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Myth Endorsement and Children's Age of Referral to Augmentative and Alternative Communication

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Abstract

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MS, Walden University, 2013

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Dissertation Submitted in Partial Fulfillment

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Abstract

Children who are born without functional speech and who have complex communication needs are at a disadvantage because of their inability to verbally respond. Professionals disagree on when to incorporate augmentative and alternative communication (AAC), often missing critical windows of development. The purpose of this quantitative study was to determine the extent to which endorsement of myths related to AAC intervention persist among speech language pathologists (SLPs) and pediatricians, and the extent to which these myths and other factors influence age of referral for children with complex communication needs to receive therapy that incorporates AAC. Perlovsky's theory of a hierarchical relationship between language and cognition provided the framework for the study. Survey data were collected from 143 SLPs and 35 pediatricians. Responses were analyzed using a repeated measures analysis of covariance and multiple linear regression. Results indicated the higher the myth endorsement score, the older the age of referral. Furthermore, myth endorsement was negatively correlated with the number of referrals in the past year, and years in practice was positively correlated with the number of referrals in the past year. Findings may be used to encourage AAC intervention prior to or during language development to afford nonverbal children the opportunity to take an active role in language learning, communication success, and independence.

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Dedication

To Claire, my very best friend, and keeper of my soul. I dedicate this entire dissertation to you. You have sat untiringly with me, made me keep working, yelled at me when I was ready to give up, and held me up when I thought I couldn't take one more step. It was your faith in me that began this journey, and it is your forever loyalty that I can never repay. Thank you for everything….

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Chapter 1: Introduction to the Study

Most children develop speech and language appropriately; however, some are born with or acquire complex communication needs (CCNs) and never develop functional speech. The National Institute on Deafness and Other Communication Disorders reported that 7.7 percent of school-age children in the United States have a speech related disorder (Quick Statistics about Voice, Speech, Language, 2017); of those, 1 to 2.7 million children ages 6-17 have severe speech impairment (Childstats.gov., n.d.). These children come from a variety of backgrounds; the only commonality is the need for assistance with speaking and writing (Jones, 2004). The most common diagnoses of children with CCN include cerebral palsy (CP), apraxia of speech, autism, and severe intellectual disability (Jones, 2004). The development of language is key for children to communicate their wants and needs, to form relationships, and to gain knowledge of the world around them (Romski et al., 2006). Children who are born without functional speech and who have varying complex communication needs are at a disadvantage because of their inability to verbally respond.

Due to the complexity of language and cognitive development, it may take years to see the ineffectiveness of traditional therapy, leaving these children to experience frustration and delays in their cognitive development because of their inability to express themselves (Perlovsky, 2009). Traditional therapy focuses on correcting delays in articulation, receptive language skills, and expressive language skills. When a child's speech and language skills differ from researched norms, and if they are considered unable to effectively communicate their wants and needs, they are diagnosed with a

speech disorder (Edition & Bauman-Waengler, 2012). Traditional treatment for delays differs from speech pathologist to speech pathologist and from place to place. Ranges of typical speech development can be found on the internet and are easily accessible. Dodd, Holm, Hua, and Crosbie (2003) reported that at 8 years of age, a child should be able to correctly produce all English speech sounds. Therapeutic intervention that incorporates a speech-generating device differs from traditional therapy in that the child with CCN responds or expresses their language abilities by using some form of facilitated communication such as picture symbols, signs, gestures, writing and speech generating devices. This approach varies from traditional therapy in which the child is asked to use articulated and intelligible speech to respond to requests and commands. Augmented speech allows the child to ask questions, make requests, and ask for clarification before they are able to articulate. Romski et al. (2010) compared augmented and nonaugmented language interventions with toddlers diagnosed with developmental delays and found that augmentative and alternative communication (AAC) intervention facilitated speech production and language acquisition better than spoken language alone. Recent research in this area showed effectiveness not only in cognitive and linguistic development, but also in improving functional and intelligible speech (Blischak, Lombardino, & Dyson, 2003).

There are many reasons why therapy using AAC is withheld. Romski and Sevcik (2005) reported that the most common reason is the misconception that augmented communication will hinder or stop further speech development. The fear of children not developing functional speech when introducing a speech-generating device (SGD) is

unwarranted (Romski & Sevcik, 2005). The purpose of this study was to determine the effect of myth endorsement on recommended age of referral from pediatricians and speech-language pathologists (SLPs) of nonverbal patients to receive therapy utilizing augmented communication devices.

This chapter includes an overview of the study, starting with a general background, problem statement, purpose of the study, and research questions. Both theoretical and conceptual frameworks are described, followed by the nature of the study, including important definitions. Lastly, the assumptions and threats to validity are discussed along with the significance and social impact of this study.

Background

Hart and Risley's (1995, 1999) landmark studies showed that children who are spoken to by adults during mutual and parallel activities that are playful and not goal directed developed larger vocabularies. However, children with CCN are often unable to play and are unable to respond; therefore, adults tend to speak to and interact with them less (Blockberger & Sutton, 2003). Reciprocal and transactional relationships between parents and children have been recognized as important for development (Sameroff, 1990). Research has shown that the complex interplay between parents and child is often hindered due to the personality or disposition of the child (Lytton, 1990). Children with CCN may or may not have antisocial tendencies (Lytton, 1990); however, their medical needs often supersede social and playful interactions with their parents, as a parent's role becomes more of a nurse (Kirk, Glendinning, & Callery, 2005). Restricted access to communication partners, environmental exposure, and opportunities for communication

often results in deficits in development (Light, 1997). Additionally, during most communication interactions, the speaking partner takes on all roles needed in the exchange from initiation of topic and setting to termination of the conversation, thereby resulting in the creation of a passive participant (Blischak et al., 2003).

From birth until approximately 12 months of age, children experience adults labeling and repeating words during familiar routines, and children learn to comprehend these words through this interaction (Nelson, 1988). From 12 months on, children begin to acquire vocabulary rapidly through a method referred to as *fast mapping* (Carey & Bartlett, 1978; Dollaghan, 1987). This fast mapping of vocabulary results in an average gain of nine words a day. By the time children reach 6 years of age, they will have acquired on average 14,000 new words (Cary, 1978). In the past, it was believed that children with CCN did not have the ability to fast map; however, Romski et al. (2010) showed that when given symbols that represent speech, children with CCN have the ability to fast map and quickly develop expressive language through the use of these symbols. However, the use of symbols, including gestures, signs or pictures, via alternative and augmentative communication devices is often withheld from those with CCN until all other forms of therapeutic interventions are exhausted. The current study addressed the effect myth endorsement has on the recommended age of referral of nonverbal patients to receive therapy utilizing augmented communication devices.

Problem Statement

Despite empirical evidence supporting the efficacy of AAC, there are reasons cited for delaying or withholding AAC. Romski and Sevcik (2005) identified six myths that result in delaying or withholding AAC:

Myth 1: AAC is a last resort in speech-language intervention.

Myth 2: AAC hinders or stops further speech development.

Myth 3: Children must have a certain set of skills to be able to benefit from AAC.

Myth 4: Speech-generating AAC devices are only for children with intact cognition.

Myth 5: Children have to be a certain age to be able to benefit from AAC.

Myth 6: There is a representational hierarchy of symbols from objects to written words (traditional orthography).

The extent to which these myths persist among SLPs and pediatricians or the extent to which these myths and other factors influence age of referral for children with CCN to receive therapy that incorporates AAC was not clear. Little research had been directed toward the effects these myths have on the age a patient is referred, leaving a gap in the literature. Researchers have reported the benefits of early intervention (Armstrong, McLaughlin, Clark, & Neyman, 2012; Binger & Light, 2006, 2007; Millar, Light, & Schlosser, 2006; Romski & Sevcik, 2005; van der Meer et al., 2012), yet there were no guidelines regarding the appropriate age of referral.

Purpose

The primary purpose of this quantitative study was to determine the effect of myth endorsement on recommended age of referral of nonverbal patients to receive therapy utilizing augmented communication devices. Recommended age of referral may differ with respect to a patient's diagnosis of autism, apraxia of speech, intellectual disability, or cerebral palsy (National Joint Committee for the Communication Needs of Persons with Severe Disabilities, 2003), so recommended age of referral was obtained for each type. Recommended age of referral may also differ by referral agent (SLP or pediatrician), so these were compared. Finally, age of referral may be affected by experience, specifically the referral agent's length of time in practice or number of previous referrals, so these were statistically controlled, when warranted, as covariates.

Research Questions

Research questions (RQs) addressed the variables of myth endorsement, age of referral for each patient diagnosis (autism, apraxia, intellectual disability, or cerebral palsy) and referral agent (SLP or pediatrician). If length of time in practice, number of previous referrals, or other variables identified in the literature review were found to affect age of referral, then they were controlled as covariates as appropriate to answer the research questions.

RQ1: To what extent does age of referral differ by patient diagnosis, referral agent, and the interaction between patient diagnosis and referral agent?

H_o1a: While controlling for referral agent and the interaction effect, age of referral does not differ by patient diagnosis.

H_a1a: While controlling for referral agent and the interaction effect, age of referral differs by patient diagnosis.

H_o1b: While controlling for patient diagnosis and the interaction effect, average age of referral across all diagnoses does not differ by referral agent.

H_a1b: While controlling for patient diagnosis and the interaction effect, average age of referral across all diagnoses differs by referral agent.

H_o1c: Age of referral is independent of the interaction between patient diagnosis and referral agent; age of referral for any patient diagnosis does not differ by referral agent.

H_a1c: Age of referral depends on the interaction between patient diagnosis and referral agent; age of referral for any patient diagnosis differs by referral agent.

RQ2: What is the overall and relative effect of age of referral for each diagnosis, referral agent, time in practice, and number of prior referrals in accounting for variance in myth endorsement?

Research question 2 was answered by a model-building approach (see Jaccard & Jacoby, 2010) for which specific hypotheses are not applicable. The overall effect of the predictors was indexed by multiple-R^2, and the relative effects of each predictor were indexed by semipartial-r^2, which is the proportion of variance in the dependent variable uniquely accounted for a predictor.

