individually for positive, neutral, and negative affect and aloofness. Facial expressions, tone of voice, and body language formed the basis of judgment for the coders (Goodlin-Jones et al., 2008).

The authors reported statistically significant increases in SPA scores between baseline and midpoint and between baseline and post-therapy (Goodlin-Jones et al., 2008). However, the authors warned that the precise nature of the relationship remains unclear, and merits further investigations. Although significant increases resulted from the study, the evidence of this

investigation appears to indicate that the cause of the increases in SPA scores and the relationship between the effectiveness of SPA and the function of the parent child interaction remains unclear (Goodlin-Jones et al., 2008). Consequently, the question still remains, is there a statistical significance between the positive interaction of a parent and child and increases in the child's language development? Despite the fact that results showed increases in the parent and child positive affect, there was no relationship found of the positive affect and increased language development.

Intervention Techniques

Typically a parent-child interaction is not seen as an intervention technique from the parental perspective because parents interact with their children daily. However, the components of a parent-child interaction become the intervention techniques that make the interaction effective. The effectiveness of a therapeutic parent-child interaction, some might argue, depends on the effectiveness of the intervention technique.

Generalized Teaching Strategy

Many interventions for children with disabilities have aimed at enhancing parent-child interactions as a viable and naturalistic means of addressing child outcomes (Goldstein, Kashinath, & Woods, 2006). Researchers of a recent study regarding parent implemented interventions have aimed to focus on parent-child interactions as the primary mode of intervention for children with ASD (Goldstein et al., 2006). The authors explain that although several studies have investigated the effectiveness of parent-implemented interventions, there is a common feature across studies that all parents were taught various non-individualized intervention strategies which lead to unclear associations (Goldstein et al., 2006). Furthermore,

interventions across several studies that have been previously discussed were conducted in artificially created one-to-one situations, such as structured play routines, often in a center-based program (Goldstein et al., 2006). Some might argue that studies aiming to investigate the effectiveness of an intervention technique, the participants are to trial the intervention within their home environment. Researchers, such as Goldstein et al. (2006) believe that implementation of their intervention technique within a family's daily routine will facilitate generalization of the technique to multiple settings, such as, the classroom, therapy setting, and of course the home environment. In the comfort of their own home in their most naturalistic state, parents are most likely to interact with their children. As such, the authors aimed to conduct their study within their participants' homes to facilitate more accurate results and to ultimately aim for generalization of their intervention.

Generalization of skills is just as important as the actual intervention. Some researchers will argue that generalization strategies promoting the generalization of a certain skill ensure the accuracy and effectiveness of an intervention technique (Goldstein et al., 2006). One generalization strategy discussed by Goldstein et al. (2006) is general case programming which incorporates aspects of training sufficient exemplars (i.e., extending the intervention to multiple situations) as well as programming common stimuli (i.e., resembling the generalization context by incorporating physical aspects of an environment) (Goldstein et al., 2006). General case programming addresses strategies to build generalized responding across contexts by using specific procedures to select and sequence teaching examples (Goldstein et al., 2006).

Past research regarding a general case programming approach has been used effectively to teach academic skills and functional skills to individuals with severe disabilities. Only recently have studies focused on the application of the general case programming approach to teach

communication and social skills to children with severe disabilities (Goldstein et al., 2006). Five critical steps were discussed by Goldstein et al. (2006) which are defined prior to initiation of the study and involve the implementation of a general case teaching approach. The first step was the importance of defining the instructional universe (Goldstein et al., 2006). In other words, defining or identifying all possible contexts within which the learner will be able to perform the skill being taught (Goldstein et al., 2006). For example, if requesting is the skill being taught, it's vital to identify all contexts in which the learner will potentially use this skill (i.e., requesting for food at home, requests for objects within the classroom) Secondly, select teaching and test situations. Teaching contexts should sample the range of possible situations and include significant exceptions (Goldstein et al., 2006). The third step of the five critical steps states that it is especially important when teaching individuals to use multiple skills at once. The fourth step is to simply teach the skill. Once the teaching contexts have been identified, a variety of teaching strategies that are related to quality instruction such as prompting, fading, shaping, and reinforcing can be used to teach the individual the target skills (Goldstein et al., 2006). The last and final step to implementing a general case teaching approach is to test. The individuals' abilities are constantly monitored in novel contexts to ensure generalization (Goldstein et al., 2006). The most significant information gathered from this generalization strategy is the fact that instructional opportunities are embedded in functional contexts such as the school or home and the authors base their investigation on this fact and some would argue that this is the functionalism and generalization are the key to an effective intervention strategy.

Given the information gathered regarding generalization strategies, the researchers desired to adapt the key components of a general case programming approach with embedded intervention in daily routines by (a) selecting teaching routines for each parent-child dyad that

are representative if their individual situation, and (b) embedding intervention in multiple routines to facilitate parents' use of teaching strategies across different routines (Goldstein et al., 2006). Therefore, the authors formulated hypotheses to examine the effects of embedding intervention within daily routines on use of teaching strategies by parents of children with autism and to examine the effects of strategy use on child communication outcomes (Goldstein et al., 2006). The first hypothesis declared that incorporating the two generalization programming components would promote generalized parent strategy use. Secondly, the authors hypothesize that proactively programming for generalization by the selection of routines for intervention and providing intervention in multiple contexts would facilitate the generalization of the use of these teaching strategies across various routines (Goldstein et al., 2006).

