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Efficacious Alternative Augmentative Communication (AAC) and the Development of Language and Speech: A Primary Focus on Children with Autism Spectrum Disorder (ASD)

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EFFICACIOUS ALTERNATIVE AUGMENTATIVE COMMUNICATION (AAC) AND THE DEVELOPMENT OF LANGUAGE AND SPEECH: A PRIMARY FOCUS ON CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD)

by

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EFFICACIOUS ALTERNATIVE AUGMENTATIVE COMMUNICATION (AAC) AND EFFECTS ON THE DEVELOPMENT OF LANGUAGE AND SPEECH: A PRIMARY FOCUS ON CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD)

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Alternative Augmentative Communication (AAC) is a viable form of intervention for children who struggle with verbal communication. According to the American Speech-Language-Hearing Association (2002) AAC involves substituting speech or writing with unaided and/or aided symbols. AAC provides the necessary supports to make functional communication possible for those with limited verbal language ability. Children with autism spectrum disorder (ASD) should benefit greatly from AAC. In this population, approximately 21-61% of individuals exhibit limited functional speech (Weitz, Dexter, & Moore, 1997).

The Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) details the following as criteria for an ASD diagnosis: difficulties communicating and interacting in social situations across a variety of contexts and repetitive behavior and interests. These symptoms are seen early in a child's development (American Psychiatric Association, 2013). They often serve as a barrier to participation in activities of daily life. ASD affects all cultural, racial, and socioeconomic groups. ASD is four times more likely to occur in boys than girls (Mirenda, 2008).

The speculation that AAC may hinder, or replace, natural speech production does exist. However, research does not show AAC to impede the production of speech (Schlosser & Wendt, 2008). It appears that AAC solely affects speech production in positive manner. Additionally to speech, language is an important aspect of communication positively affected by AAC (Lal, 2010). AAC contributes to receptive and expressive language development; vocabulary and grammatical skills haven been shown to increase due to intervention (Lal, 2010).

There are a variety of AAC therapies available. Selecting effective systems may

be a difficult task. The intelligence and capabilities of children with ASD are difficult to assess. Interventionists should avoid placing labels on children based on their presumed capabilities. The types of AAC intervention chosen for a child should not be limiting in nature, but rather support that child to attain increasingly complex communication skills (Mirenda, 2008).

Types of AAC

ASD, being spectral in nature, has a wide variety of presentations. Speech and language deficits will vary according to each individual with ASD. Appropriate AAC intervention should capitalize on strengths and minimize weaknesses to enhance functional communication. The interventionist is responsible for dissecting available AAC techniques and choosing the most appropriate (Beukelman & Mirenda, 1998).

Unaided & Aided AAC

AAC intervention falls under two distinct categories: unaided and aided. Unaided AAC does not require an individual to use anything extraneous to his or her own body. This type of communication includes sign language and gestures (Beukelman & Mirenda, 1998). Aided AAC intervention involves the use of a device in order to communicate. These devices are highly varied. They span from tangible real life objects, to pictures and line drawings, to speech generating electronic devices (SGDs) (Beukelman & Mirenda, 1998). SGDs are mostly portable and produce either synthesized or digitized speech (National Research Council [NRC], 2001). Speech is activated through eye gaze or physical contact with graphic symbols on the device (Nunes, 2008). How an individual activates the speech depends on his or her physical capabilities. SGDs may have either a fixed display or a dynamic display. In fixed displays the symbols do not change position.

If the individual requires an overlay with different symbols and words, it must be changed manually. In dynamic displays multiple overlays are automatically available to the individual through pushing specific buttons ("Communication Services," n.d.). Dynamic SGDs offer more readily available vocabulary, but may be too complex for some AAC users. Hybrid systems, which involve the use of both aided and unaided AAC with one individual, are also used (Nunes, 2008).

Unaided verses aided AAC.