Conceptual and Theoretical Framework

Romski and Sevcik's (2005) six AAC myths formed the basic conceptual framework guiding the expectation that the higher the agreement with the myths the older

will be the recommended age of referral. Myths derive from and are perpetuated within a profession by assumptions and prior practices (Romski & Sevcik, 2005), so SLPs and pediatricians having different professional focus and training are expected to differ in recommended age of referral. Among SLPs, training in the use of AAC is inconsistent. Coursework in the area of AAC is limited in SLPs' graduate programs (Ratcliff, Koul, & Lloyd, 2008), and 78% of SLPs surveyed in 2003 reported having only one class on AAC, which they rated as fair to poor (Marvin, Montano, Fusco, & Gould, 2003) and reported discomfort and a need for more training (Lebel, Olshtain, & Weiss, 2005). In addition, neither the American Academy of Pediatrics nor ASHA has age-based guidelines of when a child should be referred for therapeutic intervention that incorporates AAC referrals based on prior practice norms and ranges of typically developing children (Jones, 2004).

ASHA's (2016) position is that referral for AAC intervention is appropriate for those who have severe expressive impairments that prevent or interfere with oral language development, but there is no standard operationalization of "severe." Medicare requires that the patient possess the cognitive and physical abilities to effectively communicate using an AAC device (AAC-RERC, 2011). The conceptual frameworks of impairment severity and cognitive and physical ability guided the interpretation of differing age of referral results for patients with autism, apraxia of speech, intellectual disability, and cerebral palsy. Up to half of children who receive a diagnosis of autism will develop limited speech and language abilities (van der Meer & Rispoli, 2010), and more than half of those with a diagnosis of cerebral palsy will have some type of speech

impairment (Bax, Tydeman, & Hons, 2006). Although there are no data on the number of children with a primary diagnosis of apraxia achieving normal speech development (Worthey et al., 2013), prognosis appears to be linked to co-occurring symptoms, such as language and cognitive impairments and oral/limb apraxia (National Joint Committee for the Communication Needs of Persons with Severe Disabilities, 2003).

From a theoretical framework, the cognitive ability requirement (or any other reason for AAC delay) has child development implications. Language and cognition cannot be separated and thought of as two different aspects of development; together they allow children to learn and are so closely associated that without a solid base in language, cognition has nothing to scaffold upon (Perlovsky, 2009). Due to complex medical needs, these populations often experience limited environmental interaction and decreased communication partners, leaving them at a significant disadvantage from their peers. Vygotsky (1962) noted that a significant language repertoire was needed prior to the development of self-talk and problem-solving skills. To develop language skills and higher-level skills such as problem-solving, children need to physically work on or verbally consult with an adult about problems by manipulating and discussing the objects around them, leaving those with CCN at a further disadvantage. However, by using AAC devices early in development, children can seek assistance from those around them to manipulate their environment on their command. They can further initiate change and request action without being directed by another's thoughts and words, which allows them to scaffold newly learned information to enhance their speech-language and

cognitive skills. In the current study, age of referral findings were interpreted with respect to these theoretical implications.

Nature of the Study

A quantitative survey design was used with purposive sampling (see Creswell, 2009; Vogt, 1999) from the ASHA membership list and the Florida Chapter of the American Academy of Pediatrics. Using a quantitative survey design allowed for a comparison of the age of referral with respect to patient's diagnosis, index of AAC myth endorsement, and referral agent (SLP vs. pediatrician) while controlling for number of previous referrals and time in practice.

Definitions

Apraxia of speech: A motor speech disorder that makes the acquisition of speech difficult for children (ASHA, 2018).

Augmentative and alternative communication (AAC): Aided and unaided communication methods used to compensate for a severe speech impairment (ASHA, 2018).

Autism spectrum disorder: Social and communication impairments that appear in childhood that often include restricted interests, sensory impairments, and repetitive behaviors (APA, 2018).

Cerebral palsy (CP): A movement disorder that is caused by damage to an immature developing brain that results in muscle tone, posture, and movement impairments (Mayo Clinic, 2018).

Complex communication needs (CCN): A diagnosis of severe speech, language, and communication impairments, including autism spectrum disorder, cerebral palsy, intellectual disability, and apraxia of speech (Judge & Hospital, 2013).

Intellectual disability: A cognitive disability that presents before 18 years of age with limitation in both adaptive behaviors and intellectual functioning (American Association on Intellectual and Developmental Disabilities, 2018).

Assumptions

I assumed that the SLPs and pediatricians would be honest regarding their areas of expertise and time and practice, that these individuals would have adequate access to internet and technology to complete the survey online, and that the participants would have an adequate command of English to read and understand the survey items. I further assumed that the variables selected would encompass the measurement of the relationship between myth endorsement and the age of referral; that statistically significant findings would relate to area of expertise, years in practice, diagnosis, and level of myth endorsement; that the sample of SLPs would be representative of the population of SLPs; and that the sample of pediatricians would be representative of the population of pediatricians. Finally, I assumed that the participants would treat children with CCN and would be licensed in this area.

Scope and Delimitations

Threats to internal validity included selection bias, history of the participants, their level of myth endorsement, their time in practice, and their number of prior referrals. Testing bias posed a threat to validity because the participants would be

presented with the myths, potentially leading them to answer a question differently than they would have before reading the myth. There was a threat to external validity due to the fact that the survey was completely voluntary.

Significance

The results of this study provided data on age of referral to augmented communication devices for nonverbal children diagnosed with autism, apraxia of speech, intellectual disability, or cerebral palsy. Data were compared to determine whether myth endorsement affects the age of referral. Findings from this study were used to determine whether there is a need for further education to debunk myths among SLPs and pediatricians regarding the effectiveness of early intervention with augmentative communication. Early intervention is key to maximum linguistic and cognitive development for these children to become effective members of society (Jones, 2004).

Summary

Children born without functional speech and who have complex communication needs are disadvantaged by their inability to verbally respond and interact with their caregivers (Blockberger & Sutton, 2003), creating a gap between their potential for learning and their exposure to speech and language. The primary purpose of this study was to determine the effect of myth endorsement on recommended age of referral of nonverbal patients to receive therapy utilizing augmented communication devices. I also examined the extent to which a child's diagnosis affects when and at what age they are referred to receive therapeutic intervention that incorporates a speech generating device,

and whether the time and experience of the physician or SLP impact the age at which they refer for this type of intervention.

Chapter 1 included the framework, nature of the study, and threats to validity. Chapter 2 provides a literature review that shows the gap in the research for this population. This population, being unable to verbalize their thoughts and feelings, has been unable to have their needs met without depending on others, isolating them from participating in society. Using alternative communication gives children with complex communication needs a voice. Literature presented in chapter 2 emphasizes the need for early intervention for this population to be successful using this type of intervention. A voice is a powerful tool for all persons to have, and giving these children a voice allows them to be treated as active members of society and affords them the opportunity to participate in all facets of life.

Chapter 2: Literature Review

The research problem involved determining the extent to which myths persist among SLPs and pediatricians, or the extent to which these myths and other factors influence age of referral for children with CCN to receive therapy that incorporates AAC. The primary purpose of the study was to determine the effect of myth endorsement on recommended age of referral of nonverbal patients to receive therapy utilizing augmented communication devices. Recommended age of referral may differ with respect to a patient's diagnosis of autism, apraxia of speech, intellectual disability, or cerebral palsy. This chapter includes a review of literature related to education and training of professionals, theoretical foundations for earlier intervention, and persistent myths involving the utilization of augmented communication.

Literature Search

The search terms used for this study included *augmentative communication*, *augmentative and alternative communication (AAC)*, *autism spectrum disorders (ASD)*, *non-verbal*, *cerebral palsy (CP)*, *apraxia*, *intellectual disabilities*, *speech generating devices (SGD)*, *early intervention*, *efficacy*, and *severe developmental learning disabilities*. The search consisted of sources primarily published between 2000 and 2016, with outliers as early as 1962. Ninety-two articles were used as sources for the review, which included full-text, peer-reviewed articles from the following databases in Walden University's library: Academic Search Complete, Primary Search, Military & Government Collection, PsycARTICLES, PsycEXTRA, PsycINFO, and SocINDEX.

Information was also obtained from reliable, trustworthy sites found through search engines such as Google and Ask.

Prevalence of Nonverbal Communicators

According to the Centers for Disease Control and Prevention (2014), about 1 in 68 (1.5%) of children in the United States would be identified with autism spectrum disorder. Out of this 1.5%, experts estimated that approximately 20-30% remain nonverbal upon entering elementary school (Paul, 2009; Rogers, 2006). Statistics have shown the incidence of cerebral palsy to be approximately 3.6 out of every 1,000 births (Christensen et al., 2014). Cerebral palsy, however, is not a diagnosis that fits into one definition; it is more of a general description that results from a static insult or lesion to the developing brain that consists of impairments of movement and posture that may or may not result in speech, language, and cognitive delays (Cerebral Palsy Foundation, n.d.). Apraxia of speech is defined by ASHA (2018) as a neurological speech sound disorder in which the precision and consistency of movements underlying speech are impaired. Many children with diagnoses that may result in them remaining nonverbal may also acquire speech at some point in their life. However, due to physical deficits, as may be the case with cerebral palsy, along with significant behavioral and pragmatic language delays and challenges in conjunction with the possibility of co-occurring neurological speech impairments such as apraxia, differentiating who will develop age appropriate speech-language and cognitive skills and who will remain nonverbal is unclear (Romski et al., 2009).

Challenges of Referral Studies Involving Speech-Language Pathologist and Pediatrician Training

Understanding when and whom to refer is complicated for SLPs and pediatricians. The American Academy of Pediatrics does not have any recommended guidelines regarding when a child should be referred for an augmentative communication evaluation; referrals are based on researched norms and ranges of typically developing children. Course work in the area of AAC has been limited in SLPs' graduate programs (Ratcliff et al., 2008). Seventy-eight percent of SLPs surveyed in 2003 reported having one class on AAC, and they rated that training as fair to poor (Marvin et al., 2003). Fewer than 25% felt that the education they received was adequate, and they reported discomfort and a need for more training (Lebel et al., 2005). Many AAC courses are taught using a traditional on-site lecture format with little or no hands-on experience with the varying devices and their software (Ratcliff et al., 2008). Without familiarity with the software and a firm understanding of its capabilities, SLPs may struggle to understand what device is appropriate for what diagnosis. Trialing with unfamiliar devices may create a gap in the child's ability to functionally use the device (Ratcliff et al., 2008).