Five children with a diagnosis of ASD participated in this study along with their mothers. The children ranged in age from 33 to 65 months at the start of the study. Each of the family's home was the intervention setting for each parent-child dyad. The interventionist (the certified speech-language pathologist) met with each family for approximately 60-90 minutes twice a week to conduct the study (Goldstein et al., 2006). Baseline data was collected along with routines that each parent selected from six routine classes, which are as follows: play routines, outdoor or recreation, care giving routines, household chores, community activities, and other disability-related routines (i.e., breathing treatments). Parents selected two routines based on the routines that would be the most successful for intervention and that was of interest to the child (Goldstein et al., 2006). The rest of the routines from the target routine classes served as generalization contexts.

Following baseline interventions, the authors introduced the parent-focused intervention by teaching each parent two teaching strategies that were previously identified for each parent-

child dyad (Goldstein et al., 2006). The strategies were identified based on (a) strategies that were absent from the parent's repertoire in baseline observations and (b) empirically based strategies that appeared appropriate to influence their child's communication goals and could be implemented multiple times within target routines (Goldstein et al., 2006). The teaching strategies that were coded at baseline and that were selected for each parent-child dyad are as follows: arranging the environment, using natural reinforcement, time delay, imitating contingently to a child's actions, modeling, and gestural/visual cueing (Goldstein et al., 2006). The individual teach strategy was then introduced to the parent via explanation, example, and implementation. The parent was then expected to use the teaching strategy in the target routines as well as the generalization contexts.

Each child was identified as displaying low frequency of use of their target communication outcome in intervention and generalization contexts (Goldstein et al., 2006). The results of this study indicated increases in child communication outcomes across all 5 children despite differences in linguistic complexity of individual child outcomes (Goldstein et al., 2006). For example, one participant's communication outcome was to increase vocalizations while others communication outcomes were to increase use of words and multiword utterances (Goldstein et al., 2006). Overall, this study demonstrated that the intervention successfully enhanced generalized parent strategy use across daily routines and had positive effects on communication outcomes.

The evidence of this study suggests parent-implemented teaching strategies are effective in increasing communicative development in children with ASD. This particular study considered basic behavioral intervention principles, such as, time delay, imitation, modeling, natural reinforcement strategies, and cueing and brought these intervention techniques into the

child's home. Not only did these intervention techniques increase the communication skills of these children, generalization of these skills was successful across contexts. Some might argue that the effectiveness of this generalized teaching strategy is limited to only five subjects; however, unlike many studies regarding parent-child interactions, this study emphasized each parent-child dyad as individuals and instead of teaching the parents one intervention strategy, the authors taught individualized teaching strategies that were specific to each daily routine (Goldstein et al., 2006).

Effects of Biological Characteristics on Language Development

Although Haebig et al. (2013) supported the claim that certain parent verbal responsiveness increases language in children with ASD and Goldstein et al (2006) pointed out intervention strategies implemented in a naturalistic setting also increases language in children with ASD, Deleau et al. (2009) suggested that parental characteristics have a strong influence on language outcomes and it is not only genetic, but the socioeconomic status, gender, and education level of parents with children with autism can greatly affect language development in these children (Deleau et al., 2009). Their study was conducted to investigate whether parent characteristics (i.e., level of education and gender) influence their child's language development. The authors hypothesized that biological characteristics of parents influenced language development in children with ASD (Deleau et al., 2009)

The authors included 162 children (135 males and 27 females) who met the diagnostic criteria for ASD based on the Diagnostic and Statistical Manual of Mental Disorders 4th edition and International Classification of Diseases. The mean age of the children was 33 months old and came from intact families with a father and a mother present. The level of education of each

parent was scored independently. Three categories were considered: low level of education (a professional schooling or no education), mid level of education (high school and first year of college), and high level of education (completed college and graduate school) (Deleau et al., 2009). The language criteria was measured using a survey method by asking the mother and father of each child, the age of the first single words, age of first phrases, overall level of language, and abnormality of development evident at or before 36 months.

The results of the study indicated that a clear influence of the educational levels of parents appeared on language development (Deleau et al., 2009). Specifically, the authors found that the language of children raised by high level of education parents developed earlier. First single words and first phrases were uttered earlier by children with high level of education mothers. This evidence suggests that although parental intervention is pertinent for language in children with ASD, in the absence of intervention, the parents' education level and gender play a significant role in the development of language in children with ASD. However, they each play their own part in influencing language development.

