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Success Factors of Augmentative and Alternative Communication Post Early Intervention

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SUCCESS FACTORS OF AUGMENTATIVE AND ALTERNATIVE COMMUNICATION POST EARLY INTERVENTION

by

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ABSTRACT

Children with complex communication needs often require augmentative and alternative forms of communication (AAC) to efficiently convey messages across various settings (Barker et al., 2013). Early implementation of AAC devices for this particular population has been proven successful through the improvement of speech production and language development (Topia & Hocking, 2012). Several factors play an important role in a child's success or abandonment of an AAC device including speech-language pathologist (SLP) expertise, familial support and perceptions, AAC acceptance, and availability of AAC therapeutic services. This survey-based study explored factors related to success of AAC post early intervention programs through a 33 question anonymous parent survey that included a population of 129 with a respondent sample size of 29.

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LIST OF ABBREVIATIONS

AAC	Augmentative and Alternative Communication
SGD	Speech Generating Device
LAMP	Language Acquisition through Motor Planning
PODD	Pragmatic Organization Dynamic Display
SLP	Speech-Language Pathologist
TCCCD	The Children's Center for Communication & Development

CHAPTER I – REVIEW OF LITERATURE

Augmentative and alternative communication

According to the AAC Institute, augmentative and alternative communication (AAC) is a supplementation of natural speech and/or writing through the use of aided or unaided symbols using computer or non-computer devices. AAC addresses the communication difficulties in individuals who experience different complex communication disorders and allows for their voices to be heard despite their limitations with verbal speech. The AAC Institute has stated that AAC is a key component in helping an individual achieve the highest and most effective communication possible, along with increasing their overall quality of life. AAC is not constricted into one rigid category; however, it encompasses a range of technology at varying levels. Most often, individuals utilize communication devices or communication boards to supplement their language (Aphasia Institute, 2021).

AAC speech-generating devices (SGDs) include computer and non-computer technology displays for those who are unable to use natural speech as a means of communication. Specific technologies and applications are recommended based on the individual's specific daily communicative needs. AAC communication boards consist of non-electronic displays that aid individuals with natural speech difficulties using a manual board. Boards may include graphic and pictorial symbols and/or alphabet-based systems to generate messages through the use of physical selection, eye gaze, or partner-assisted techniques. Largely, AAC serves to aid in an individual's daily communicative abilities to enhance and improve their desire and need to communicate (Aphasia Institute, 2021).

Forms of AAC

There are several effective AAC methods available for children. Topia and Hocking (2012) have stated that there is promising evidence for the implementation of AAC in children to help overcome communicative obstacles to effectively communicate and participate in everyday life activities. Here, three types of AAC will be discussed. Language Acquisition through Motor Planning (LAMP) is an approach used through an SGD or picture board that provides communication for children utilizing auditory and visual signals, along with specialized motor patterns. Bedwani, Bruck, and Costley (2015) reported that the LAMP program provides opportunities for children to learn word meaning through natural consequences caused by the selection of a word and an immediate speech output. LAMP uses a variety of core and fringe words within the application. Core words are those used most often, such as function words like "more." Fringe words are included to enable longer utterances like "more apple." The program also emphasizes the importance of learning consistent motor patterns. The symbols for words are in the same place on the board or device so that the child has the opportunity to use them instantaneously over time because they have been learned (Bedwani, Bruck, & Costley, 2015).

A second AAC approach named Pragmatic Organization Dynamic Display (PODD) can also be effective for children who need communication support. PODD is a system that uses aided symbol vocabulary to provide spontaneous communication in the form of a communication book or an application through an SGD (Cafiero & Porter, 2009). Unique components of PODD communication books and devices are oriented around the overall organization of features within the program. The individual's current

level of communicative and cognitive functioning is taken into consideration through variance in the number of icons on one page. PODD communication books typically utilize a communication partner to assist the individual in communication through modeling. Specifically, several simple features like "go to page (number,)" color-coded page tabs, and specific command symbols are incorporated to allow the communication partner to efficiently peruse the book. The first pages of the book typically consist of items that need to be quickly stated or those that express messages related to an ongoing activity like “more” or “all done.” For the PODD system used on an SGD, the application vocabulary is structured similar to the book form, but with the intention being that the individual with the complex communication needs is the primary correspondent (Cafiero & Porter, 2009).

The last AAC method discussed is Snap Core First, a communication application used with SGDs. Snap Core First is a symbol-aided vocabulary application that features benefits in supporting communication by emphasizing core words, hence its name. The core words page on the application is comprised of highly manipulated words and symbols accessed and combined immediately by the user. The core page consists of words frequently used in daily situations like "I," "want," and "go" that can be easily combined to communicate clearly, along with fostering the growth of literacy through the use of employing the symbol's word as well (Tobii Dynavox, 2021). The application allows for individualized communication with “word lists” comprised of flexible fringe vocabulary organized into specific categories that allow for more precise communication. Along with core and fringe word pages, Snap Core First has a unique “quick fires” label that consists of frequently used, predictable messages for situations in which the

communicator wishes to say something quickly. A "topics" section is included as well to promote precise communication in specific places or situations that help alleviate messages that might be hard to predict ahead of time. Additionally, an on-screen keyboard is included to help cultivate independence (Tobii Dynavox, 2021).

Implementation of AAC.

Simply providing children who have complex communication disorders with various supports for daily language encounters is not sufficient. Supporting and facilitating communication through AAC must also occur. Barker et al., (2013) described that the implementation of AAC can provide a more efficient modality of communication to increase communicative competence and foster language growth in children with developmental disabilities and complex communication needs. There have been numerous methods used for AAC implementation in young children. Barker, Akaba, Brady, and Thiemann-Bourque, (2013) noted that the different ways in which adults model language through AAC systems influence language development. This includes picture symbols (e.g., PODD communication books), digital symbols that produce speech through an SGD when a symbol is activated, or the communication environment itself. Input and adult models of AAC foster language development by providing expert demonstrations and help establish AAC as an appropriate modality for communication. Additionally, adult models convey the many functions that AAC symbols and words can serve in real-world communication interactions and help young children better understand that AAC can serve as an effective way to communicate with their peers and adults.