Approximately 50% of SLPs working in a school setting work with children who are assisted by augmented communication (Kent-Walsh, Stark, & Binger, 2008). Specialists in the area of AAC are often on the district level and are available for consult and evaluation to therapists on-site; however, it is up to the treating therapist to make this referral at the school level or to the pediatrician to make this referral in the community. The number of students on an SLP's caseload in a school district can be overwhelming,

and most therapy is done in a group setting or consultative to the special-needs teachers for children with complex communication needs (Alarcon, 2007). As a result, children utilizing AAC require intensive intervention that may not be available to them; also, when an SLP is considering a referral, they may feel it is inappropriate given the limited success with an attempted intervention. Kent-Walsh et al. (2008) noted that 83% of SLPs surveyed felt that their students would have greater success if they had access to more intensive interventions.

Block et al. (2013) found that doctors spend an average of 8 minutes with their patients. During this time, doctors are not only assessing the patient, they are also collecting history, speaking to the families, and documenting data in the electronic medical record (Block et al., 2013). Osborn et al. (2015) noted significant concerns in the United States as well as nine other countries regarding how physicians feel unprepared in their practices to manage the care of those with complex medical needs. Furthermore, physicians reported difficulties being able to communicate and coordinate care with specialists and service providers (Osborn et al., 2015). Difficulties coordinating with specialists may lead to delays and misdiagnoses because practitioners are unaware of the conceptual models of communication that can assist in guiding intervention of children with complex communication needs (Clarke & Price, 2012). Delays in starting interventions can result in language gaps, and a delay in referral may prolong interventions for several years (Clarke & Price, 2012). Crane, Chester, Goddard, Henry, and Hill (2015) found that parents reported an average delay of 3.5 years from the time they approached a health care professional and the diagnosis of autism.

Up to half of children who have received a diagnosis of autism will develop limited speech and language abilities (van der Meer & Rispoli, 2010), and more than half of those with a diagnosis of cerebral palsy will have some type of speech impairment (Bax et al., 2006). Although there are no current data on the number of children with a primary diagnosis of apraxia achieving normal speech development, prognosis appears to be linked to co-occurring symptoms such as language and cognitive impairments and oral/limb apraxias (Worthey et al., 2013).

SLPs who work in general practice provide assessment and treatments for a range of services; however, SLPs do not necessarily specialize in AAC assessment and treatment (Beukelman, Ball, & Fager, 2008). General practicing SLPs and pediatricians serve children in the community with complex communication needs in schools, hospitals, and long-term facilities and are often the finders of those needing referral to the AAC specialist (Beukelman et al., 2008). Guidelines of whom to refer and who is appropriate have yet to be developed (Binger et al., 2012). Global measures of intellectual ability, as well as language assessments, do not assist health care professionals in determining who is appropriate for referral because they require individuals to either use expressive language or motorically touch and manipulate objects. Myths regarding levels of cognition prior to the referral for AAC result from misguided understandings of speech and language and cognitive development (Jones, 2004). These misunderstandings result in children with CCN not being referred until later in development (Jones, 2004).

Theoretical Foundation

Vygotsky (1962) theorized that language and cognition merge at the age of 3 years, as inner speech is developing. Vygotsky noted that inner speech differentiated people from monkeys. As inner speech and complex language develops, a child's ability to problem-solve ideas and activities through self-talk and by seeking the assistance of those around them begins to emerge. Gaining the attention of others and seeking assistance often requires mobility (Vygotsky, 1962). Newly walking babies actively attend and seek initial social interaction (Clearfield, Osborne, & Mullen, 2008). This social interaction between a child and an adult is the foundation for the development of cognition and language. Children with CCN who do not have sufficient vocabulary or the ability to seek assistance and ask questions of those around them are left with cognitive and social disadvantages (Perlovsky, 2009).

Theorists hypothesized that the development of language is a result of interactions between the brain and the body, and this complex development is controlled and developed through the child's experiences (Nobre & Plunkett, 1997). Due to complex medical needs, children with CCN have limited environmental interactions and decreased communication partners, leaving them at a significant disadvantage from their peers. Prior to the development of self-talk and problem-solving skills, typically developing children physically work out their problems by manipulating the objects around them (Piaget, 1964). Those with CCN are at a disadvantage because many have co-occurring physical impairments that do not allow them to physically manipulate objects in their environment. By using AAC devices, children can seek assistance from those around

them to manipulate their environment on their command. They can initiate change and request action without being directed by another's thoughts and words.

Chomsky and Halle (1965) theorized that without an enormous amount of knowledge, a child cannot learn to speak or understand language in the way it is learned by other typically developing children. Tomasello (2000) noted that children develop language through direct imitation of modeled expressive language from their adult counterpart; without the ability to expressively communicate, children's language cannot develop appropriately. Language and cognition cannot be separated or thought of as two different aspects of development. Together they allow children to learn; without a solid base in language, cognition has nothing to scaffold upon (Perlovsky, 2009). Children with CCN can, with the use of AAC, acquire vocabulary at a more rapid pace (Blischak et al., 2003). As receptive language increases, children's expressive language also increases (Light & Drager, 2002) creating a base of knowledge for cognition to build on.

In summary, there are sensitive and critical periods of cognitive and linguistic development. Brains of animals reared from birth in physically and socially stimulating surroundings, when compared with those in isolation, show much denser synaptic connections (Greenough & Black, 1992). Research with children adopted as early as 8 months of age from deprived orphanages showed deficits in areas such as learning, behavior, attention, anger management, and impulse control (Gunnar & Cheatham, 2003). The most critical period of cognitive and language development is prior to the age of 3 (National Scientific Council on the Developing Child, 2007). Children with CCN will make the most significant gains when interventions are incorporated during these

early stages (ASHA, 2008). Based on these theories, early intervention with children with complex communication needs and the age of referral to augmentative communication intervention become imperative to their linguistic and cognitive development.

Empirical Literature Review Related to CCN

Most language development occurs prior to the age of 5 years. Delays that have not been corrected or continue to be present after this time often result in long-term deficits (Anderson et al., 2007; Pickett, Pullara, O'Grady, & Gordon, 2009). Early intervention has been an ongoing recommendation for years (Guralnick, 1997, 1998; National Research Council, 2001; Thelin & Fussner, 2005).

The importance of initiating therapeutic intervention that incorporates an SGD with a nonverbal child is noted by the National Scientific Council on the Developing Child (2007) who stated that the foundation for brain development occurs during the first three years of life and is secondary to learned experiences. This is consistent with ASHA's (2008) position statement that noted the greatest communication gains are made in the earliest stages of development.

AAC Intervention

Children Age 3 Years and Under

Branson and Demchak (2009) conducted a literature review on AAC use with children under 3 years of age. Twelve studies were used based on the inclusion criteria: (a) children who were diagnosed with significant communication deficits and developmental disabilities, (b) ages birth to three years, and (c) studies performed between 1982 and 2007. Out of the 12 studies reviewed, seven provided evidence that

early AAC implementation, whether aided or unaided, improved communication, and all 12 of the studies indicated improvement in the child's communicative ability.

Romski, Sevcik, Barton-Hulsey, and Whitmore (2015) completed a 30-year literature review on early intervention with AAC. The search included peer-reviewed journals from 1985 to 2014. One hundred forty-three articles were reviewed, including meta-analyses, case studies, and nonexperimental narrative reviews. Of the 143 articles, 73 were categorized as being broadly related to early intervention of AAC. Support for early AAC intervention for communication and language development was well documented. Studies indicated significant increases in language development for children 3 years old and under (Adamson & Dunbar, 1991; Barton, Sevcik, & Romski, 2006; Bondy & Frost, 1994; Wright, Kaiser, Reikowsky, & Roberts, 2013). Researchers noted increases in grammatical development of preschoolers after the age of 3 (Binger & Light, 2007). Additionally, reports described different and significant changes in communicative turns and functions (Light, Collier, & Parnes, 1985a, 1985b, 1985c), as well as increased communication initiations (Dicarlo & Banajee, 2000; Letto, Bedrosian, & Skarakis-Doyle, 1994).

In three of the studies, significant changes were noted with increased parent-child interactions resulting in increased communication (Light, Binger, & Kelford Smith, 1994; Mcconachie & Pennington, 1999). The evidence for early intervention and increased language and cognitive development spanned from preschool age to 10 years old with various disabilities such as apraxia of speech (Bornman, Alant, & Meiring, 2001), intellectual disabilities (Sevcik, Romski, & Adamson, 1999; Stephenson, 2007), cerebral

palsy (Goossens, 1989); sensory impairments (Harding, Lindsay, O'Brien, Dipper, & Wright, 2011; Rowland & Schweigert, 1989; Schweigert & Rowland, 1992), and autism (Johnston, Nelson, Evans, & Palazolo, 2003; Nunes & Hanline, 2007).

Shane and Bashir (1980) proposed prerequisites that took into consideration Piagetian stages, specifically tertiary circular reactions in which a child can think in terms of actions that go with an idea, and mental representation in which a sign or word can represent more than one thing.

Benchmarks were developed as prerequisites for the cognitive skills they felt were needed for a child to understand means/end behaviors and representational behaviors for successful, and therefore functional, use of AAC. They further proposed that a cognitive age of 18 months is required for children to achieve competence with an AAC device, however, formal tests have not been developed thus far that links these abilities (Beukelman & Mirenda, 1998).

Children With Primary Diagnoses of Intellectual Disabilities

Speech and language development is an indicator of overall development in children (Nelson, Nygren, Walker, & Panoscha, 2006) and is often considered an important indicator for school success (Silva, Williams, & McGee, 1987). Speech and language delays left untreated have a tendency to remain persistent 40-60% percent of the time. One study by Roulstone, Peters, Glogowska, and Enderby (2003) found that an initial language gap will continue to grow if left untreated. If an untreated language gap continues to grow, there is an increased risk for later learning disabilities. As children with speech and language delays enter school they are tasked with higher level learning,

such as reading and writing (Stern, Connell, Lee, & Greenwood, 1995). Being faced with higher-level cognitive tasks may lead to behavior problems and, in some cases, lower IQ scores and underachievement as they try to navigate their academic worlds (Young et al., 2002).

