Autism and Speech: How Autism Spectrum Disorder Affects Speech and Language Development in Young Children

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Abstract

Autism Spectrum Disorder (ASD) is a neurological and developmental disorder that can severely affect a child's social interactions, behaviors, interests, and their communication skills. The focus of this research is to highlight the connections between autism spectrum disorder and speech and language development in the early years of a child's life. How and why is language affected? There is no set standard for a therapy tactic since every child is different and requires a personalized approach, but professionals have identified key strategies to use. A review of relevant literature and reflection on personal speech therapy observations allowed for conclusions to be drawn about what are considered to be the best techniques and approaches when working with a child that is diagnosed with autism spectrum disorder.

Keywords: autism spectrum disorder, speech-language pathology, speech therapy, special education, communication

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Introduction

Autism Spectrum Disorder (ASD) has had a constantly evolving definition, which in turn causes who, how, and when receives a diagnosis to also constantly evolve. The phrase "autism spectrum disorder" is newer within the field. People were previously diagnosed with autism disorder or Asperger's disorder, which was considered "high-functioning" autism. These were later combined to all be diagnosed as autism spectrum disorder, with different individuals falling in different places along the spectrum. The American Psychiatric Association's Diagnostic and Statistical Manual (DSM-5) states that a child can be diagnosed with ASD if they present with persistent deficits in three areas of social communication and interaction and show at least two of the four types of restricted, repetitive behaviors. The severity of the diagnosis can be determined by how deficiant a child is in each area looked at.

One major area that is assessed when looking for autism spectrum disorders are communication skills. Children with ASD generally have poor verbal communication skills. Their receptive language skills are typically close to the mark, but their expressive language skills tend to be lower than their peers. This can range from being completely nonverbal, using assistive technologies, using American Sign Language, or having limited to normal spoken language.

Method

This research assignment will go in-depth in reviewing and analyzing literature that looks at different aspects of autism spectrum disorder. It will answer the questions of what can cause this disorder and how it can be diagnosed. What are the links between autism spectrum disorder

and communication skills? How and why are these communication skills impaired? What are the best practices and interventions to help speech and language development? Personal, professional observations and literature review from database sources, like EBSCOhost, allowed for analysis on each question. All sources used are scholarly, peer reviewed, journals and have been published since 2009. When searching for these articles, keywords used in different combinations were used to focus the content of the articles being displayed. The main search words were "autism," "autism spectrum disorder," "children," "incidence," "speech therapy," "language," and "speech and language therapy." EBSCOhost wielded articles from *American Journal of Speech-Language Pathology, Journal of Autism & Developmental Disorders,* and *Journal of Clinical Child & Adolescent Psychology.*

Literature Review

Etiology. Autism Spectrum Disorder is a neurological developmental disorder. There has more recently been a rise in autism spectrum disorder incidence. Myers et al. (2019) completed a longitudinal study that followed 31,220 individuals from birth until adulthood born in Olmsted County, Minnesota. About 3.4% of the individuals were classified as having ASD by the time that they were 21 years of age. 1.7% met a more narrow criteria for a more severe ASD. Myers et al. attributes this larger incidence of autism spectrum disorder to heightened awareness and knowledge among the public and professionals. Berg (2009) also believes that the increase in support services and funding towards programs has driven individuals to seek out a diagnosis.

Berg (2009) writes about how the nature-nurture debate rears its head when it comes to diagnosing autism. Genetic and biological factors have always been thought to be the cause of the condition. In the mid-1900s, there was a shift to believing that social and environmental factors, like parenting styles and trauma, played a role because a large amount of the symptoms

relate to impaired social and behavioral characteristics. "While the evidence still points to a genetic component, an apparent increase in the incidence of ASDs has prompted some researchers to look again at the possibility of environmental influences on the disease," (Berg, 2009, p. 14). There is not one specific gene or chromosome that has been linked to causing autism, which leads to the argument that there is some level of environmental influence.