The overall facilitation of language development and speech production has been observed in various AAC interventions as well. AAC modeling during playtime in which the child's communication partner pointed to a symbol or activated a digital symbol on an SGD while simultaneously using verbal speech was observed to increase language development. Additionally, comprehension of language symbols and verbal speech production or production through AAC increased (Harris & Reichle, 2004).

In a recent study by Romski and Sevcik (2005), it was observed that children who were exposed to and utilized augmented communication through SGDs (e.g., LAMP, Snap Core First, PODD) utilized more language either through their specific AAC device or through verbal speech. The authors determined that the implementation and use of AAC aided in speech production and enhanced overall language abilities in preschool children with complex communication needs. Furthermore, it was commented that AAC implementation through SGDs may foster social communication interactions with peers who do not present with disabilities. Topia and Hocking (2012) further proved that early implementation of AAC is necessary for young children with complex communication needs. They stated that typically developing children constantly acquire new speech and language skills from birth to show expressions of wants and needs and to make social gestures; however, in children with communication disorders, there is a communication barrier that can lead to social and educational isolation. By implementing AAC systems early, there is a greater success rate in vocabulary acquisition and social expression. Overall findings aid in the confirmation that early and effective implementation of AAC in children who have complex communication needs is successful in improving speech production and language development.

Challenges of AAC implementation

While implementation of AAC provides innumerable benefits and communicative opportunities in children with complex communication needs, the challenges and demands can slow participation and effective communicative success of those who use AAC as their primary mode of communication (Light, McNaughton, Beukelman, Fager, Fried-Oken, Jakobs, and Jakobs, 2018). Over the years, the field of AAC has witnessed several advances in society, including increased communicative expectations and participation for those who use AAC; however, many challenges that impede implementation and daily use must be addressed. Light et al. (2018) conducted a study focusing on the various challenges that still exist for AAC users despite the many advancements that have recently occurred. It was noted that in younger children with severe developmental disabilities, ongoing modifications were needed as the child learns and grows academically. Specifically, the language and vocabulary within their device are constantly changing and becoming more complex, and if modifications are not made available and are not ongoing, the child can fall behind or lose communicative competence. Supports for children who use AAC must also be readily available and flexible so that academic and daily life activities are successful for the individual. Supports should be transparent so that a wide variety of caregivers can implement and support the child effectively (Light et al., 2018).

Caregiver demands with children who use AAC

The common challenges stated above pose many demands on caregivers who have children with complex communication needs. In a study conducted by Goldbart and Marshall (2004), the high levels of time and energy required for AAC implementation

and use in young children were noted as one of the most daunting demands. Caregivers in the study also noted that simply communicating with their child and enabling others to was an exhausting task. AAC implementation and use by the child demanded high amounts of effort and learning by the caregivers and others that the children communicated with most frequently. This often led to caregivers serving as one of the primary communicators for the child in situations where the communicative partner was not familiar with the child's AAC device (Goldbart and Marshall, 2004).

Family perceptions of AAC

Family perceptions and perspectives of AAC also influence daily use and overall communicative success of a child who uses AAC as their primary mode of communication. Goldbart and Marshall (2008) noted that parental involvement and positive support are considered a vital importance to the introduction and continuation of AAC in children. Unfortunately, family perspectives are not always taken into consideration. In Goldbart and Marshall's (2004) study of caregiver experiences and views about having children who primarily use AAC, several themes were noted and discussed. Caregivers in the study stated that most of the communicative responsibility was placed on them and that lots of individual research was necessary to successfully support their child in communication. Additionally, caregivers described that they often felt as if they had to be the communication expert, while few stated that they had been provided with adequate introductory methods for supporting their child's communicative attempts. Largely, Goldbart and Marshall found that these factors impacted the caregiver's level of engagement with professionals and the level of AAC support provided for their child (Goldbart and Marshall, 2004).

Abandonment of AAC

While the general expectation is that children who use AAC are fully supported by their caregivers, as well as professionals who provide intervention and academic services, that is not always the case. Negative experiences and lack of professional support contribute to the abandonment of AAC systems in children. Research conducted by Moorcroft, Scarinci, and Meyer (2021) through caregiver interviews explored experiences that led to AAC abandonment. Surfaced themes that contributed to abandonment included experiences where families felt devalued when professionals only considered themselves as AAC experts and instances where caregivers did not feel supported by SLPs and felt pressured to continue using AAC systems with their child without proper introduction or explanations. Another factor that influenced abandonment in the study was the lack of a supportive community. Caregivers stated that when the child's AAC system was not supported by all members in their community (e.g., family, daycare provider, extracurricular activities), it was difficult to continue using the system (Moorcroft, Scarinci, & Meyer, 2021).

Moorcroft, Scarinci, and Meyer (2021) also noted a few common themes which led to the abandonment of AAC in children. Parents stated that they lacked the emotional readiness to support their child in AAC communication and that they were not given sufficient time to emotionally deal with their child's communicative or medical diagnosis before AAC was introduced. Another theme that led to abandonment occurred when parents perceived their child's AAC device to be unsatisfactory. Some parents felt that the language used on the AAC system was either too simple or too complex for their child and that they were not seeing any improvement in overall communication abilities.

Moreover, some parents did not see the value of AAC with the high price and maintenance required for high technology devices (Moorcroft, Scarinci, & Meyer, 2021).

Ultimately, abandonment is an opportunity barrier for children who use AAC. Without their AAC systems, children are more likely to struggle with communication, socialization, and fall behind academically due to the lack of communicative competence. Moorcroft, Scarinci, and Meyer's (2021) research provided insight into the pertinent need for family-centered practice in the implementation and continuation of AAC systems. When given adequate information and support, AAC abandonment is less likely to occur. Speech-language pathologists (SLPs) and other professionals who provide services to children with complex communication needs should collaborate to implement strategies for emotional encouragement and provide support to caregivers in a new and overwhelming way of communicating. When implementing a new AAC system for a child, SLPs should also consider demands that are placed on caregivers and provide functional and meaningful tactics to integrate AAC into their daily lives. Moreover, the child's motivation, physical abilities, and parental preferences must be assessed carefully for AAC implementation and interventions, as these considerations will help to ensure the most communicative success (Moorcroft, Scarinci, & Meyer, 2021).