In order to develop functional speech and language skills, children must be able to understand as well as express language (Adamson, Romski, Bakeman, & Sevcik, 2010). Intact language skills allow a child to take on both roles of the speaker and the listener. The role of the listener is a passive role, but the role of the speaker guides the conversation and allows for exploration of newly learned information. Therefore, developing expressive language as early as possible should be a top priority for physicians and SLPs alike. Romski et al. (2010) completed a study with sixty-eight toddlers ages ranging from 24 to 36 months that compared augmented versus non-augmented language intervention with toddlers. All toddlers in the study were unable to produce more than 10 words. Medical etiology varied including genetic syndromes, seizure disorders, cerebral palsy, and children without a known diagnosis. All of the children who qualified for the study had normal hearing and vision. Category assignments were random. Each parent and child participated in 18 sessions with 3 parental coaching sessions. Results of this study showed that the children who received therapeutic intervention that incorporated an AAC device made growth not only in vocabulary, but in their ability to produce spoken words as compared to toddlers without the AAC device.

Children With Primary Diagnoses of Cerebral Palsy

Due to significant motor impairments, children with a clinical diagnosis of cerebral palsy face immediate barriers to their acquisition of language and speech development. Abnormal tone, coordination, respiration, phonation, resonance, and articulation skills often result in a diagnosis of dysarthria, a motor speech disorder (VanSant, 2006). The UK charity Communication Matters reviewed a report created by the University of Sheffield in collaboration with Barnsley Hospital that estimated approximately 20% of those diagnosed with CP could benefit from some form of AAC. It was further noted that 35% of children with CP will have some form of speech impairment with 24% essentially non-verbal at the age of 5 years old (Judge & Hospital, 2013).

The relationship between language development and motor skills was described by Iverson (2010). She gave two arguments:

First, the acquisition of motor skills provides infants with opportunities to practice skills relevant to language acquisition before they are recruited for that purpose. Second, the emergence of new motor skills changes infants' experiences with objects, people, and their own bodies in ways that are relevant for both general communicative development and the acquisition of language. (p. 254-255)

Language and motor development are so closely tied together that children with a diagnosis that includes motor impairments are at an immediate disadvantage. Augmenting communication for these individuals gives them access to their immediate environment, and to objects and vocabulary outside their environment. Children with

motor impairments are often unable to produce natural speech, or have little intelligible speech, and due to fine and gross motor deficits are not considered candidates for sign language (Clarke & Price, 2012). AAC is often classified as picture symbols or manual signs, therefore, therapy with these children often incorporate low and high-tech speech generating devices (SGD). SGDs use symbols and graphics to represent language; often orthography is present with the picture symbols that can be combined to make grammatical language units (Clarke & Price, 2012).

Clarke and Price (2012) completed a review of intervention principles, assessments, and AAC systems that are available to children with a diagnosis of CP. For assessment purposes, they noted that attention, executive function, and memory skills continue to be noted as important prerequisite skills needed for AAC intervention. Determining cognitive functioning without a speech generating device, and with a child with motoric restrictions, makes decision making complicated for professionals. Parental and professional attitudes toward AAC devices continue to be a barrier. This review further noted that the provision of AAC should not be considered the end of therapeutic intervention, but one aspect that can vary throughout time and facilitate communication across environments.

Children With Primary Diagnoses of Apraxia

Developmental apraxia of speech is a communication disorder that interferes with the development of language, social emotional development, and the ability to socially acclimate in school (Cumley & Swanson, 1999). Three case studies were reviewed by Cumley and Swanson (1999) in order to assess the effectiveness of AAC interventions

with children who have previously been diagnosed with Apraxia. These three children had initially participated in speech therapy that focused primarily on traditional articulation interventions and utilized sign language to support their natural speech. One child reviewed was of preschool age, the other elementary school age, and the third was in junior high school. In all three cases reviewed, natural speech was successfully augmented and allowed for opportunities for language growth and development. The incorporation of an AAC device, along with traditional therapy, promoted growth in academic achievement and increased competence in communication. More importantly, the children were reported to initiate more in conversation, maintain conversation, and repair misunderstandings and breakdowns between speaker and listener interactions.

Intelligibility in children with apraxia of speech can vary greatly. Inconsistent errors in prosody and articulation make traditional therapy ineffective for those with severe apraxia of speech (Oommen & McCarthy, 2015). Oommen and McCarthy (2015) created an online focus group with SLPs to investigate decision making and strategies currently being used when determining appropriate therapy for this group. This review and thematic analysis found the following consistent themes: treatment philosophy, rationale, history, benefits, key decision-making factors, therapy activities, goals, activities and generalization when collaborating with team members.

All therapists who participated in this discussion group had implemented both traditional speech therapy and AAC in conjunction with one another. This treatment philosophy and understanding presented as client-driven and highly effective. They felt by augmenting speech, whether through basic sign or speech generating device,

successfully facilitated and diminished negative behaviors. The biggest challenge to incorporating simultaneous therapy interventions was lack of training and experience of the SLP. Limited time to prepare was another area of weakness and lack of support or inconsistent collaboration (Oommen & McCarthy, 2015).

Decision making factors that influences the SLP's decision to recommend AAC or incorporate AAC was directly linked to the education and experience of the clinician. Their experience and comfort with augmented communication further influenced their use of, or referral to, AAC intervention because they considered areas such as severity of childhood apraxia of speech, age of the child, attention span, communication needs, motivation, willingness to communicate, and the child's current receptive and expressive language skills.

Strategies, activities, and therapy goals were also a focus of this group and several interventions were noted in this review; in all interventions, the goals focused on the acquisition of natural speech. Participants in this study expressed satisfaction using these dual focus strategies of AAC and natural speech because it presented as a way to decrease the child's frustrations during communication breakdowns. Decreased frustrations resulted in increased participation and increased the likelihood of independent initiation of speech by the child and increased generalization, therefore carryover, into different environments.

Children With Primary Diagnoses of Autism

Children with a diagnosis of autism present with persistent deficits in the social area of language development, sensory deficits that present as restrictive, repetitive motor

patterns, and behavioral concerns (Iacono, Trembath, & Erickson, 2016). The spectrum of autism ranges from deficits in pragmatic skills to severe language, cognitive, and speech delays. Approximately 30% of nonverbal children with autism benefit from therapeutic interventions that incorporate AAC (Iacono et al., 2016).

Iacono et al. (2016) completed a systematic review of 17 studies that researched AAC interventions with children up to 21 years of age. This review found the majority of studies completed on this population lacked conclusive evidence of the effectiveness of AAC with children with a primary diagnosis of autism. The limited studies that did yield conclusive evidence rated the effectiveness of this type of intervention as effective to highly effective for this population. Due to this gap in the research, this intervention is often neglected by practitioners and autism researchers.

Myths

Although research has repeatedly shown that early intervention with AAC has been beneficial to children regardless of their diagnosis, myths have persisted. Parents and professionals continue to dismiss AAC as a first line intervention (Jones, 2004) because of fears that AAC will hinder or stop speech development (Romski & Sevcik, 1988). Therapeutic interventions that incorporate AAC for children with cerebral palsy have been considered a viable option since the early 1980's (Light et al., 1985a, 1985b, 1985c). However, because global developmental coordination disorders and cerebral palsy present similar to one another, the diagnosis of cerebral palsy is often withheld until the age of five (McIntyre, Morgan, Walker, & Novak, 2011) and for children with a

diagnosis of developmental delay or intellectual delays, AAC services continue to be a last resort therapy (Romski, Sevcik, Barton-Hulsey, & Whitmore, 2015).

In addition, Sullivan and Lewis (2000) suggested that the limited use of assistive technology with very young children may be due to a common provider perspective that children with disabilities must possess an understanding of cause and effect, or other cognitive skills, before they can effectively use these devices. Similar beliefs about children needing to have specific speech and language competencies before using AAC devices have also been reported (Cress & Marvin, 2003). Decision makers continue to deny access to services that incorporate AAC because they feel their child or patient lacks the prerequisite skills required to functionally use a device (Light & McNaughton, 2013).

Using low-level forms of augmented communication with children who have received a diagnosis of autism has become a more common option, however, autism continues to be associated with a diagnosis of cognitive impairments (McPartland, Reichow, & Volkmar, 2012). It is estimated that one-third to one-half of children who have autism will not develop functional speech (National Research Council, 2001) and often the diagnosis of autism is not given until a child has reached school age (Howlin & Moore, 1997; Mandell, Ittenbach, Levy, & Pinto-Martin, 2007; Yeargin-Allsopp et al., 2003).

In the 1980's Miller, Chapman, Branston, and Reichle (1980) and Shane and Bashir (1980) described candidacy models for the incorporation of AAC that included chronological age as a consideration. Myths regarding age of referral continue to be present today. Technology as they knew it in the 1980's has changed significantly. The

Kaiser family foundation conducted a study in 2003 and reported that 27% of children in the one to four-year-old age range have used a computer of some kind (Altman, 2003). Inconsistent research in areas of AAC such as autism continue to perpetuate myths about when and what diagnosis to refer to therapeutic interventions that incorporate AAC devices. The National Autism Center (2009) viewed AAC as being an emerging intervention that should have a limited role due to a lack of conclusive studies. This is in contrast to years of work and research on AAC interventions with children with varying communication needs. Research in the field of AAC is complex because the only consistency in a diagnosis of complex communication needs is the fact that at the time of assessment the child is nonverbal. The diagnosis, causality, and presentation varies in severity from child to child. Research has shown that the earlier AAC intervention is incorporated into therapy the more successful the child will be immediately in decreasing frustrations and in the future increasing independence. No research study to date shows that the incorporation of AAC is harmful or hinders speech and language development; yet myth endorsements continue to persist, leading to therapy utilizing augmented communication devices continuing to be withheld. This research study investigated the correlation between these variable as they pertain to referrals from SLPs and pediatricians.