With strong evidence pointing to a genetic and biological cause, the general population still tends to believe in inaccurate sources of the onset of autism spectrum disorder. A prominent argument that is still an issue in the current news is that vaccinations can lead to autism. Berg (2009) writes that the presence of mercury found in the preservative used in vaccines is what is claimed to be the cause of autism. "The use of thimerosal in the manufacture of early-childhood vaccines ended in 1999, and according to the National Network for Immunization Information, the last lot of vaccines made with it expired in 2003," (Berg, 2009). There is no concrete evidence that supports the claims of any correlation between vaccinations and autism spectrum disorder. Gulyn & Diaz-Asper (2018) conducted a survey in which they sent out a survey to 2,362 adults from a "medium-sized liberal arts university community in the United States," and asked what factors they believe cause autism. The four main categories that appeared in the survey were parenting, supernatural (fate, "God's Will"), medical-chemical (vaccines, medications), and genetics. While a good majority believed genetics was the cause, there were still individuals who believe it is fate or a side effect from medication that is the reason for autism spectrum disorder. These beliefs can stem from a lack of education or a "fear" of disabilities, causing non factual claims to be spread and consumed by the general public.

Coburn and Williams (2020) investigated the genetic side of what causes autism spectrum disorders. Children with ASD have differences with all aspects of neural trajectory

growth. This includes brain volume, cortical thickness, surface area, and myelination. Their brain volume is increased by about 10% compared to neurotypical brains between the ages of 2 and 4. Around this time is when children tend to receive a diagnosis. Increased or decreased amounts of grey and white matter areas in the brain cause inconsistencies with cortical thickness and surface area in comparison to a typically developing brain. White matter differences are more prevalent and therefore, studied more. Myelination results in the development of white matter, which surrounds neuronal axons and increases the efficiency of neural signal transmission (Coburn & Williams, 2020). This allows for the brain to facilitate more complex behaviors and cognitive developments. Children with ASD develop white matter in the frontal cortex of the brain faster than typically developing brains, but it came later in the temporoparietal junction. Both of these regions are important for language processing and production.

Effects on Speech and Language. Speech and language are both a crucial and integral part of a child's development. Every person has the want and the need to communicate, but not every person has the ability to effectively communicate. Children with Autism Spectrum Disorder learn to communicate using many types of modalities for this reason. The brain of a child with ASD develops differently compared to a child with a neurotypical brain, which causes differences in speech and language development.

Understanding how language works within the brain is important to understanding why children with ASD face challenges. According to Coburn and Williams (2020), the brain organizes itself for language development, usually starting in preschool or early childhood. By the brain organizing itself, it creates functional networks between regions that all contribute to speech and language development. Understanding, processing, and using language all occur in different parts of the brain, including the superior temporal cortex, angular gyrus of the parietal

lobe, and the inferior frontal cortex. These are all typically lateralized in the left hemisphere of the brain. Children with ASD have these cortical regions, but the way that they are functionally connected and what processes are distributed to what region tend to be different. There is also atypical hemispheric lateralization among children with ASD.

Another way that the function of the brain causes language deficits in a child with autism spectrum disorder is through neuronal oscillations. Coburn and Williams (2020) define this as "rhythmic patterns of excitation and inhibition of brain cells." It plays a role in the sense of timing and synchronization of cortical regions in the human brain. This is important for understanding and processing speech input. "Relationships of oscillations in the auditory cortex may be involved in parsing the speech stream," (Giraud & Poeppel, 2012). Children with ASD have altered patterns of excitation and inhibition, so this can skew the neuronal oscillations. For neurotypical children, there is a baseline of these neural oscillations. Once there is excitation, there is an equal inhibition to bring the cells back down to baseline. The baseline for ASD brains is elevated compared to typically developed brains. Regulation is a hard concept for children with autism. Once those cells experience excitation, it is a lot more difficult to bring on inhibition to come back down to baseline, thus making the baseline rate higher overall. This disrupts the sense of timing within the brain and also causes the functional connections to be thrown off.