Family involvement with AAC usage

For communicative success to occur in children with complex communication needs, family participation and encouragement, along with professional collaboration must be present. Communicative advocacy should also be consistent to ensure academic and social success. Rackensperger (2012) noted the importance of positive family involvement and influences in correlation to the academic achievement and overall

success of children. This is especially true for those who have complex communication disorders. Social disadvantages such as discrimination, stereotyping, and negative beliefs are often associated with children who have complex communication needs. This gives rise to a strong need for parental support and advocacy to improve and ensure the highest quality of communicative success. Rackensperger (2012) stated that children who utilize AAC as one of their primary modes of communication need family support and involvement to gain the best academic accommodations to make them successful. Specifically, a parent's role in conveying the importance of appropriate education has shown a positive impact.

Oftentimes, school personnel mislabel children with complex communicative needs. However, when parents realize the role that AAC plays in the importance of their child's academic success and their need for appropriate education, advocacy for specific AAC accommodations becomes more relevant. Without alternative communication and one-on-one support accommodations, children frequently struggle to adapt and cope with the challenges posed in an academic environment. Parent-school relationships are also important to a child's overall academic and communicative success. Parents and appropriate school personnel should consistently discuss goals and expectations for the child concerning the use of AAC in the classroom so that the child's success is the highest priority (Rackensperger, 2012).

In young children, AAC implementation and parent-focused training are effective in the improvement of the child's communication abilities. For AAC to be successful for young children, their communication partners need to be in tune with the child's communicative differences and adapt to them accordingly. Most often, when an AAC

type is abandoned, it is the result of a lack of parent knowledge and training. When parents have been given proper knowledge regarding AAC navigation and implementation, and the importance of AAC in their child's communicative success has been made explicit, they are more likely to implement it into their everyday lives (Faidt, Fabian, Thunberg, & Lucas, 2020).

School transitions with AAC

Although family advocacy and support play a significant role in the implementation and continuation of AAC use in children, parent-professional collaboration is pertinent to overall communicative success in academic and social settings as children continue to grow and mature. Mandack, O'Neill, Light, and Fosco (2017) suggested that family-centered intervention styles should be incorporated by SLPs and other professionals who serve children with complex communication needs to ensure optimal communicative outcomes. Through family-centered intervention practices, speech pathologists can provide caregivers choices for intervention options, along with various resources to help support AAC communication with their child. With various options and supports for families and caregivers, Mandack et al. (2017) suggested that overall greater family satisfaction with AAC implementation and interventions occurred, as well as a more positive understanding of how AAC supports language growth. Additionally, increased family involvement was noted and most importantly, children's overall language improved through the use of AAC with the approach. Implementing and utilizing AAC inevitably changes how a family operates daily, and without professional support and resources, many families abandon or reject AAC usage with their children.

Therefore, it is imperative to consistently engage in parent-professional collaboration to ensure family satisfaction and communicative success for the child (Mandack et al., 2017).

Availability of AAC services in schools

Availability of speech and language intervention services for children with complex communication needs who use AAC systems is crucial for communicative success holistically. Specifically, educational success is dependent on the quality of intervention services to facilitate AAC and literacy skills. Fallon (2008) stated that access to a supportive academic community heavily influences a child's success and continuation with AAC, along with the level of expertise of interventionists (e.g. speech-language pathologists), the effectiveness of professional collaboration, the dedication to AAC services, and the quality of AAC services. The Individuals with Disabilities Education Act (2017) requires that assistive technology devices, services, or both must be provided for children with disabilities, specifically communication disabilities (section 300.105). However, with this requirement of available services, effective implementation and service delivery cannot exist without effective speech pathologist training.

The level of expertise of SLPs who service children that use AAC systems impact not only the child's overall academic success but also influence how parents incorporate AAC into their daily lives. Fallon (2008) surveyed school-based SLPs' knowledge and expertise of AAC and results proved that most SLPs had low knowledge of AAC and what AAC services looked like. Furthermore, SLPs in the survey stated that their low levels of expertise affected the quality of AAC services provided to children, which also

affected parent's perceptions of AAC. The lack of SLP expertise is derived from insufficient training. Consequently, the lack of training ultimately leads to the abandonment of AAC in children (Fallon, 2008). In contrast, Beukelman, Ball, and Fager (2008) provided insight into what characteristics SLPs possess that qualify them as AAC experts allowing them to serve children's complex communication needs most effectively. It was reported that SLPs who focused their professional efforts on the development and maintenance of AAC knowledge and service delivery, and who provided instruction and education to related professionals about AAC services, were most effective in the facilitation of AAC intervention of children with complex communication needs. Specifically, experts were reported to have focused their professional work on the implementation, facilitation, and continuation of AAC. Therefore, if AAC services are available to children with complex communication disorders, a need for high levels of professional expertise is crucial for success, as well. also impacts AAC provision (Fallon, 2008).

Fallon (2008) highlighted the importance of professional teams consisting of SLPs, classroom teachers, special education teachers, and parents working collaboratively to ensure maximum success in academic and social settings, along with overall AAC success and continuation. It was noted that when collaborative teams had flexible professional role boundaries and adequate collaborative and coordinated team training, positive outcomes for children with complex communication needs were more successful. In Chung and Stoner's (2016) meta-synthesis, effective professional communication was the most important factor relating to AAC success in academic settings. Keeping team members and parents current about student goals and experiences

was stressed, leading to effective AAC service delivery and better parent satisfaction. Moreover, the amount and quality of AAC services provided by professional and collaborative teams are closely related to successful student outcomes. Various reports of inadequate preparation and service delivery time from SLPs surveyed were consistent, along with unmanageable caseload numbers (Fallon, 2008). Overall, while the availability of AAC services greatly impacts user provision, professional expertise and collaboration, along with the amount and quality of services have been indicated to be equally important in AAC implementation and success.