Chapter 3: Research Method

The primary purpose of the study was to determine the effect of myth endorsement on recommended age of referral of nonverbal patients to receive therapy utilizing augmented communication devices. Chapter 3 includes a description of the design and clarifies the approach that was used to measure the effect of this endorsement. Also included in this chapter is the sampling approach and the design rationale. This chapter further provides the data collection tool, including a description of the populations and sampling techniques that were used to ensure reliability and validity of this study.

Research Design and Rationale

The variables of interest in this study included an index of myth endorsement, age of referral, patient diagnosis, and referral agent (SLP or pediatrician). Myth endorsement, time in practice, and number of prior referrals were identified in the literature review to affect age of referral, therefore they were controlled as covariates in order to answer the research questions.

The nature of this study was a quantitative survey design (see Creswell, 2009; Vogt, 1999) using purposive sampling (see Daniel, 2012) from the ASHA membership list and the Florida Chapter of the American Academy of Pediatrics. Survey designs are used to sample from a population to make inferences about variables of interest (Creswell, 2009; Vogt, 1999), and purposive sampling is used to ensure participants fit the purposes of the study (Daniel, 2012). Using the quantitative correlational survey design allowed for a comparison of the age of referral with respect to patient's diagnosis,

index of AAC myth endorsement, and referral agent (SLP vs. pediatrician), controlling for time in practice and number of previous referrals. A quantitative approach was used to align with the survey instrument (see Appendix B) to explore the endorsement of myths as they relate to age of referral to advance knowledge in these two disciplines.

Methodology

Population

The target population was SLPs who are members of ASHA and pediatricians who are members of the Florida Chapter of the American Academy of Pediatrics. ASHA is the governing body and credentialing association for SLPs, students, speech language and hearing scientists, and audiologists. There are approximately 186,000 members. The Florida Chapter of the American Academy of Pediatrics marketing department provides a telephone number to a company that allows for the purchasing of a list of names from the approximately 2,100 members.

Sampling and Sampling Procedures

ASHA provided a random sampling list of SLPs, while a random sampling list of pediatricians was provided by the Florida Chapter of the American Academy of Pediatrics.

Procedures for Recruitment and Participation

Because ASHA provided only mailing addresses, not email addresses, SLPs and were sent a letter (see Appendix C) inviting them to access SurveyMonkey and respond to items that capture their profession, years in practice, and number of prior referrals to an AAC intervention. Pediatricians received an email copy of the letter sent by a third-

party company, MMS, referred by the Florida Chapter of the American Academy of Pediatrics. Duplicate emails were sent so that the pediatricians would receive three emails in a 60-day period inviting them to participate. The letter provided consent as well as a link to access the survey instrument. After the participants completed the study, they were thanked for their participation and given my contact information should future questions arise.

Sampling Frame

The sampling frame for this study was lists of certified SLPs and licensed pediatricians provided by be ASHA and the Florida Chapter of the American Academy of Pediatrics, respectively. Members of these associations who have opted out of sharing their information and participating in mailing lists were excluded from the sampling frame.

Power Analysis

The primary analysis was a repeated measures analysis of covariance (ANCOVA). Age of referral for each of the four patient diagnoses was the repeated measure. Referral agent was the independent variable, and the covariates were myth endorsement, time in practice, and number of prior referrals. With alpha = .05 and power = .80, a sample of 82 was needed to detect population effect sizes of Cohen's f = .25 for between groups and f = .13 for the repeated measures by group interaction.

Instrumentation

Demographic information included the participants' profession (SLP or pediatrician), years in practice, age range they primarily work with, setting in which they

work, area of specialization, number of prior referrals to an AAC intervention, AAC index of myth endorsement, and recommended age of referral to an AAC intervention for nonverbal children diagnosed with autism, apraxia, intellectual disability, or cerebral palsy. The plan was to have participants rate each of the six myths on a 5-point Likert agreement scale to create a composite index of myth endorsement. The six myths are the following:

Myth 1: AAC is a "last resort" in speech-language intervention.

Myth 2: AAC hinders or stops further speech development.

Myth 3: Children must have a certain set of skills to be able to benefit from AAC.

Myth 4: Speech-generating AAC devices are only for children with intact cognition.

Myth 5: Children have to be a certain age to be able to benefit from AAC.

Myth 6: There is a representational hierarchy of symbols from objects to written words (traditional orthography). (Romski & Sevcik, 2005)

Participants were asked to rate their level of agreement with each myth (strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree). A composite mean was computed. Participants also provided recommended age of referral four times, one for each diagnosis. Order effects were controlled by SurveyMonkey's randomization of the four questions asking age of referral for each diagnosis. See Appendix B for operationalization of the items including age of referral, time in practice of physicians and SLPs, and diagnosis. The following demographics were collected from each

participant: profession, years in profession, age range of patients, and setting in which they work.

Data Analysis Plan

A repeated measures ANCOVA was the primary analysis to determine (a) differences in age of referral by patient diagnosis (within-subjects effect), (b) differences in age of referral by referral agent (SLP or pediatrician; between-subjects effect), and (c) interaction effect between patient diagnosis and referral agent. Each of these primary effects of interest was analyzed while controlling for myth endorsement, time in practice, and number of prior referrals. An additional regression analysis, complementary to the repeated measures ANCOVA, was conducted to understand the overall and relative effect of age of referral, referral agent, time in practice, and number of prior referrals in accounting for variance in myth endorsement. Prior to these inferential analyses, the data were screened and cleaned for missing data, outliers, and violations of statistical assumptions that could have affected the results.

Threats to Validity

Threats to validity included testing bias. For this survey, the reader was presented with questions and asked to respond using a Likert scale. Reading the myths may have created bias leading the reader to answer a question differently than they would have prior to reading the question.

A threat to the internal validity of this study was selection bias. Participants were randomly selected from the sampling frame to mitigate this threat. However, people chose whether to complete the survey, and those who completed the survey may have had

different opinions than those who chose not to. Additional threats to internal validity were the history of the participants, specifically which group they belong to (SLPs or pediatricians); their level of myth endorsement; their time in practice; and their number of prior referrals. To address these threats to validity, I controlled for these variables in the use of repeated measures ANCOVA. SurveyMonkey allows one response per email address, which controlled for the access-to-survey threat to internal validity. The use of expert sampling ensured a sample appropriate to the needs of this study. Because the survey was completed voluntarily, there was an inherent threat to external validity.

Ethical Procedures

Participants had been provided an opportunity to opt out of mailings and participation lists. This had been done through their individual memberships in which they were afforded the opportunity to opt out of mailings and participation lists. Those contacted for participation in this study had agreed to their names and mailing address being distributed in a member contact list. Any risk of physical, social, or psychological harm was controlled by advising the participant of their right to stop answering questions at any time. Prior to dissemination of the survey instrument, approval was obtained from Walden University's Institutional Review Board (06-11-19-0400282).

Data Storage

Data were collected through SurveyMonkey, and participants were assigned a subject number. Data were stored on my personal computer in a password-protected database. Data were backed up to my password-protected external hard drive, which is stored in a locked file cabinet. The data will be securely maintained in this manner for a

period of 5 years. After five years, all electronic data files will be deleted from my computer and external hard drive.

Summary

Chapter 3 addressed the methodology and method of inquiry for the population and sampling procedures used to conduct this research. The data collection processes and data analysis were also described. This chapter also included instructions for the participants, along with the data collection tool, sampling methods, and size of sample needed to yield reliable results.

Chapter 4: Results

The purpose of this study was to determine the effect of myth endorsement on recommended age of referral of nonverbal patients to receive therapy utilizing augmented communication devices. Research questions addressed the variables of myth endorsement, age of referral for each patient diagnosis (autism, apraxia, intellectual disability, or cerebral palsy), referral agent (SLP or pediatrician), length of time in practice, and number of prior referrals. A repeated measures ANCOVA was used to examine the main and interaction effects of patient diagnosis and referral agent while controlling for the other key variables, and a multiple linear regression was used to examine the combined and relative effects of age of referral for each diagnosis, referral agent, time in practice, and number of prior referrals in accounting for variance in myth endorsement. In this chapter I describe the data collection process, data cleaning and screening, descriptive statistics of the sample, and results of inferential analyses.

Data Collection and Assessment of Missing Data

Participants were sent direct mail or emails inviting them to complete an online survey, through SurveyMonkey, on the age of referral to augmentative devices. Data were collected over a period of 6 months from July 2019 to December 2019. The survey was accessed by 124 SLPs and 44 pediatricians. Due to missing data for a number of the key variables (profession, age of referral for each of the four diagnoses, composite score for myth endorsement, years in profession, and number of referrals in the past year), 20 cases were eliminated before analysis was performed, leaving 110 SLPs and 38 pediatricians for the final data set.

Data Cleaning and Screening by Group

Because a primary interest was to compare SLPs and pediatricians, data were cleaned and screened separately for these two groups for univariate and multivariate outliers following standard procedures outlined in Tabachnick and Fidell (2007).

Screening for Univariate Outliers

The years in profession for SLPs varied from 1 to 48, and for pediatricians the years in profession varied from 1 to 36. SLPs and pediatricians differed in the number of referrals made in the past year. SLPs gave responses between 0 and 285 referrals, and pediatricians responded that they gave between 0 and 100 referrals. The values of 285 referrals for SLPs and 100 referrals for pediatricians were deemed potential outliers (with *z*-score values of 10.20 and 5.27, respectively); therefore, those cases were eliminated from further analysis, leaving a total of 109 SLPs and 37 pediatricians.

Screening for Multivariate Outliers

Multivariate outliers were screened following Tabachnick and Fidell's (2007) procedure to regress a random variable (the sequential ID number) on the key variables of profession, years in profession, number of referrals in the past year, age of referral of each of the four diagnoses, and the composite score of myth endorsement. The maximum Mahalanobis value was 40.956. Three cases exceeded the critical chi-square value of 26.125 for $df = 8$ at alpha = .001. These three cases were eliminated from further analysis, leaving a valid sample size of 143, composed of 108 SLPs and 35 pediatricians.