This all answers the questions of why there is a speech and language delay seen in children with autism spectrum disorder, but what does this mean for a child trying to communicate? Children that are diagnosed with autism spectrum disorder have a higher risk of having an articulation or phonological speech disorders (Cleland et al., 2010). Shriberg et al., (2011) agree that ASD comes with a higher prevalence of speech delays and errors. To go

deeper, studies have found that there are impairments concerning the principles of grammar (reflexives and pronouns), which are unrelated to cognitive deficits (Perovic et al., 2013). These children with autism spectrum disorder range from being completely nonverbal, to only communicating using augmentative and alternative communication (AAC), to using smaller utterances or phrases, to having full use of speech and language processes. Having a large range of how speech and language can be impaired means that there are a variety of ways to approach therapy sessions.

Best Practices. There is not one best approach when it comes to speech therapy for a child with autism spectrum disorder. A plan is created after an intial assessment of the child's prelinguistic level of development. A good starting point for assessment is a connected speech sample of at least 50 speech-like vocalizations and phonetic stimulability (Broome et al., 2017). This can be challenging to do within a clinical setting, however. Children with ASD may struggle to endure a therapy session, and evaluations tend to be longer in order to collect enough data. Speech-language pathologist have to work with what they get to create a comprehensive plan that details goals, timelines, and expectations for the child during therapy.

Child-Directed Interaction Training (CDIT) is an approach that a lot of speech therapists use when working with a child with autism spectrum disorder. CDIT is the idea that a child leads the way during therapy sessions. They would show fewer behavior problems as well as increases in language, social awareness and responsiveness, and create better relationships with the people working with them (Ginn et al., 2017). Autism Spectrum Disorder can cause the child to become very overwhelmed in social situations, especially if it is new and they are being demanded to perform tasks. Letting the child set the pace allows them to ground themselves and actively participate in chosen activities. This weilds better evaluations and outcomes.

Clarke & Williams (2020) looked at speech pathologists that use augmentative and alternative communication (AAC) for children with ASD. AACs can take many different forms. This can include high-tech systems, like and i-Pad, to low-tech systems, like Picture Exchange Communication Systems (PECS) (Sievers et al., 2018). The question of whether this is an efficient method to use for ASD comes into question because AAC devices usually require visual and auditory perception and processing skills. Combining multiple modalities that need to be processed at once can be problematic for children with ASD (Clarke & Williams, 2020). I have seen many PECS put into practice. There are some that are very useful and beneficial for children, mostly with learning routines, and then there are others who will not attempt to use the PECS.

Outside of working directly with the child, the speech pathologist can create relationships with others involved to have additional resources. The transdicipilnary approach (TA) has been awarded the best practice in early intervention and working in special education settings (Weiss et al., 2020). TA calls for a collaborative team to work together when treating aa child. This can consist of the general education teacher, special education teacher, parents, families, and all professionals (SLP, OT, PT) involved with the child. Working collaboratively with an entire team brings differing perspectives when trying to problem-solve and achieve goals. Every person is involved, so this lessens the chance for confusion and conflicting reports about the child's progression.

Implications. Many people are led to believe that people with autism spectrum disorder are lower academically because of their level of speech and language use. This is not the case. Children with ASD have the potential to grow and excel academically along with their

neurotypical peers. With that being said, hard work is put in to keep these children on an academically appropriate level.

Reading comprehension at a higher level is something that many children with ASD struggle with. This can present differently along the spectrum. Davidson (2021) compared two third graders with ASD that had both just been evaluated (see full study). Children struggle with social communication within reading comprehension. Inferencing and theory of mind are both areas that require children to make a social-emotional connection to outside characters and worlds. Lucas and Norbury (2015) studied the inference abilities of children with ASD that also have co-occurring language impairments. Certain types of inferences are impacted more than others. For example, having to infer a character's emotional response to a specific situation would be difficult for a child with ASD.

There are clinical implications of speech and language development among children with ASD. Speech-language pathologists need to create multiple strategies to tackle these emerging issues of language development. Providing intervention can help these children build both their expressive and receptive language skills, which will ultimately increase their social communication level. Targeting joint attention, engaging in symbolic play, and imitation have been proven to increase verbal expressive language skills (Pecukonis et al., 2019).