SLP AAC expertise

The quality of AAC services closely correlates with the level of SLP expertise and positive professional characteristics. Chung and Stoner (2016) gathered information from various studies about factors related to positive student outcomes with AAC. Academic success was strongly connected with high levels of SLP expertise, which included attributes such as an extensive background in AAC intervention, collaborative skills, and family inclusion in AAC decision-making. SLPs who provided effective AAC interventions used strategies to help teachers understand how AAC can be implemented within curricula, provided opportunities in the classroom for children using AAC to communicate with typical peers, and applied adaptations to support independence (Chung & Stoner, 2016). Effective AAC interventions provided by SLPs ultimately led to increases in academic skills, communication opportunities, and appropriate classroom behaviors. In particular, increased communication competence was reported by all studies examined. Students were able to generalize communication through AAC outside of

academic settings, as well. Additionally, in multiple studies, teachers reported a better awareness for students using AAC to communicate with their peers in the classroom, which led to improvement in overall AAC usage by the students with complex communication needs. Overall, higher levels of SLP expertise and positive professional characteristics have been explicitly shown to correlate with better academic success and communicative competence for students who use AAC as their primary mode of communication (Chung & Stoner, 2016).

Acceptance of AAC in schools

As a child reaches school age and preparations are made to begin education in the classroom, non-disabled peer friendships are positively connected with the success of AAC usage amongst children who have complex communication needs. Ostvik, Ytterhus, and Baladin (2018) investigated characteristics that influenced the establishment of friendships among children who used AAC and their peers in primary school. They found that non-disabled students were inclusive and accepting of their peers who communicated through AAC and frequently engaged with them and created friendships based on their kind and witty character. It was reported that friendships were mostly established through play and communication; therefore' students who used AAC became highly motivated to communicate. Organized social activities were also a positive influence in the establishment of friendships. Specifically, when students who used AAC were paired with non-disabled peers for classroom and social activities, friendships were more likely to form. A general acceptance of AAC communication was also noted. With positive peer friendships and a general acceptance of AAC as a competent form of communication,

students who use AAC to communicate are more likely to continue usage of AAC and succeed academically and socially. Furthermore, the well-being of students who use AAC can be enhanced because they can participate in conversation and coursework more effectively (Ostvik, Ytterhus, & Laladin, 2018).

Rationale

Current literature provides overwhelming support for the early implementation of AAC for children with complex communication disorders. Additionally, the principle of using AAC to increase communicative competence if implemented in a supported family and academic environment is promising (Topia & Hocking, 2012). The field of speech-language pathology has also acknowledged the importance of early intervention with children who have complex communication needs concerning higher communicative success rates. However, there is a lack of attainable information concerning characteristics related to the success and continuation of AAC usage following completion of intensive early intervention programs, along with a lack of specific factors that facilitate and increase AAC usage. Furthermore, existing literature has failed to report differences in success rates with various types of AAC methods and technologies. Not only would data from AAC success following post-completion of an early intensive program provide SLPs and related professionals tools to implement better practices, but it would also allow for the more future academic and social success of those who use AAC primarily to communicate. Additionally, a comparison of success with various AAC methods would allow SLPs to better individualize implementation techniques when choosing AAC methods for different diagnosis groups and family dynamics.

The current study was designed to identify AAC success factors after completion of intensive early intervention programs, as well as identify any differences between AAC methods and devices with communicative success. In addition, the current study was designed to provide support and insightful knowledge to practicing clinicians for effective AAC service delivery.

Research Questions

1. Are there factors related to the success of an AAC system post early intervention intensive program?

2. What factors increase the use of an AAC system post early intervention intensive program?

3. Are there significant differences between AAC methods and devices?

    (a) Low technology vs. high technology? (b) Systems such as PODD, Snap Core First, LAMP?

4. Are there significant differences relating to success factors among diagnosis groups?

    (a) Autism? (b) Genetic Diagnoses?

CHAPTER II - METHODS

Purpose of the Study

The purpose of the study was to determine the success factors of augmentative and alternative communication (AAC) systems with children who had completed early intervention programs. The author also sought to identify any differences among AAC methods and devices related to communicative success.

Research Design

A descriptive survey-based research design was used by the investigator. The design was chosen to investigate various factors related to success or failure of AAC usage after the discontinuation of early intervention services by caregiver surveys. The survey was anonymous and voluntary. It was distributed through an early intervention provider in the state of Mississippi through an electronic survey database.

Participants. The participant population used for the study included caregivers of children who completed early intervention services up to five years previously through The Children's Center for Communication and Development in Hattiesburg, Mississippi. They ranged in age from 25 to 54 and were volunteers. Caregivers of children serviced by The Children's Center for Communication and Development (TCCCD) were used as the study's population sample because of the high-quality, intensive speech therapy and AAC services conducted by clinicians at the center. A total of 129 parents were identified as the target population. Each participant was recruited through an email attachment distributed by TCCCD that was sent to the center's caregiver contact database. Initial contact with participants in September of 2021 with weekly reminder emails sent the closure date of October 27th, 2021. The email contained a brief description of the study

along with an anonymous link to participate in the study. A respondent sample size of 29 was recorded at the time of closure of the survey.

Confidentiality

Participants were given assurance of privacy regarding their information and were presented with a consent document prior to their participation.

Instrument

An electronic survey created through The University of Southern Mississippi's Qualtrics software was used to collect data for the study. The survey was divided into three main sections. The first section asked various demographic questions pertaining to the caregiver participant. The second section asked demographic questions about the child in their care who received early intervention services. The third and final section gave a brief description of several types of AAC and asked questions specifically related to AAC. The third section also contained caregiver perception statements. Answer formatting throughout the survey included multiple choice, select all that apply, write in, and a five-point Likert scale.

Procedures

Caregivers of children who had received early intervention services from TCCCD were identified and gathered by the center's communication coordinator. An email was drafted by the primary investigator and the communication coordinator explaining the study, describing its benefits for current and future speech-language pathologists, along with providing the link to the survey. The survey was distributed via email from the TCCCD communication coordinator. Weekly emails were sent as reminders until the survey closed.

Data Collection and Analysis

Data was collected and analyzed through Qualtrics analytical software.

CHAPTER III - RESULTS

The survey used in the study was emailed to a list of 129 caregivers of children who completed early intervention services up to 5 years previously through TCCCD. Twenty-nine surveys were completed; however, the number of responses for each item varied. This survey consisted of 33 questions and was used to collect and apply descriptive statistics. The data from the survey are presented in four segments: caregiver demographics, child demographics, AAC-related questions, and caregiver perceptions.