Descriptive Statistics

Years in Profession, Number of Referrals, and Age of Referral by Diagnosis

Table 1 shows the descriptive statistics for the participants, which include years in profession, number of referrals in the last year, and age of referral for each of the four diagnoses (autism, apraxia, intellectual disability, and cerebral palsy). The mean number of years in practice was 16.80 for SLPs and 15.30 for pediatricians. The mean number of referrals in the last year was more for SLPs (4.71) than for pediatricians (3.51). The mean age of referral for the four diagnoses was coded such that 1 represented the age range from 0 to 24 months; 2 represented 25 months to 3 years; 3 represented 3 years, 1 month to 4 years; 4 represented 4 years, 1 month to 5 years; 5 represented 5 years, 1 month to 7 years; 6 represented 7 years, 1 month to 10 years; and 7 represented above 10 years. Although the means for autism and apraxia were lower for pediatricians (2.51 and 2.49, respectively), as compared to those from SLPs (2.64 and 2.84), these means still fell within the range of 25 months to 3 years. For the diagnoses of intellectual disability and cerebral palsy, the means for pediatricians (2.97 and 2.77, respectively) were higher than those for SLPs (2.84 and 2.36), but these means represented the age range of 25 months to 3 years.

Table 1

Descriptive Statistics by Profession

Profession		Years	Referrals, year	Autism	Apraxia	Intellectual disability	Cerebral palsy
SLP	Mean	16.80	4.71	2.64	2.84	2.84	2.36
	Standard deviation	10.87	5.30	1.34	1.26	1.47	1.30
	Minimum	1.00	.00	1.00	1.00	1.00	1.00
	Median	15.00	3.00	2.00	3.00	3.00	2.00
	Maximum	48.00	25.00	7.00	7.00	7.00	7.00
	Skewness	.49	1.97	1.17	.67	.78	1.12
	Kurtosis	-.60	4.08	1.60	.23	.15	1.20
Pediatrician	Mean	15.30	3.51	2.51	2.49	2.97	2.77
	Standard deviation	11.58	6.20	1.40	1.09	1.44	1.55
	Minimum	2.00	.00	1.00	1.00	1.00	1.00
	Median	13.00	1.00	2.00	2.00	3.00	2.00
	Maximum	36.00	25.00	7.00	5.00	6.00	6.00
	Skewness	.33	2.45	1.36	.32	.30	.75
	Kurtosis	-1.47	5.43	1.93	-.67	-.95	-.35

Workplace Setting by Profession

Table 2 shows a crosstabulation of professions and setting. Participants were asked which setting they primarily work in: school, hospital, outpatient rehabilitation, or private practice. Profession and setting were not independent. SLPs were more likely to work in schools and outpatient rehabilitation, while pediatricians were more like to be employed in hospitals, $\chi_2(3, N = 142) = 49.3$, $p < .001$, Cramer's $V = .59$.

Table 2

Crosstabulation of Profession and Setting

Profession		Setting				Total
		School	Hospital	Outpatient rehabilitation	Private practice	
SLP	Count	43	9	24	31	107
	Expected count	32.4	21.9	19.6	33.2	107.0
	Adjusted residual	4.5	-6.2	2.2	-.9	
Pediatrician	Count	0	20	2	13	35
	Expected count	10.6	7.1	6.4	10.8	35.0
	Adjusted residual	-4.5	6.2	-2.2	.9	
	Count	43	29	26	44	142
	Expected count	43.0	29.0	26.0	44.0	142.0

Myth Endorsement

As shown in Table 3, a mean composite score for myth endorsement was calculated for each profession based on their responses to the six myths:

Myth 1: AAC is a “last resort” in speech-language intervention.

Myth 2: AAC hinders or stops further speech development.

Myth 3: Children must have a certain set of skills to be able to benefit from AAC.

Myth 4: Speech-generating AAC devices are only for children with intact cognition.

Myth 5: Children have to be a certain age to be able to benefit from AAC.

Myth 6: There is a representational hierarchy of symbols from objects to written words (traditional orthography). (Romski & Sevcik, 2005)

A higher score corresponded to a higher endorsement of the myths. The mean composite score for SLPs was 2.11, while the mean composite for pediatricians was 2.72, indicating that pediatricians had a higher endorsement of the myths related to AAC use.

Table 3

Myth Endorsement

		Mean composite score
SLP	Mean	2.11
	Standard deviation	.68
	Minimum	1.00
	Median	2.08
	Maximum	3.67
	Skewness	.32
	Kurtosis	-.54
Pediatrician	Mean	2.72
	Standard deviation	.57
	Minimum	1.17
	Median	2.83
	Maximum	4.00
	Skewness	-.17
	Kurtosis	1.01

Inferential Results

Research Question 1

A repeated measures ANCOVA was conducted to answer the first research question: To what extent does age of referral differ by patient diagnosis, referral agent, and the interaction between patient diagnosis and referral agent? The independent variable was referral agent (SLP or pediatrician), the repeated measure was age of referral for each of four diagnoses, and covariates included myth endorsement score, time in practice, and number of referrals in the past year. The statistical effects determined by the

repeated measures ANCOVA included (a) within-subjects effect (differences in age of referral by patient diagnosis), (b) between-subjects effect (differences in age of referral by referral agent, SLP or pediatrician), and (c) interaction effect between patient diagnosis and referral agent. Each of these effects were adjusted for the covariates, and estimated marginal means were reported. As shown in Table 4, those with cerebral palsy tended to be referred at the youngest age, followed by autism, apraxia, and intellectual disability.

Table 4

Age of Referral by Diagnoses

Factor	Mean	Std. error	95% confidence interval	
			Lower bound	Upper bound
1 Autism	2.49[a]	.13	2.23	2.74
2 Apraxia	2.56[a]	.12	2.33	2.78
3 Intellectual disability	2.77[a]	.13	2.50	3.03
4 Cerebral palsy	2.46[a]	.13	2.20	2.71

Note. a. Covariates appearing in the model are evaluated at the following values: Years = 16.43, Referrals, Year = 4.42, myths = 2.26.

The difference in age of referral was statistically significant for intellectual disability compared to each of the other three diagnoses, as shown in Table 5.

Table 5

Pairwise Comparisons of Age of Referral by Diagnoses

Factor 1 (I)	Factor 2 (J)	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval for difference[b]	
					Lower bound	Upper bound
1 Autism	2 Apraxia	-.07	.10	.50	-.28	.14
	3 Intellectual disability	-.28*	.10	.00	-.47	-.09
	4 Cerebral palsy	.03	.10	.78	-.17	.23
2 Apraxia	3 Intellectual disability	-.21*	.10	.03	-.40	-.02
	4 Cerebral palsy	.10	.09	.28	-.08	.28
3 Intellectual disability	4 Cerebral palsy	.31*	.08	.00	.15	.47

Note. Based on estimated marginal means.
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

The overall interaction effect between profession and age of referral across the four diagnoses was statistically significant, as illustrated in Figure 1 (actual values are reported in Table 6). While controlling for myth endorsement, time in practice, and number of referrals in the past year, I discovered that SLPs tended to refer patients with autism, apraxia, and intellectual disability at an older age than did pediatricians. The age of referral for those with cerebral palsy was essentially the same between SLPs and pediatricians.

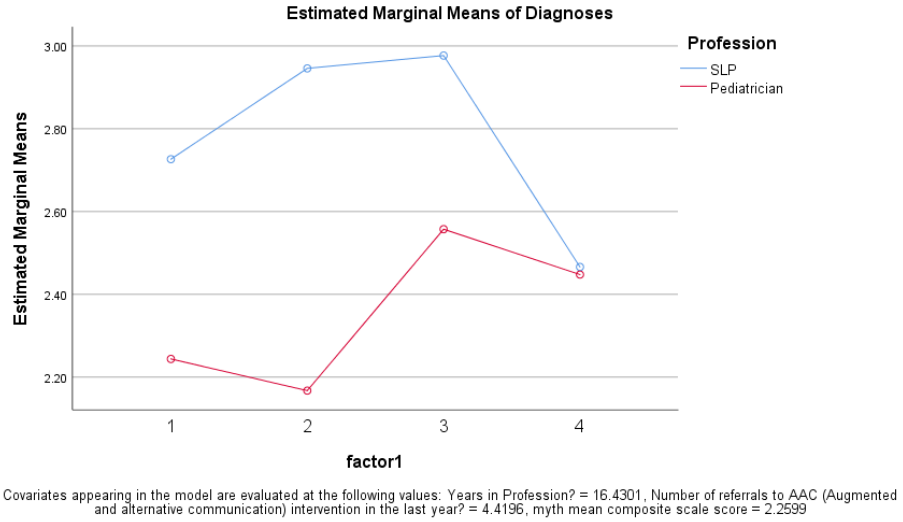

Figure 1. Estimated marginal means by diagnosis and profession.

Table 6

Covariate Adjusted Means of Each Diagnosis by Profession

Profession	Factor 1	Mean	Std. error	95% Confidence interval	
				Lower bound	Upper bound
SLP	1Autism	2.73[a]	.13	2.47	2.98
	2 Apraxia	2.95[a]	.11	2.72	3.17
	3 Intellectual disability	2.98[a]	.13	2.72	3.24
	4 Cerebral palsy	2.47[a]	.13	2.22	2.72
Pediatrician	1Autism	2.24[a]	.23	1.78	2.71
	2 Apraxia	2.17[a]	.21	1.76	2.58
	3Intellectual disability	2.56[a]	.24	2.08	3.04
	4 Cerebral palsy	2.45[a]	.23	1.99	2.91

Note. a. Covariates appearing in the model are evaluated at the following values: Years = 16.43, Referrals, Year = 4.42, myths = 2.26.

Table 7 shows parameter estimates for each of the diagnoses. The SLPs' age of referral for apraxia was statistically significantly later and approached significance for intellectual disability compared to pediatricians. Additionally, for each of the four diagnoses, the myth endorsement composite score significantly accounted for age of referral: the higher the myth endorsement score, the older the age of referral.