Observations and Interventions

Working directly with children that have autism spectrum disorder has allowed me to be able to draw my own conclusions and conduct my own personal research. During speech therapy sessions that I have observed over the last couple of years, I have kept detailed notes and accounts of what behaviors and interventions I was able to watch. All of my observations took place at The Child Family Center in Millville, New Jersey. This is a free preschool program that

works very closely with early interventionists. They follow the full inclusion model, which means that there are no special education or self-containment classrooms in the school and all students are educated together. I had the opportunity to observe three different speech-language pathologists that work at the school full-time, all of which had contrasting styles when it came to working with the children.

The first thing that I noticed when comparing my notes from the children that I observed that have an autism spectrum disorder diagnosis is that they were all either nonverbal or had very little language skills. These children were all between the ages of three and four, so this is not all that surprising. All of them are classified as "preschool disabled" in addition to having an ASD diagnosis. I am going to analyze and compare and contrast three different children that I observed. These three children, I feel, represent different stages of working on speech and language skills with a child that has ASD. For privacy purposes, all names have been changed.

Alexander is in the first year program at the preschool. He was three years old at the time of these observations. Alexander is completely nonverbal. He makes no effort to communicate verbally. Alexander was new to the school and new to going to formal speech therapy. His two biggest goals were toleration of therapy and keeping attention on one activity for at least thirty seconds. The first time I watched Alexander, I noticed immediately that he was very sensory-driven. The speech pathologist centered her entire session around this. Alexander was allowed to sit in the large computer chair to spin and jump on a bouncing ball. This centered his need for sensory stimulation, which then made it possible to continue with the session. The speech pathologist would set up one toy or thing for him to play with at a time to try and focus his attention on something. She also used this to work on his play skills. Alexander could not engage or recognize that others were playing with him. The next time that I saw Alexander, the

speech pathologist and the occupational therapist were doing a co-treatment. The OT worked with him on some sensory stimulation activities to ground him before moving forward. When she felt he was ready to participate, they built him an obstacle course that required him to pay attention to verbal cues and directions. Once he made it through the course, he had to pick up a magnetic puzzle piece and place it on the wall before he was allowed to go down the slide. He struggled with this portion of the session. Getting him to listen and follow the directions before he was rewarded was difficult.

Brandon is another three year old boy that is diagnosed with autism spectrum disorder. He had attended extended school year programs at the preschool previously, so this was not his first time going to speech therapy. Brandon seemed to know more of what to expect during the session. This is because the speech pathologist had developed a routine for him. As soon as he walked in the door to her office, he was allowed to jump up and hit a bean bag and then must go find the little blue chair to sit in. I gathered that he was comfortable in therapy and that he can also follow directions. Brandon has very minimal language. He utilized one and two word utterances that were intelligible, and he also attempted longer phrases, but they were unintelligible. His goals for the session were to follow directions, imitate language, and use more spontaneous language throughout activities. The speech pathologist started by making a hand turkey with him, since it was almost Thanksgiving. Brandon was given a choice between two colors for each feather. He had to name and point to the color he wanted each time. The speech pathologist also had fall flashcards that she did with him while he was coloring. She would ask him to put down his crayon, look up at the flashcard, and name the object. If he did not know what it was, she would tell him and he had to repeat it. The last ten minutes of the session was free choice play. He chose to play with race cars, so she asked him questions to

keep him talking while he played. Even if Brandon's speech was unintelligible, he was able to turn-take in a conversational setting and use good play skills.