Caregiver demographics

The questions in this section of the survey were designed to gather information and determine demographic information among the caregivers of children who received early intervention services at TCCCD. Results from item one, "What is your gender?" had a total of 25 respondents, with 100% identifying as female. Item two also was found to have a total of 25 respondents. For item two, "What is your age?", 36% indicated the age range of 25-34, 52% indicated the age range of 35-44, and 12% indicated the age range of 45-54. A total of 25 respondents answered item three and were asked to indicate race and/or ethnicity. Ninety-two percent indicated that they identified as Caucasian, 4% identified as Hispanic or Latino, and 4% identified as Black or African American. For item four, “What is your level of education?”, 24 respondents provided answers. Twelve and a half percent reported a high school diploma or equivalent, 25% reported that they had obtained an associate’s degree, 29.1% reported a bachelor’s degree, and 33.3% reported they had obtained a post-graduate degree. Item five, “How many children do you have?” had a total of 24 respondents. Twenty-nine percent reported having one child, 37.50% reported having two children, 25% reported having three children, 4.17%

reported having 4 children, and 4.17% reported having 6 or more children. Respondents were asked to describe the family unit in their home for item seven. A total of 24 selected an option to the question. Seventy-one percent of respondents reported a family unit of two parents with multiple children, 4.17% reported living in a home as a single parent with one child, and 25% reported having a family unit of two parents with one child. Item eight, "What is your relation to the child who attended TCCCD?", also had a total of 24 respondents. Ninety-six percent stated that they were the child's parent and 4.17% stated that they were the child's legal guardian (no relation).

Child demographics

This section of the survey sought to identify and describe demographic information about the children who received early intervention services through TCCCD. Item one, "What is your child's age?" had a total of 23 respondents. Twenty-six percent stated that their child was currently 5 years old, 8.7% reported that their child was 6 years old, 26.1% reported their child's current age as 7, 8.7% stated that their child was 8 years old, 13.1% reported that their child was 9 years old, and 17.4% respondents stated that their child was currently 10 years old. Item two asked caregivers to identify their child's primary medical diagnosis and had a total of 21 respondents. Seven percent reported autism, 38.1% reported a genetic syndrome, 23.8% reported hearing impairment, and 14.3% reported speech and/or language disorder.

Table 1

Child's primary medical diagnosis

Medical diagnosis *n* = 21	%
Autism	7.0%
Genetic syndrome	31.8%
Hearing impairment	23.8%
Speech and/or language impairment	14.3%

Item three, "What is your child's communication diagnosis?" had a total of 29 respondents. Seven percent stated that their child's communication diagnosis was childhood apraxia of speech, 27.6% reported language delay/disorder, 62.1% reported that their child had a diagnosis of speech delay/disorder, and 3.5% reported a feeding disorder.

Table 2

Child's communication diagnosis

Communication diagnosis *n* = 29	%
Childhood apraxia of speech	6.9%
Language delay/disorder	27.6%
Speech delay/disorder	62.1%
Feeding disorder	3.5%

For item four, respondents were asked to identify what age their child began receiving services at TCCCD. A total of 23 responses were recorded. Forty-four percent

reported their child began receiving services before their first birthday, 17.4% stated their child was 1-year-old, 21.7% stated their child was 2 years old, 8.7% reported their child was 3 years old, and 8.7% reported that their child was four 4 years old. Item five, "How many years did your child receive services at TCCCD?" had a total of 23 recorded responses. Nine percent stated that their child received services for 1 year, 17.4% reported that their child received services for 2 years, 34.8% reported their child received services for 3 years, 13.1% stated their child received services for 4 years, and 26.1% reported that their child received services for a total of 5 years. For item six, caregivers were asked about their child's current educational setting. Twenty-three responses were recorded. Sixty-three percent of respondents reported that their child was currently enrolled in public school, 13% reported that their child attended private school, and 21.7% reported that their child was homeschooled. Item 7 asked caregivers to identify if their child currently received any therapeutic support and had a total of 23 respondents. Eighty-seven percent indicated that their child currently received therapeutic support and 13% indicated that their child was not currently receiving therapeutic support. If respondents indicated “yes” to item seven, they were asked to identify specific therapeutic supports their child currently received through a “select all that apply” format. A total of 42 options were chosen. Forty-five percent of respondents reported that their child was currently receiving speech therapy, 16.7% stated that their child was receiving physical therapy, 28.6% reported that their child was receiving occupational therapy, 2.4% reported that their child was receiving counseling services, and 4.8% stated that their child was currently receiving behavioral therapy.

AAC-related questions.

In this section of the survey, caregivers were asked to provide information regarding their child's AAC usage or abandonment. For Item 1, "Did your child who attended The Children's Center for Communication and Development use any form of AAC?", there was a total of 22 recorded responses. Twenty-seven percent of respondents selected "yes" and 72.7% selected "no." Item two asked respondents to indicate if any of their other children had communication challenges. There was a total of 22 responses. Eighteen percent selected "yes" and 81.8% selected "no." If the respondent selected "yes" to item two, they were asked to indicate if they had AAC experience with any of their other children in item three. With a small total of four responses, 50% reported that they had previously had AAC experience with their other children and 50% reported that they had not. For Item 4, "Did your child consistently use any form of AAC at TCCCD?", there was a total of 26 responses. 34.7% reported PODD Communication Book, 23.1% reported sign language, 19.2% reported gestures, 11.5% reported that their child used a low technology SGD, 7.7% reported Snap Core First, and 4% reported that their child used LAMP.

Table 3

AAC systems used by children at TCCCD

Type of AAC system *n* = 26	%
PODD Communication Book	34.7%
Sign Language	23.1%
Gestures	19.2%
Low Tech SGD	11.5%
Snap Core First	7.7%
LAMP	4.0%
PODD Application	0.0%

Item five asked respondents to indicate if their child was currently utilizing an AAC system. There were a total of 25 responses. Twenty-eight percent reported "yes" and 72% reported "no." If respondents indicated "yes" in item five, they were asked to select the settings in which their child currently used an AAC system for item six. 40% reported that their child used an AAC system in a school setting, Forty percent reported the home environment, and 20% reported social settings. There were a total of 10 recorded responses for item six. If respondents selected "no" for Item five, they were asked to indicate when their child abandoned the use of an AAC system. With a total of seven responses, 29% stated that their child abandoned their AAC system once they entered school, 29% reported abandonment after speech improved while receiving services at TCCCD, 29% reported a specific age (ages 6 and 12 were reported), and 14% reported no specific reason for abandonment.