Table 7

Parameter Estimates by Diagnosis

Diagnosis	Parameter	B	95% Confidence interval		t	Sig.	Partial eta squared
			Lower bound	Upper bound			
Autism	Intercept	.92	-.20	2.04	1.62	.11	.02
	Years	.01	-.01	.03	.65	.52	.00
	Referrals, year	-.02	-.06	.03	-.71	.48	.00
	Myths	.57	.22	.92	3.17	.00	.07
	SLP	.48	-.06	1.03	1.76	.08	.02
	Pediatrician	0[a]					
Apraxia	Intercept	.49	-.50	1.48	.97	.33	.01
	Years	-.00	-.02	.02	-.09	.93	.00
	Referrals, year	.02	-.02	.05	.87	.38	.01
	Myths	.72	.40	1.03	4.51	.00	.13
	SLP	.78	.30	1.26	3.20	.00	.07
	Pediatrician	0[a]					
Intellectual disability	Intercept	.27	-.89	1.43	.46	.65	.00
	Years	.01	-.01	.03	.73	.47	.00
	Referrals, year	.01	.57	1.30	.54	.59	.00
	Myths	.94	.57	1.30	5.04	.00	.16
	SLP	.42	-.14	.98	1.48	.14	.02
	Pediatrician	0[a]					
Cerebral palsy	Intercept	.99	-.14	.98	1.76	.08	.02
	Years	.00	-.02	.02	.35	.73	.00
	Referrals, year	-.02	-.06	.02	-1.04	.30	.01
	Myths	.66	.31	1.02	3.73	.00	.09
	SLP	.02	-.52	.56	.07	.95	.00
	Pediatrician	0[a]					

Note. a. This parameter is set to zero because it is redundant.

Research Question 2

What is the overall and relative effect of age of referral for each diagnosis, referral agent, time in practice, and number of prior referrals in accounting for variance in myth endorsement?

Prior to conducting the regression, correlations among variables were examined. Table 8 shows the correlation matrix, whereby it can be seen that myth endorsement was positively correlated with an older age of referral for each diagnosis and negatively correlated with the number of referrals in the past year (the more referrals the lower the myth score) and negatively correlated with SLP (meaning SLPs had lower myth scores compared to pediatricians). Additionally, years in practice was positively correlated with the number of referrals in the past year. In an initial regression run, each predictor had an acceptable variance inflation factor value (1.0 to 4.1) indicating results would not be seriously affected by multicollinearity.

Table 8

Correlations

Variable	1	2	3	4	5	6	7	8
1. Myths	1.00	.02	-.34	.26	.28	.39	.37	-.38
2. Years	.02	1.00	.17	.06	.03	.08	.02	.06
3. Referrals, year	**-.34**	**.17**	1.00	-.14	-.04	-.09	-.20	.09
4. Autism	**.26**	.06	**-.14**	1.00	.67	.75	.72	.04
5. Apraxia	**.28**	.03	-.04	.67	1.00	.73	.72	.13
6. Intellectual Disability	**.39**	.08	-.09	.75	.73	1.00	.83	-.04
7. Cerebral Palsy	**.37**	.02	**-.20**	.72	.72	.83	1.00	-.13
8. SLP	**-.38**	.06	.09	.04	.13	-.04	-.13	1.00

Note. Coefficients printed in bold are significant (p<.05)

Regression residuals were normally distributed with no apparent outliers (see Figure 2), and the assumptions of linearity and homoscedasticity were satisfactory as visually assessed in Figure 3.

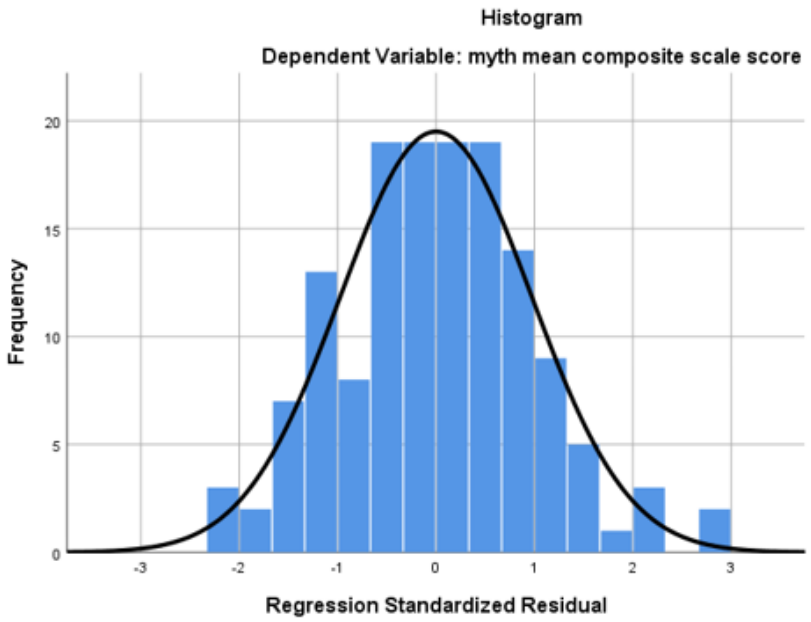

Figure 2. Histogram of standardized residual.

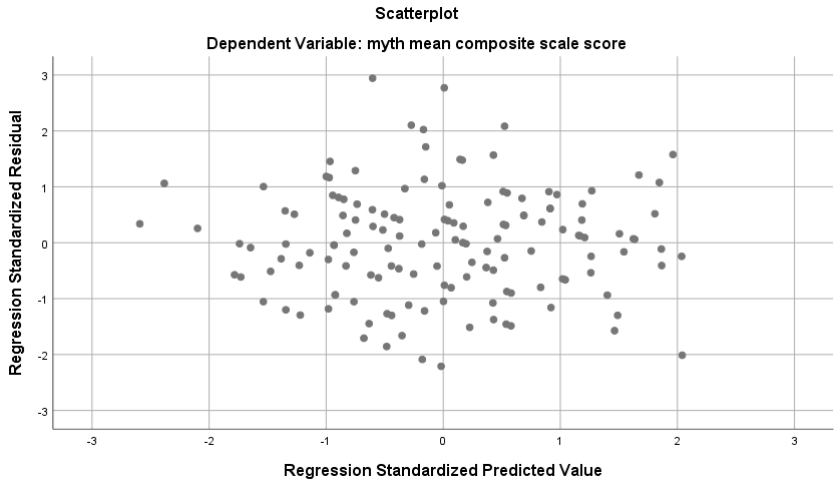

Figure 3. Scatterplot of standardized predicted and residual values.

The seven predictor variables: years in practice, referrals in the last year, age of referral for each diagnosis (i.e., autism, apraxia, intellectual disability, cerebral palsy), and SLP combined to account for 37.9% of the variance in myth endorsement.

Despite the simple regression showing that six of the seven predictors had statistically significant correlations with myth endorsement, in controlling for the correlations among predictors, it was found that only three of the predictors were significant. SLPs had lower myth endorsement scores that uniquely accounted for 12.25% of the variance (i.e., part correlation squared). The number of referrals in the past year was inversely correlated, accounting for 8.82% of the variance in myth endorsement. The age of referral for those diagnosed with intellectual disability accounted for 3.42% of the variance (the older the age of referral the higher the myth endorsement). The age of referral for apraxia approached significance with a $p = .092$ and uniquely accounted for 1.32% of the variance.

Table 9

Coefficient for Myths Variable

Factor	B	95% Confidence interval		t	Sig.	Part correlation
		Lower bound	Upper bound			
Constant	2.29	1.97	2.60	14.36	.00	
Years	.00	-.00	.01	1.02	.31	.07
Referrals, year	-.04	-.06	-.02	-4.38	.00	-.30
Autism	-.05	-.16	.06	-.86	.39	-.06
Apraxia	.11	-.02	.23	1.70	.09	.12
Intellectual Disability	.18	.05	.31	2.72	.01	.19
Cerebral Palsy	-.06	-.20	.08	-.89	.38	-.06
SLP	-.61	-.84	-.37	-5.16	.00	-.35

Summary

There was a statistically significant difference in age of referral found for intellectual disability compared to each of the other three diagnoses. Additionally, those with cerebral palsy tended to be referred at a younger age than those with other diagnoses. The interaction effect between profession and age of referral across the four diagnoses was also found to be statistically significant. Overall SLPs tended to refer patients with autism, apraxia, and intellectual disability at an older age than did pediatricians, while the age of referral for those with cerebral palsy was essentially the same between the two professions. Myth endorsement was positively correlated with an older age of referral for each diagnosis, while being negatively correlated with the number of referrals in the past year (the more referrals the lower the myth score) and negatively correlated with SLP (meaning SLPs had lower myth scores compared to pediatricians). Additionally, years in practice was positively correlated with the number of referrals in the past year.

Chapter 5 presents an interpretation of these findings, specifically as they relate to the literature reviewed, as well as recommendations based on the findings. I will also discuss limitations of this study and implications for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Approximately 0.2% to 0.6% of school-age children around the world have a severe speech impairment. In the United States, between 1 and 2.7 million children ages 6-17 have a severe speech impairment (Childstats.gov., n.d.). The most common diagnoses of children with CCN include cerebral palsy, apraxia of speech, autism, and severe intellectual disability (Jones, 2004). Traditional therapy focuses on correcting delays in articulation, receptive language skills, and expressive language skills. Therapeutic intervention that incorporates a speech generating device differs from traditional therapy in that the child with CCN responds or expresses their language abilities by using some form of facilitated communication. Researchers have reported benefits of early intervention using augmented communication (Armstrong et al., 2012; Binger & Light, 2006, 2007; Millar, Light & Schlosser, 2006; Romski & Sevcik, 2005; van der Meer et al., 2012), yet there are no guidelines as to the appropriate age of referral. Although there is empirical evidence of the efficacy of AAC, there are reasons cited for delaying or withholding AAC. Romski and Sevcik (2005) identified six myths for delaying or withholding AAC:

Myth 1: AAC is a “last resort” in speech-language intervention.

Myth 2: AAC hinders or stops further speech development.

Myth 3: Children must have a certain set of skills to be able to benefit from AAC.

Myth 4: Speech-generating AAC devices are only for children with intact cognition.

Myth 5: Children have to be a certain age to be able to benefit from AAC.