Carson is the last boy that I am going to talk about. He is four years old and was in his last year at the preschool. He had the most functional language use out of the three. He was able to verbally communicate using sentences. Carson's speech therapy goals included expanding his utterances, using appropriate nouns and pronouns, differentiating between singular and plural objects, and following directions. Carson started his first session with flashcards that had different quantities of fall vocabulary words. Some had one leaf, while others had three pumpkins. He was supposed to identify whether they were singular or plural by adding an "s" at the end of the word. He was able to get some, but needed help with others. Carson then had to put a puzzle together that had a different color circle and object on every piece. For example, when he picked up the piece that had a green circle and a piece of broccoli on it, he said "I see the green broccoli" before he put it with the rest of the pieces. Carson also made a hand turkey. The speech pathologist asked him questions about different fall vocabulary words that were on each feather. She would ask him, "Where can you find leaves?" and he would have to answer before he could color it in.

All three of the children that I observed have an autism spectrum diagnosis and are at the preschool age level. With that being said, each child is at a very different level when it comes to speech and language development. They, most likely, fall along different areas of the spectrum, with Alexander being the most severe, Brandon being in the middle, and Carson being the least severe. Alexander required much more sensory stimulation to get him to even be able to tolerate being in the speech therapy office. The focus of his sessions were not on using verbal communication, but on listening and learning to attend to others. Brandon did not need outside

help for sensory regulation, therefore he was able to sit at the table the entire time for his session. He worked on verbal communication, but not at the same level as Carson was. Carson had much longer utterances, along with intelligible speech. This just proves that autism affects every child in diverse ways and how speech and language will be impacted varies. The speech pathologist had to learn how to tailor each session to not only working with an autism spectrum diagnosis, but how that diagnosis individually impacted the child's use of functional speech and language skills.

Limitations

My research had a few limitations. Not all scholarly articles on the subject of autism spectrum disorder in relation to speech and language were at my disposal. Restricted access to sites and books and journals that do not provide online, PDF versions to students were a couple challenges that I faced. There were several times that I had come across the abstract of an article that looked like it would fit my research, but there was no link to the full text. Time also limited my research. Since this was only a semester-long project, I did not have the time to do endless research and additional observations to further supplement my project. Longitudinal studies would be a great addition to my research.

COVID-19 also played a huge role in my project. I reached out to several schools, clinics, and rehabilitation facilities to see if in-person observation hours were a possibility. Almost every place that answered me said that their policies did not allow for non-staff members to enter the building. This caused me to use previous observations that I have done. I had taken detailed notes about all sessions that I observed, but not necessarily for the scope of this project. It also would have been very interesting to see how COVID-19 has impacted the speech services delivered to children with autism spectrum disorder.

Future Research

There are endless studies that have the potential to be conducted regarding autism spectrum disorder and its relation to speech and language. Going off of this research project, I would like to conduct my own personal longitudinal study following children with ASD. This study could follow children evaluated for an early intervention program and attending the same schools. They receive speech therapy services by the same speech pathologist, and every year their evaluations are examined and compared. How often they receive services, what their goals are for therapy, and what strategies the speech pathologist uses with them would be looked at. This could represent how the therapy journey is different for every child and highlights how contrasting strategies work for children that fall all along the spectrum. I would like to look at the time from early intervention placement until entering middle school. These years are formative to language development and can set the tone for the rest of their lives.

I am interested specifically in how speech therapy for children with autism spectrum disorder can alter their language development. Staying up-to-date on current literature is a simple way to learn more about emerging practices. There may not be time or resources to conduct my own study, but reading other journals and professional studies that pertain to different strategies will allow me to stay knowledgeable and use them when I become a speech therapist.

Conclusions

Autism Spectrum Disorder has evolved over the years to encompass a wide variety of neurodivergent disorders. Social communication deficits are a hallmark for ASD. Though two children are both diagnosed with ASD, the ways in which their speech and language are impaired can be very different. This ranges from being completely non-verbal, to having full use of

speech and language. Because children can fall along a spectrum, there is no one right way to provide therapy to a child with ASD. Every child responds differently to the ways in which they are serviced. Speech-language pathologists need to be well-versed in therapy tactics due to this. More research needs to be completed in this field to better supplement previous findings and arguments. I hope to one day complete a study of my own to look further into how contrasting speech therapy activties and goals can affect a child with autism spectrum disorder.

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