Caregiver Perceptions

In this section of the survey, caregivers were asked to select choices based on 11 perception statements. Statements related to AAC competence, services, usage, abandonment, appropriateness, and support. Selections were made on a five-point Likert scale ranging from strongly agree, somewhat agree, neutral, somewhat disagree, and strongly disagree.

Table 4

AAC-related caregiver perceptions

	n	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
1. Equipped to communicate with child using AAC	15	20.0%	13.3%	60.0%	0.0%	6.7%
2. Post TCCCD services hard to find	16	6.3%	18.8%	37.5%	18.8%	18.8%
3. Transition to next educational setting supported	16	62.5%	31.3%	6.3%	0.0%	0.0%
4. Current therapist is AAC competent	15	20.0%	6.7%	53.3%	20.0%	0.0%
5. Child's current device is appropriate/functional	15	13.3%	20.0%	60.0%	0.0%	6.7%

Table 4 (continued).

6. Want more services for child	15	53.3%	26.7%	13.3%	0.0%	6.7%
7. Post TCCCD, AAC usage increased	15	6.7%	0.0%	46.7%	13.3%	33.3%
8. Child no longer needs AAC	14	28.6%	14.3%	28.6%	14.3%	14.3%
9. AAC education provided post TCCCD	16	31.3%	25.0%	37.5%	6.3%	0.0%
10. No support for AAC post TCCCD	15	0.0%	20.0%	53.3%	0.0%	26.7%
11. AAC currently accepted	15	13.3%	6.7%	46.7%	6.7%	26.7%

Item 1, "I am equipped to communicate with my child using their AAC system" had a total of 15 responses. Twenty percent selected "strongly agree," 13.3% selected "somewhat agree," 60% selected "neutral" and 6.7% selected "strongly disagree." For Item 2, "Services after graduation from TCCCD were challenging to find," a total of 16 responses were recorded. Six percent reported "strongly agree," 18.8% reported "somewhat agree," 37.50% reported "neutral," 18.6% reported "somewhat disagree" and 18.6% reported "strongly disagree." Item 3 asked about AAC transitional support provided to caregivers as their child entered school. Sixty-three percent reported "strongly agree," 31.3% reported "somewhat agree" and 6.3% reported "neutral." Item 4, "My child's current therapist has extensive knowledge of AAC," had a total of 15 responses. Twenty percent reported "strongly agree," 6.7% reported "somewhat agree," 53.3% reported "neutral," and 20% reported "somewhat disagree." For Item 5,

respondents were asked to indicate if they felt their child's AAC system was functional and appropriate. Thirteen percent selected "strongly agree," 20% selected "somewhat agree," 60% selected "neutral," and 6.7% selected "strongly disagree." There were a total of 15 recorded responses. For Item 6, "I wish there were more services for my child," there were 15 responses. Fifty-three percent selected "strongly agree," 26.7% selected "somewhat agree," 13.3% selected "neutral" and 6.7% selected "strongly disagree." Item 7, "My child had increased use of AAC since graduation from TCCCD" had a total of 15 respondents. Seven percent reported "strongly agree," 46.6% reported "neutral," 13.3% reported "somewhat disagree," and 33.3% reported "strongly disagree." For item 8, respondents were asked to indicate if they believed their child did not currently need AAC. Twenty-nine percent selected "strongly agree,"14.3% selected "somewhat agree," 28.6% selected "neutral," 14.3% selected "somewhat disagree," and 14.3% selected "strongly disagree." There were a total of 14 responses. Item 9, "I have received continuous education from providers after my child graduated from TCCCD" had 16 recorded responses. Thirty-two percent reported "strongly agree," 25% reported "somewhat agree," 37.5% reported "neutral" and 6.3% reported "somewhat disagree." Item 10 asked respondents to indicate if they did not have anyone to support their efforts in getting an AAC system for their child after graduation from TCCCD. Twenty percent selected "somewhat agree," 53.33% selected "neutral," and 26.7% selected "strongly disagree." There were a total of 15 responses for Item 10. Item 11, "AAC is accepted and used in my child's current educational setting," had a total of 15 responses. Thirteen percent reported "strongly agree," 6.7% reported "somewhat agree, " 46.7% reported "neutral," 6.7% reported “somewhat disagree” and 26.7% reported “strongly disagree.”

CHAPTER IV – DISCUSSION

The research questions addressed in this study were: (1) "Are there factors related to the success of AAC post early intervention intensive program?" (2) What factors increase the use of AAC post early intervention intensive program?" (3) Are there significant differences among AAC methods and devices?" (a) Low technology vs. high technology? (b) Systems such as PODD, Snap Core First, LAMP? And (4) Are there significant differences relating to success factors among diagnosis groups?" (a) Autism? (b) Genetic Diagnoses?

Interpretation of Results

According to the author's data analysis, there are several factors that relate to the success and continuation of AAC post early intervention programs. Through previous research, various factors of success and continuation of AAC systems were reported (Topia & Hocking, 2012); however, data is sparse regarding AAC success after a child completes an early intervention intensive program. The author determined that there are a number of factors that play a key role in AAC success post early intervention. Through the caregiver perception responses, factors that related to the most success were as follows: transitional supports provided for future educational settings, AAC education provided post early intervention, appropriateness of the child's current AAC system, and caregiver AAC competence.

These findings suggested that caregiver education of how to facilitate language with their child who uses an AAC system is crucial for later success. Similar to results from this research study, Barker et al. (2013) highlighted the importance of the ways in

which caregivers model language through AAC as a key factor related to overall success and continuation.

Caregiver AAC competence and transitional support were also shown to be factors for AAC success, suggesting from the results that the 62% who reported they were supported in their transition to their child's next educational setting also reported a combined 33.3% of AAC competence with their child's system. While the caregiver competence percentage is lower than the transitional support percentage, it should be noted as positive due to the low 6.7% reported by caregivers as not being competent to communicate with their child using their AAC system. Previous research by Mandack et al. (2017) reported language growth through AAC when a child's caregivers were provided various supports when transitioning to different educational settings.