Due to the wide variety of AAC devices available, individuals requiring support in order to communicate have many options. It is the responsibility of the interventionist to assess which methods work best for their clients by conducting trials and taking data. The final decision should take into account the client's environment and motor abilities (Nunes, 2008)

According to a research review by Nunes (2008) several studies revealed that individuals with ASD are more receptive to aided communication systems which utilize pictures and photographs. This may be due to deficits in working memory, information processing, and imitation skills in this population. Unaided AAC, such as sign language, requires learned skills. Photographs and pictures are more permanent in nature, while manual signs are transient. This permanency minimizes demands on the AAC user's memory. The images they need to communicate are readily available and visible to them. A sign language user must mentally recall signs, placing very high demands on working memory and information processing skills (Peterson, Bondy, Vincent, & Finnegan, 1995).

Intelligence and Motor Ability in ASD

While it is crucial that AAC intervention be suited to the individual user, ASD is a perplexing disorder. The cause of the condition is unknown, and the symptoms vary greatly. Mirenda (2008) supported the idea that ASD has two largely unrecognized attributes. Mirenda (2008) suggested intelligence is difficult to assess with traditional measures in this population. Additionally, deficit motor ability may be a trait present in many individuals with ASD. These attributes could impact how an interventionist approaches AAC therapy with a child that has autism.

Motor Ability

While the DSM-5 describes repetitive motor movements as a diagnostic indicator of ASD, motor impairment is a not recognized as a symptom. Research shows results that appear contradictory to this omission Dyck, Piek, Hay, and Hallmayer (2007) conducted a study which assessed the motoric abilities of twenty-nine children in relation to the severity of their ASD. A correlation between the two was found, and the children did appear to have deficit motor ability. According to Mirenda (2008) children in this population struggle with motor praxis, which involves motor conceptualization and planning. Research suggests difficulties with motor praxis can be linked to the social, communicative, and repetitive behaviors that characterize ASD (Dziuk et al., 2007). Along these lines Ming, Brimacombe, and Wagner (2007) found 41% of children with ASD between ages 2-6, and 27% between ages 7-18, displayed signs of oral and/or hand apraxia (Mirenda, 2008). Muscle apraxia is a neurological condition resulting in impaired motor movement. It is a possible reason why individuals with ASD have a difficult time imitating facial and body movements. This difficulty may have an effect on

the type of AAC device that the interventionist decides to use.

Intelligence

The second attribute described by Mirenda (2008) is intelligence. Intellectual disability is not a diagnostic indicator or result of ASD, but the DSM-5 states the two disorders are often co-occurring (American Psychiatric Association, 2013). Recent research suggests that the presumption of intellectual disability (ID) often co-occurring with autism should be questioned. Edelson (2006) reviewed 215 published research articles, dating back to 1961, which supported high rates of ID in individuals with ASD. It was discovered merely 26% of this research was from empirical sources, while the remaining 74% of the research was from theoretical, non-empirical, sources which did not base their data on observational processes. Of the research based on empirical data, only 15.7% was based on data which used sound measures to test intelligence (Mirenda, 2008). The message of Edelson's (2006) investigation is that presumptions about the intelligence of children with ASD should be avoided.

The intelligence of children with ASD is often unknown as the majority of intelligence quotient (IQ) assessments require the utilization of verbal and linguistic abilities. People with ASD generally have much stronger non-verbal, visual skills. Shah and Holmes (1985) contrasted the scores of two intelligence assessments taken by eighteen children with ASD. The Leiter International Performance Scale (Leiter, 1980) and the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1976). The WISC-R involves the use of speech, while the Leiter requires test takers to match items (Mirenda, 2008). In this case the test takers scored, on average, 13 points better on the Leiter than the WISC-R. This supports the idea that testing the intelligence of

children with autism is difficult due to the nature of ASD.

Intelligence and motor impairment appear to be two aspects of ASD which are not well researched. Through discussion and research of these aspects interventionists can provide more efficacious AAC intervention.