Future Directions

While the efficacy of increased parent-child interaction and the relationship between the interaction and language development is well documented (Goldstein et al., 2006; McDuffie & Yoder, 2010;Solomon et al., 2008;Goodlin-Jones et al., 2008; Baker et al., 2010;Haebig et al., 2013; Sigman & Siller, 2002; Sigman & Siller, 2008) there is much research yet to be done. Although a few researchers discussed in this literature review have concluded a positive correlation between parent-child interactions and increased language development, there are many conceptual elements to this investigation that are missing or could be enhanced.

Many researchers in the studies discussed, used participants who were children under the age of 5 (Goldstein et al., 2006; Solomon et al., 2008). Future investigation should consider the efficacy of parent-child interactions with children of differing ages, specifically children who have already began elementary school and older. Although older children with ASD may have developed a complex language repertoire, it would be beneficial to investigate the effects of parent-child interactions on current language goals.

Additionally, much of the research gathered for this literature review rarely addressed the severity levels regarding the communicative deficits in these children with ASD. Further investigations need to be warranted regarding the efficacy of parent-child interactions on children with ASD who are nonverbal versus children with autism who have a greater mean length of utterance (MLU). Although Aldred et al. (2013) pointed out that certain parenting styles are more effective for children with ASD who are less verbal and other parenting styles are effective for children who are more verbal, researchers of this study were unable to identify if the parenting styles were a direct correlation to increases in the child's language development (Aldred et al., 2013)

Several researchers have conducted their studies in a therapy setting as well as in more naturalistic settings, such as the participant's home. However, further investigations should consider how their findings differ across contexts and how their findings compare. While researchers have considered the generalization issue, many questions are still to be answered regarding the gap between language gains made in a therapy setting versus language gains made in a naturalistic setting. Which setting stimulates more gains in language development?

Researchers have identified that parental biological characteristics play a significant role in the overall development of their child with ASD (Deleau et al., 2009). Further investigations

should be conducted considering these biological characteristics additional to implementation of intervention techniques used within the parent-child dyad. How do parenting styles and the efficacy of the intervention differ in parent-child dyads with higher levels of education and in parent-child dyads with lower levels of education?

Lastly, there are limitations in current research regarding the comparison of parent-child interactions with children with ASD versus typically developing children. It would be beneficial to gather information on typically developing parent-child dyads and how the interaction enhances the typically developing child's language. This would helpSLP's in gaining insight into how to better serve their clients with autism as well as how to better serve their families.

Summary

In spite of the differences in parent-child interaction therapy techniques and the definitions of such, many conclusions may be drawn from the research that has been reviewed. Most importantly, it can be concluded that certain components of a parent-child interaction, specifically responsiveness to a child's focus of attention, have a significant impact on language development of children with autism (Haebig et al., 2013).

In addition to parental verbal responsiveness, Goldstein et al. (2006) found increases in language development when parent-implemented intervention techniques were incorporated into the parent and child's daily routine within the home environment. Although limitations to this study were minimal subjects, the findings are significant to the field of speech-language pathology and should be considered for current therapeutic techniques.

Although there was refuting evidence found that concluded parental biological characteristics have a significant impact on language development (Deleau et al., 2009), this conclusion should be seen as an additional component that influence gains in language

development among children with ASD. Further investigations are warranted regarding specifically how biological characteristics affect intervention of language development.

This research review described findings related parent-child interactions and the components that influence gains in language development. More specifically, the findings suggest gains in language development are made in children with ASD through parent-implemented intervention specifically within a parent-child interaction. Additionally, children with ASD are able to generalize their novel communicative skills to multiple settings and throughout many daily routines such as, outdoor play routines, washing hands, eating, indoor play routines, dressing, potty routines, etc (Goldstein et al., 2006). However, the findings are limited to specific components and specific routines. This research review confirms the significance of parental interaction in the development of children with ASD which also warrants the importance for further investigation of this topic.

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APPENDICES

APPENDIX I

Code	**Definition**	**Example**
Follow-in comments	Parent describes child's action or focus of attention without directing the child to change his or her behavior	"You have the doggy!" "Run piggy!" (as child moves pig) "Moo moo" (as child plays with the cow)
Parent descriptions of his or her own behavior	Parent describes his/her own action with a toy (provided that the child is attending to the parent's toy)	"I'll put the eyes on." (as parent places eyes on Mr. Potato Head)
Follow-in directives for behavior	Parent directs the child to change his/her behavior	"Put the nose here." "Push the car."
Follow-in directives for language	Parent directs the child to produce a communication act (verbal or nonverbal)	"What's this?" "What does the cow say?"
Redirects	Parent redirects an engaged child	"Look at the dog." or "Here's the dog." (while child is playing with the pig)
Introductions	Parent introduces a toy to an unengaged child	"I have glasses." "See this sheep?"
Other talking Linguistic Mapping	Other talking Parent puts the child's nonverbal communication act into words	"oh" "mhmm" Child: points to the sheep and looks up at the parent Parent: "Sheep"
Repetition	Parent repeats the child's verbal communication act	Child: "Shoe" Parent: "Shoe"
Expansion	Parent repeats part or all of child's verbal communication act and adds additional linguistic information	Child: "Hat" Parent: "Red hat"

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