Although a large number of caregivers felt that they were adequately supported in their child's transition post early intervention at TCCCD, there appeared to be a breakdown in AAC education and continuation in the child's current education setting. Only 26% of caregivers reported having received AAC support post TCCCD intervention. This supported earlier evidence from Light et al. (2018) who also found support and implementation in a school setting to be limited. This data, combined with the low percentage of 20% reported for the child's current therapist's AAC competence, suggested a need for more educational support for caregivers. It also highlighted the importance of SLP continuing education with AAC to ensure family inclusion in AAC decision-making, appropriate system selection, and individualized intervention strategies. Similar results were noted by Chung and Stoner (2016) who also reported the importance of SLP AAC expertise in relation to overall AAC success. To further emphasize the

importance of overall AAC competence and individualization, data from the study revealed that only 6.7% of children increased their use of AAC post early intervention. Moreover, 53% of caregivers stated that they wished there were more services for their child.

Another factor of AAC success post early intervention that related to the level of acceptance of a child's AAC system in the current educational and social settings. This author determined that only 13.3% of caregivers feel that their child's system is welcomed by their peers and adults in a school setting as well as other settings. This is different from Ostvik, Ytterhus, and Baladin (2018) who reported positive AAC experiences in schools. Given this low percentage, children and their caregivers may choose to abandon their AAC systems. However, a large number of caregivers (46.7%) felt neutral about their child's system acceptance, which raises a need for further investigation. Caregivers were also asked to identify when their child abandoned their AAC system, in which 29% reported abandonment once their child entered school. The low post early intervention acceptance percentage combined with the higher school abandonment percentage may relate to overall peer, teacher, and school community AAC acceptance or lack thereof. Previous research by Ostvik, Ytterhus, and Baladin (2018) has noted the relationship between positive peer interactions with AAC acceptance and success. Therefore, through the data presented in this study, it can be suggested that higher percentages of AAC acceptance can lead to more success with AAC systems overall.

The author also sought to determine if there was a significant difference of success rates with various AAC systems. According to the data, the AAC system that

most caregivers reported their child using at TCCCD was the PODD communication book. Sign language and gestures closely followed. Because most children who receive early intervention services at TCCCD are below age four and have complex communication and motor needs, the high occurrence of using a low technology system like the PODD communication book is not surprising. Due to the low sample size number of 29, comparison statistics could not be used to determine which specific AAC system proved most successful post early intervention services. However, it can be generalized that low technology systems, along with gestures and hand signals proved to be positive and effective ways of communicating for children with complex communication needs between the ages of birth to four years.

Caregivers reported significantly lower usage of high technology AAC systems such as LAMP, Snap Core First, and PODD Application while their child received early intervention services at TCCCD. Several rationales could support this data. Various communication, motor, and sensory needs of the children could have played a factor in low technology AAC system preference, as well as SLP, child, and caregiver preference. Overall, the data from this study pointed to low-technology AAC systems as proving to be more successful within the population sample.

Because this study was conducted through a small early intervention service provider in a rural area of Mississippi, the low sample size did not allow for comparison of differences in AAC success related to different medical diagnoses such as autism or genetic disorders.

Limitations of the current study

Some limitations were noted throughout the process of the study and after its conclusion. One limitation was that the study was conducted on a small scale. The study only included a population of 129 with a sample size of 29. Due to this, only descriptive statistics could be used to analyze the data. This did not allow for comparisons among various questions in the survey and ultimately limited the results.

Another limitation of the study was that it was conducted using a single early intervention provider. The Children's Center for Communication and Development only accepts a small number of children for services for several reasons. The center is also located in a smaller city in the state of Mississippi. Because the study was conducted with only one small early intervention provider, it is difficult to empirically show with the experiment's data if the findings will generalize to larger populations.

Recommendations for future research.

A few changes should be implemented if this study is replicated. The population and sample size should be much larger to allow for more valid and reliable data. Results should be gathered from several early intervention providers in the future, not just one. It is important that a future study be conducted on a larger scale so that findings can be generalized. A larger scale study would also allow for better comparison of demographics, AAC systems, and diagnoses. Future research on AAC post early intervention is necessary for the improvement of implementation and overall success and continuation of AAC. More information can be gained in the future if a population is followed for a period of time to determine long term findings of AAC success. Because

there appeared to be a gap in AAC implementation in this study, future research should discuss specific implementation procedures as well.

Conclusion

SLPs frequently provide services to children who use or may need an AAC system. The use of AAC has become increasingly common to allow children with complex communication needs to supplement their speech, or replace their speech that is non-functional so that they can effectively communicate their thoughts, wants, and needs with others. It is an essential part of their lives. Early implementation of AAC systems for this particular population improves communication skills and a child's overall quality of life (Topia & Hocking, 2012). With this in mind, SLPs must pay careful attention to the various AAC success factors reported in previous research and in this particular study. Factors such as transitional supports provided for future educational settings, AAC education provided post early intervention, appropriateness of the child's current AAC system, and caregiver AAC competence were found to be successful factors of AAC post early intervention in this study. Results from this project can be used to guide future SLPs in providing an evidence-based implementation of AAC systems for children after completion of early intervention programs.

APPENDIX A – Electronic Survey

Demographics: Caregiver

1. What is your gender?
    - Male
    - Female
    - Non-binary / third gender
    - _____

2. What is your age?
    - Under 18
    - 18-24
    - 25-35
    - 36-50
    - 51-65
    - 66 or older

3. What is your race/ethnicity? Select all that apply.
    - Native American or Alaskan Native
    - Asian
    - Black or African American
    - Native Hawaiian or Other Pacific Islander
    - White
    - Hispanic or Latino
    - Other

4. What is your level of education?
    - Less than high school education
    - High school diploma or equivalent
    - Associate degree
    - Bachelor's degree
    - Post-graduate degree

5. How many children do you have?
    a. 1
    - 2
    - 3
    - 4
    - 5
    - 6+

6. Describe the family unit in your home.
    - Caregiver (non-parent) with one child
    - Two parents with multiple children
    - Single Parent with one child
    - Single parent with multiple children
    - Two parents with one child
    - Other: _____

7. What is your relation to the child who attended The Children's Center for Communication and Development?
    - Parent
    - Grandparent
    - Aunt
    - Uncle
    - Legal Guardian (no relation)
    - Sibling
    - Other