Intelligence related to AAC intervention.

Presuming a child with ASD has below average intelligence will decrease expectations for that child. The majority of research with this population appears to be on studies which teach participants to make requests or commands with AAC (Wendt, Schlosser, & Loyd, 2006). Thus, intervention for this population appears largely focused on teaching the ability to make requests. The ability to make requests and demands is crucial for communicating wants and needs and AAC intervention towards this end is appropriate. However, often AAC intervention is so centralized around teaching requesting that it does not progress to teaching other communication skills. If a child with ASD is thought to have an intellectual disability (ID) interventionists are more likely to disregard complex communication skills, such as interacting with peers (Mirenda, 2008). Instead they focus on basic, although functional, requesting and rejecting (Mirenda, 2008). Intervention implemented in less regimented contexts may utilize more intelligence skills. There is evidence in support of AAC which uses language modeling paired with symbols in natural environments (Mirenda, 2008). A study by Cafiero (2001) examined natural aided language intervention (NAL). A non-verbal 13 year old was the sole participant. A Picture Communication Symbol (PCS) display containing symbols related to his daily life (i.e., nouns, verbs, adjectives, and commands) was used. The participant's communication partners would point to relevant symbols on the display

while talking to and conversing with him. The only instruction given was the communication partner's modeling which was done by pointing to the symbols which represented the verbal words used. At the end of 19 months the participant had a functional vocabulary of 67 words. He was also independently initiating two to three word utterances. Additionally undesirable behaviors greatly decreased and the staff at the school began to engage him in more intellectual activities. Prior to the intervention his instruction was less academic as the staff was unaware of his capabilities, which appear to have been masked by his inability to communicate and ensuing frustration. The success this participant achieved with an unstructured method supports the idea that AAC intervention can be successful in a natural context, and not focused solely on teaching commands (Mirenda, 2008).

Motor ability related to AAC intervention.

The literature suggests that motor impairment may be present in many individuals with ASD (Mirenda, 2008). While ID is often presumed in individuals with ASD, motor impairment is often disregarded. Since motor impairment is not seen as related to ASD, giving consideration to such impairment when planning and implementing intervention is often overlooked. Difficulty imitating or producing manual signs, or repeatedly using the same button on a SGD at inappropriate times are examples of ways motor impairment can affect AAC intervention (Mirenda, 2008). To make intervention more accommodating for motor impairments Mirenda (2008) recommends considering the motor abilities of individuals with ASD as one would consider the motor abilities of an individual with noticeable motor difficulties (e.g., an individual with cerebral palsy).

Speech Production as result of AAC

A common apprehension related to AAC is that a device will replace, or hinder, natural speech from developing in a child with ASD. Schlosser and Wendt (2008) systematically reviewed studies done between 1975 and 2007 related to AAC use in children with ASD, and their subsequent speech production abilities. The authors concluded that AAC does not lessen natural speech production.

Research review on Speech Production

Nine single-subject design studies (27 participants), and 2 group studies (98 participants) were reviewed. The mean age of the participants in the single-subject designs was 81 months. The participants in the 2 group studies had a mean age of 60 months and 33 months. In order to be included in the review the studies had to meet strict criterion.

Studies which researched interventions adhering to the ASHA definition of AAC were included. All participants were diagnosed with either ASD, or pervasive developmental disorder not otherwise specified (PDD-NOS).

The review Schlosser & Wendt included studies using a wide array of AAC intervention, thus outcomes across the studies were varied. The intervention types include: picture exchange communication system (PECS), SGD, and manual signs. The outcomes of the studies reviewed suggested that this type of intervention seems to be highly effective in regards to speech outcomes in children with ASD. In general the authors found the outcomes of the single-subject design studies to indicate most interventions were highly effective, with a small amount being ineffective (Schlosser & Wendt, 2008). Therefore, the authors reviewed various studies, and were able to draw

conclusions from their synthesis of data. In none of these studies did speech decline as a result of AAC intervention. The notion that AAC may hinder, diminish, or replace natural speech development does not appear to be founded when compared to the data collected from this review (Schlosser & Wendt, 2008).