Demographics: Child

Tell me about the child who attended The Children's Center for Communication and Development (TCCCD) and Development by answering the following questions:

1. What is your child's age?
    - _____
2. What is your child's primary medical diagnosis? Ex. Autism, Cerebral Palsy
    - _____
3. What is your child's communication diagnosis?
    - Childhood Apraxia of Speech
    - Language delay/disorder
    - Speech delay/disorder
    - Feeding disorder
    - Voice disorder
4. At what age did your child begin receiving services at TCCCD?
    - _____ months
    - 1
    - 2
    - 3
    - 4
5. How many years did your child receive services at TCCCD?
    - Less than 1
    - 1
    - 2
    - 3
    - 4
    - 5
6. In what educational setting is your child currently enrolled?
    - Public school

- Private school
- Homeschool
- Hybrid homeschool (co-op program)
- Behavioral school
- Headstart
- Daycare

7. Does your child currently receive any therapeutic supports?
    - Yes
    - No

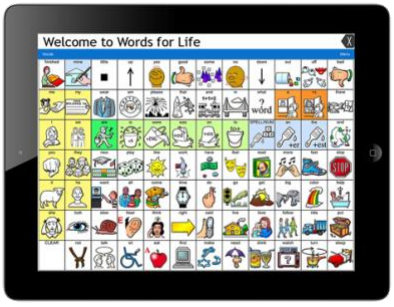
8. If yes, what specific supports does your child receive? Check all that apply:
    - Speech therapy
    - Physical therapy
    - Occupational therapy
    - Behavioral therapy
    - Play therapy
    - Other: _____

9. Do any of your other children have communication challenges?
    - Yes
    - No

10. If yes, have you had AAC experiences with multiple children?
    - Yes
    - No

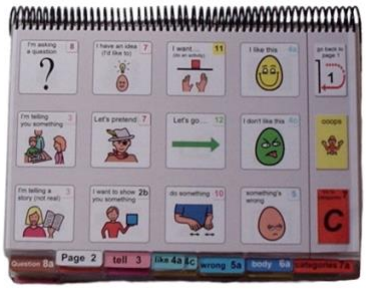
Augmentative and Alternative Communication (AAC) Specific Questions:

A brief description of AAC systems is shown below for reference.



LAMP: A high technology system available on an iPad or as a stand-alone device. It features small grid-sized symbols and it is not easily customizable. It focuses on motor planning for learning locations and understanding of vocabulary.

Snap Core First: A high technology system available on an iPad or as a stand-alone device. It features core vocabulary items (symbols) as well as fringe (lesser used words) in a folder system and it is easily customizable.



PODD: Considered a low technology system in book form, but it is high technology on an iPad. It is a pragmatic language social system that is easily customizable and there are special versions for kids with visual or other impairments (partner assisted versions).

1. Did your child consistently use any form of augmentative and alternative communication (AAC) at TCCCD? Check all that apply.
    - LAMP
    - Snap Core First
    - PODD communication book
    - PODD Application
    - Gestures (pointing, reaching, tapping, grabbing, etc.)
    - Sign Language
    - I'm not sure. Describe _____

2. Is your child currently using AAC?
    - Yes
    - No

3. If yes, in what settings do they use AAC? Check all that apply.
    - Home
    - School
    - Social Settings
    - Other: Describe _____

4. If no, when did your child stop using AAC to communicate?
    - _____

Perception Statements:

1. I am equipped to communicate with my child using their AAC device.
2. Services after graduation from TCCCD were challenging to find.
3. I felt the transition from TCCCD to the next educational environment was supported.
4. My child's current therapist has extensive knowledge of AAC?
5. I feel the device my child uses is functional and appropriate.
6. I wish there were more services for my child.
7. My child has increased use of AAC since graduation from TCCCD.
8. I do not feel my child needs AAC any longer.
9. I have received continuous education from providers after my child graduated from TCCCD.
10. I did not have anyone to support my efforts in getting an AAC system after graduation from TCC (i.e. communication book, application on IPad).
11. AAC is accepted and used in my child's current educational setting.

APPENDIX B –IRB Approval Letter

ORI | Office of Research Integrity

INSTITUTIONAL REVIEW BOARD

STANDARD (ONLINE) INFORMED CONSENT

STANDARD (ONLINE) INFORMED CONSENT PROCEDURES
☐ ***Use of this template is optional.*** However, by federal regulations (45 CFR 46.116), all consent documentation must address each of the required elements listed below (purpose, procedures, duration, benefits, risks, alternative procedures, confidentiality, whom to contact in case of injury, and a statement that participation is voluntary). Last Edited July 7th, 2021

Today's date: 08/10/21		
PROJECT INFORMATION		
Project Title: Success Factors of Agmentative and Alternative Communication Post Early Intervention		
Principal Investigator: Kathryn Roberts	Phone: 334-381-0052	Email: kathryn.roberts@usm.edu
College: Nursing and Health Professions	School and Program: Speech and Hearing Sciences; Masters of Speech-Language Pathology	

RESEARCH DESCRIPTION

1. **Purpose**:
   The purpose of this investigation is to determine success factors of augmentative and alternative communication post early intervention programs. The study also seeks to identify any differences between AAC methods and devices in relation to communicative success. Results will help guide current and future speech-language pathologists with insightful knowledge necessary for effective AAC service delivery.

2. **Description of Study:**
   The study will consist of an anonymous electronic survey of 21 questions and 11 perception statements using a Likert scale. The survey will take approximately 5-10 minutes to complete. Participants will include caregivers of previous Children's Center for Communication and Development clients.

3. **Benefits:**
   There are no benefits for participants at this time.

4. **Risks:**
   There are no risks related to the study. All participant information will be anonymous. Careful wording has been chosen for the survey to be inclusive and sensitive.

5. **Confidentiality:**
   The electronic survey will be anonymous.Confidentiality will be maintained throughout the duration and completion of the study. All data retrieved will be stored in a locked cabinet in a locked office.

6. **Alternative Procedures:**
   There are no alternative procedures in the study. Caregivers can choose not to complete the survey.

7. **Participant's Assurance:**
   This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5125, Hattiesburg, MS 39406-0001, 601-266-5997.

   Any questions about this research project should be directed to the Principal Investigator using the contact information provided above.

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