Results.

The review conducted by Schlosser & Wendt (2008) indicated overall positive gains in speech as a result of AAC intervention. Most of the studies reviewed reflected at least some gain in speech development, however there were some discrepancies found between the data gleaned from the various studies. While a number of the studies showed intervention was highly effective with large gains, some showed only modest gains in speech production (Schlosser & Wendt, 2008). The authors hypothesized these discrepancies resulted from individual differences (communication strengths and weaknesses) of the participants (Schlosser & Wendt, 2008).

The review of literature published by Schlosser & Wendt (2008) appears to support AAC intervention. Although the review showed minimal increases in speech production, the authors see this as a positive side effect of the intervention. The major end goal of AAC is functional communication, not speech production.

PECS & Speech Production

Research by Ganz and Simpson (2004) focused on the use of PECS to increase the production of verbal words, as well as the length and complexity of phrases. The authors also examined how well PECS worked to decrease the number of non-word vocalizations in the participants. The participants consisted of three students with ASD. They were identified through a school system, and had their diagnosis prior to the study.

The participants had very limited verbal output. Each was identified as having a repertoire of less than ten verbal words used with functional communicative intent. None of the participants had prior exposure to the PECS intervention.

In this study the PECS system consisted of four phases: basic picture exchange, increasing distance, picture discrimination, and sentences. The intervention was implemented for 15 trials per session. Eighty percent or more accuracy on the trials was required in order to proceed to the subsequent phase. Intervention was continued until all four phases were mastered. Data was collected on the participants' performance on the PECS phase criteria, the frequency of intelligible verbal words, and non-word vocalizations (Ganz & Simpson 2004).

Results.

The results of this study show all three participants made notable gains in the amount of intelligible words used per trial. Participant 1 had no intelligible or recognizable speech at the beginning of the study. By the end of phase four the participant was capable of making verbal requests using the phrase "I want". Prior to the study, participant 2 could verbally produce over thirty words, however he rarely used these words independently, or with communicative intent. The participant was requesting items with sentences after receiving the PECS intervention. Participant 3 was successful at requesting using full sentences as well. Participant 3 showed generalization by requesting items from his mother, not solely the interventionist, during sessions. The data related to the participants' non-word vocalizations was inconsistent (Ganz & Simpson, 2004).

The results of this study suggested that the PECS program is beneficial for

increasing intelligible speech in children with ASD. It also demonstrated that children in this population are capable of mastering the program. The children were able to generalize the use of PECS with others individuals besides the interventionist. This supports the idea that the participants will be able to utilize PECS when interacting with different communication partners in their environment. This promotes the functionality of PECS as an AAC device for children with autism (Ganz & Simpson, 2004).

While the authors of this study reported positive results related to PECS and speech production, replication of this study would support the efficacy of these findings. Research in this area is scarce; no prior research has examined PECS and words produced per trial in the same manner as this study. A direct replication study would support the results of this study. If the results of a replication study matched the results of this study, the generalization that PECS increases speech output in children with autism would be more supported (Ganz & Simpson, 2004).

Language Development

Speech production is not the only facet of communication which ASD may affect. Children with ASD experience delays in language development due to difficulties utilizing certain skills which promote language acquisition such joint attention and symbol use (Dawson et al., 2004).

Joint attention is shared visual attention between two people on an object (Bono, Daley, & Sigmon p. 495). The visual aspect of joint attention involves directing gaze appropriately between people and objects while communicating (Lal, 2010). Joint attention is crucial to understanding a communication partner's emotions and feelings. Mundy, Sigmon, and Kasari (1990) claimed that joint attention to play a crucial role in

the development of receptive and expressive language.

The use of symbols is crucial for both verbal and nonverbal communication. Understanding the conventional symbolic meaning of words, gestures, and signs is fundamental for development of expressive and receptive language (Lal, 2010). Children with ASD often have difficulties comprehending the communicative meaning of symbols. This results in limited and disordered symbol use. Commonplace gestures, such as pointing to a preferred game, are often lacking in children with ASD (Stone and Caro-Martinez, 1990). Instead, they often communicate by motoric manipulation of their communication partner. An example of this would be a child leading an adult by the hand to a game he or she would like to play. Symbolic play incorporates symbol use, and is strongly linked to language development (Sigman and Ruskin 1999). A child engaging in symbolic play may pretend a banana is a telephone or use a hairbrush as a microphone.

Makaton & Language Development

In 2010, Lal conducted a research study examining language development, social behavior, and AAC intervention in children with ASD. The purpose of the study was to determine if implementation of the AAC Makaton Vocabulary Language Program resulted in increased expressive and receptive language skills, as well as more preferred social behavior.

Makaton teaches vocabulary consisting of nouns, verbs and adjectives through signs or graphic symbols. These signs and symbols are used in conjunction with speech. There are eight stages to the intervention (Lal, 2010). The beginning stages focus on teaching concepts relevant to the child's current environment. The concepts may include tangible items such as people, food, and furniture accompanied by pertinent adjectives

and verbs. The later stages of the program introduce complex intangible concepts such as relationships and religious theories (Lal, 2010). Makaton was created in the United Kingdom. For the purposes of their study the authors used The Makaton Vocabulary - Indian Version. This version has been altered to be culturally appropriate and relevant to Indians.

The participants consisted of eight children with ASD, ranging from 9 to 12 years old. All of the participants were students at special schools. The criterion for this study excluded participants who had experienced AAC or language intervention in the past and children performing below three years on the Language Assessment Tool (Rao 1992) in language and communication.

The structure of the study consisted of a pretest prior to intervention and a posttest subsequent to intervention. The assessments used for testing included the language assessment test for children with autism (LATCA) and the social behavior rating scale (SBRS) (Lal, 2010). The LATCA assessed the child's receptive and expressive language. The expressive language portion contained concepts taught in Makaton and required the participant to identify the concepts either through sign or speech. This assessment is beneficial as it pinpoints the effectiveness of the Makaton program by examining specific concepts taught by Makaton. The SBRS measured social behavior related to communicative intent. The behaviors measured included joint attention, facial expression, and eye contact. In total twelve behaviors were assessed using a 5-point scale according to the frequency of each behavior. The SBRS was conducted through observation by both the author and classroom teachers of the children (Lal, 2010).

Method.

The AAC intervention, Makaton, was administered across twelve sessions. Typically two to three new words were taught each time and each of the sessions was structured in the same manner. Prior to the Makaton therapy warm-up exercises were performed. The author provided hand over hand prompting to have the child touch a part of his or her own body. Simultaneous with this movement the author would verbally provide the name of the body part. This warm up is pertinent to the Makaton intervention as it supports the connection between an object and a corresponding gesture and auditory word. In this case the object is the body part (Lal, 2010). After the warm-up exercises Makaton was taught over the course of four separate steps. Step 1 focused on displaying either tangible objects or pictures simultaneous with their manual Makaton sign and verbal name. Step 2 required the participant to identify through pointing to a picture or object when it was accompanied by a distracter. Step 3 required the participant to accomplish the more difficult task of labeling a shown object or picture using either verbal production or manual sign. Finally, Step 4 is related to how all of the participants' responses were reinforced. Additionally physical prompting was used to shape the acquisition of manual sign as necessary. These sessions taught the meaning of words such as what, where, I, you, and me by the nature of therapy structure. These words were taught indirectly and not included on the LATCA. The author states that the learning of these words promotes and enhances social interactions, and thus plays a part in the SBRS assessment (Lal, 2010).

Results.

The results of this study suggests that AAC intervention promotes language development and appropriate social behavior in children with ASD. Significant gains were made by the children in both of these areas. The Wilcoxon Signed Ranked test was used to synthesize the data in this study, a test which considers the differences between pre and post test data to arrive at results.

Two attributes of the Makaton AAC intervention are strongly responsible for the growth in language development of the participants. Makaton teaches words which are relevant to a child's environment; additionally, the program capitalizes on visual processing strengths by incorporating signs and pictures in tandem with verbal speech (Lal & Bali 2008). This study not only supports the efficacy of Makaton, but shows what may be beneficial in other functional AAC intervention for this population. It displays what seems to work for children with autism, which is extraordinarily helpful for interventionists.

AAC & Behavior

Makaton increased the children's socially acceptable interactions and behavior because it taught language which was relevant to the children's environment and lives. Thus the children used this knowledge to have functional social interactions and comprehend the meaning behind these interactions (Thieman & Kamps, 2008). The study from Lal (2010) drives home the point that language and social interactions are intrinsically linked. Language goals for children with ASD should include participation and comprehension of social interactions to enhance communication (Lal 2010).

While results of this study support the efficacy of AAC intervention on language

and social behavior in children the number of participants, at eight, was rather small. In order to establish the universality of these results future research in this area should be done with more participants.

Future Intervention & Research

When implementing AAC with a new client, making judgments about abilities based on previous assessments should be avoided. While previous assessments such as IQ and language scores may offer some insight into the client's capabilities, they should be examined critically. Future research should examine children with ASD that have found success with using AAC to communicate independently and adequately (Mirenda, 2008). Research on these children and their methods will show if there are common factors shared between them which lead to their success. These common factors will contribute to the knowledge of what works for children with ASD using AAC.

Literacy instruction for many individuals with ASD is overlooked due to perceived low intelligence. The intelligence of individuals with ASD is often presumed, or unknown, due to the inability of IQ tests to accurately assess this population. Future research should study the effect of evidence-based literacy instruction on a variety of individuals despite their intellectual ability. Studies of this nature would shed light on what individuals with ASD can accomplish given literacy instruction, and how this type of instruction affects communication abilities (Mirenda, 2008).

Conclusion

AAC intervention has been shown to promote speech and language development in children with ASD. Fears related to AAC hindering natural speech appear to be unfounded (Schlosser & Wendt, 2008). In addition to speech and language, behavior

seems to be positively affected by AAC as well. When children have an outlet with which to communicate their wants and needs, problem behaviors appear to decrease (Lal, 2010).

Children on the spectrum have a wide variety of strengths and weaknesses related to communication. AAC intervention must be individualized and accommodating. Individuals with ASD appear to have strong visual processing skills. This promotes the use of AAC which utilizes graphic symbols (Nunes, 2008). While interventions that incorporate graphic symbols are beneficial to many with ASD, numerous individuals in this population communicate using manual sign. Hybrid systems consisting of both unaided and aided AAC are utilized as well. Deciding on the most beneficial AAC system for a child is difficult, and may require numerous devices and trials (Beukelman & Mirenda, 1998). Considering how well AAC functions in natural contexts and environments is vital in this decision making process (Mirenda, 2008).

Presumptions about a child's communication ability should be avoided. Interventionists often make unfounded conclusions about children's cognitive ability in this population, and this leads to lower expectations. These expectations consist of the child learning imperative commands, but not more complex communication skills. Teaching imperative commands and requests to a child with ASD is quite appropriate, but intervention should not cease there (Mirenda, 2008). Along with intelligence, the motor ability of children with ASD should be considered when choosing an AAC intervention. An integrated and unbiased approach is necessary when using AAC with children with ASD.

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Research Paper Title:

Efficacious Alternative Augmentative Communication (AAC) and the Development of Language and Speech: A primary focus on children with Autism Spectrum Disorder (ASD)

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