> Myth 6: There is a representational hierarchy of symbols from objects to written words (traditional orthography). (p. 178)

The research problem was the extent to which these myths persist among SLPs and pediatricians and the extent to which these myths and other factors such as patient diagnosis, referral agent, and the interaction between patient diagnosis and referral agent influence age of referral for children with CCN to receive therapy that incorporates AAC was unknown. Little research had been directed toward the effects these myths have on the age a patient is referred, leaving a gap in the literature. Chapter 5 provides an interpretation of the findings, limitations of the study, recommendations for action, implications for social change, and final comments.

I tested the hypothesis that there is a statistically significant correlation between myth endorsement and the age of referral from pediatricians and SLPs of nonverbal patients to receive therapy utilizing augmented communication devices. I found that myth endorsement significantly accounted for age of referral: the higher the myth endorsement score, the older the age of referral. I also found that SLPs had lower myth endorsement scores than pediatricians; the number of referrals in the last year was negatively correlated with myth endorsement (the more referrals made in the last year, the lower the myth endorsement); and the age of referral for those diagnosed with intellectual disability was significant, which indicated that the older the age of referral, the higher the myth endorsement.

Interpretation of the Findings

Regarding referral by diagnosis, I found that those with cerebral palsy tended to be referred at the youngest age, followed by autism, apraxia, and intellectual disability. The difference in age of referral for intellectual disability was statistically significant compared to each of the other three diagnoses. Sixty-three out of 123 SLPs reported referring children with intellectual disabilities after the age of 3, and 16 SLPs referred children with intellectual disabilities after the age of 5. The foundation for brain development occurs during the first three years of life (see National Scientific Council on the Developing Child, 2007). Initial language gaps will continue to grow without intervention, increasing the likelihood of learning disabilities (Roulstone et al., 2003). Additionally, 23 out of 41 SLPs who referred after 3 years of age reported "agree" on the endorsement of Myth 3 ("Children must have a certain set of skills to be able to benefit from AAC"), indicating a direct correlation between endorsement of this myth and increased age of referral. Withholding this type of intervention until after the age of 3 may result in cognitive development being delayed and the ability to develop later skills also being delayed.

When comparing age of referral of each diagnosis by profession, I discovered that SLPs tended to refer patients with autism, apraxia, and intellectual disability at an older age than did pediatricians; the age of referral for those with cerebral palsy was essentially the same. SLPs' age of referral for those with apraxia was statistically significantly later and approached significance for intellectual disability compared to pediatricians. The

overall interaction effect between profession and age of referral was statistically significant across all diagnoses.

More than 35% of the pediatricians surveyed reported referring children with a diagnosis of autism, apraxia, or intellectual disability by 25 months. This discrepancy between pediatricians and SLPs is most likely the result of physician discomfort with the management and care of children who are nonverbal with complex medical needs (Osborn et al., 2015). Due to this discomfort, pediatricians refer to the American Academy of Pediatrics's (2011) guidelines of typical development in which a typically developing child should be able to say 50 to 100 words by 24 months. When delays are noted, pediatricians refer to speech pathologists to determine what type of intervention would best meet the needs of their patients.

From a theoretical framework, the cognitive ability requirement (or any other reason for AAC delay) has child development implications. Perlovsky (2009) theorized that language and cognition cannot be separated or thought of as two different aspects of development. Vygotsky (1962) theorized that language and cognition merge at the age of 3. However, the results of this study indicated that more than 50% of SLPs surveyed continue to refer these diagnoses after the age of 3, potentially missing critical periods of brain development (see National Scientific Council on the Developing Child, 2007).

ASHA (2008) reported that the most significant gains in cognitive and language development occur when interventions are incorporated prior to the age of 3. However, endorsement of myths continues to be prevalent and directly affects the age of referral for AAC intervention apparently because of SLP discomfort with incorporating AAC into

their traditional therapy. Although no statistical significance was evident, it appeared those with fewer than 5 years of experience and those with more than 25 years of experience reported earlier referral to AAC than those between 5 and 25 years of experience. This may be explained by new therapists being more acclimated to technology and those with more than 25 years of experience being more confident in their therapy skills and having more experience with these complex populations.

Due to complex medical needs, children with cerebral palsy often experience limited environmental interaction. In this study, approximately 15% of SLPs reported referring children with a diagnosis of cerebral palsy after the age of 4. To develop language skills and higher-level skills such as problem-solving, children need to physically work on or verbally consult with an adult about problems (Vygotsky, 1962). This discrepancy between what is being reported and what is recommended is most likely the result of a combination of continued myth endorsement by SLPs and parental focus on the complexity of their child's medical needs (Kirk et al., 2005) along with misconceptions and attitudes toward AAC intervention (Clarke & Price, 2012).

Limitations of the Study

Although a significant correlation was found, there were limitations of this study. The first limitation was the small sample of pediatricians; only 35 were included in the analysis. The small sample size may limit the generalizability of the findings. Additionally, the sample of pediatricians was selected from the Florida Chapter of the American Academy of Pediatrics, not all pediatricians across the United States.

Another potential limitation of the study was the use of age ranges in the survey as opposed to allowing for an open-ended response. With an open-ended response, a specific mean age of referral could have been calculated. Although the mean age of referral across diagnosis and across profession was the same age range (25 months to 3 years), there was some variability. If respondents had been given the option to state specific ages, that variability may have been statistically significant. Additionally, most physicians who completed the survey reported being employed in a hospital setting where access to this population may have been limited; this contrasted with SLPs who reported being primarily employed in schools and outpatient rehabilitation settings.

I attempted to mitigate limitations by eliminating univariate outliers and multivariate outliers. There were outliers for the number of referrals from SLPs and pediatricians. Two cases were eliminated: one SLP who reported referring 285 patients in the last year and one pediatrician who reported referring 100 patients to AAC. Three additional cases were eliminated as multivariate outliers.

Recommendations

This study provided information on the age pediatricians and speech pathologists are referring nonverbal children to therapeutic intervention that incorporates a speech generating device, and the influence of myth endorsement on the age they refer. Due to the limitations of this study, there is a need for additional studies with larger sample sizes to increase generalizability. Furthermore, researchers could perform a chart review to determine who made the initial recommendation to AAC for patients who are nonverbal (SLP or pediatrician) and at what age the recommendation was made.

Implications

Approximately one third of children diagnosed with autism will remain minimally verbal or nonverbal after years of intensive intervention (Rose, Trembath, Keen, & Paynter, 2016). Failure in the development of expressive language skills is the most commonly reported developmental delay for children with ASD (Franchini et al., 2018). Approximately 24% of children with a diagnosis of CP will remain nonverbal after the age of 5 (Judge & Hospital, 2013), and due to significant motor impairments, 35% of children with a diagnosis of CP will have some form of speech impairment (Judge & Hospital, 2013). There are multiple theories on the acquisition of language, and many of them reference a language burst in which children double and triple their understanding and expressive use of language (Bates, Dale, & Thal, 1995). Although the exact age range in which this burst occurs varies from 14 months to 30 months, the most commonly reported prediction from theorists is 17-19 months.

The result of the current study indicated that the average age of referral for nonverbal children to receive AAC intervention was between 25 months and 3 years of age. To develop functional speech, children must be able to understand and express language (Adamson et al., 2010), and language gaps left untreated will remain consistent 40-60% of the time and will continue to grow, increasing the risk of later learning disabilities (Stern et al., 1995).

The results of this study provided evidence of the prevalence of myth endorsement and its impact on the age of referral of nonverbal patients to therapy incorporating the use of AAC. Diminishing belief in myths and referring nonverbal

children to receive some form of AAC intervention prior to or during language development would afford these children the opportunity to take on an active role in language learning; they would be able to guide conversation, increasing their ability to explore newly learned information and decreasing their initial language gap, decreasing the likelihood of later learning disabilities, increasing the chances of success and participation in typical classrooms and work environments, and promoting independence in the future.

Conclusion

The current study focused on the correlation between myth endorsement and the age of referral from pediatricians and SLPs of nonverbal patients to receive therapy utilizing augmented communication devices. The results of the repeated measures ANCOVA indicated a significant relationship between myth endorsement and age of referral: A higher myth endorsement score tended to result in an older age of referral. The interaction effect between profession and age of referral across the four diagnoses was statistically significant. SLPs tended to refer patients with autism, apraxia, and intellectual disability at an older age than did pediatricians. Both professions tended to refer those with cerebral palsy at approximately the same age. Furthermore, myth endorsement was negatively correlated with the number of referrals in the past year, and years in practice was positively correlated with the number of referrals in the past year. Results indicated that the more experience a pediatrician or SLP has, the more likely they are to refer a patient to AAC and the less likely they are to endorse the myths associated with AAC intervention.

Understanding the results of this study may lead to earlier referral for intervention. This research may provide insight to pediatricians and SLPs regarding the timing of intervention that utilizes AAC. This research may increase awareness of this type of intervention for this underserved population to decrease the age at which this vulnerable population can receive needed care and treatment. Furthermore, this research may assist in the implementation of policies and timelines to inform pediatricians and SLPS regarding the appropriate age of referral, giving a voice and opportunity in life to those who may never have one without AAC intervention.

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Appendix A: ASHA Mailing Lists

Subject: ASHA Mailing Lists

Good Afternoon Jen,

It was great speaking with you! I have attached your IRB letter and have provided 2 counts below. The first count is of all SLPs that work with youth 0-17. Based on our data collection standards, I am not able to extend this to 0-21. The next available age range is 18-64. The second count is of all SLPs that work with youth 0-17 and who have an area of expertise in AAC.

(1) All SLPs who work with youth 0-17
Title: Count By State
Executed: Tuesday, September 27, 2016

Count	State
191	AK
738	AL
1338	AR
1280	AZ
6242	CA
1519	CO
1145	CT
160	DC
216	DE
4110	FL
2105	GA
251	HI
538	IA
398	ID
4296	IL
1267	IN
817	KS
1185	KY
1226	LA
2395	MA
1711	MD
421	ME
2149	MI
1450	MN
1792	MO
727	MS

211 MT
2574 NC
290 ND
566 NE
462 NH
3175 NJ
694 NM
369 NV
8821 NY
2822 OH
1064 OK
861 OR
3432 PA
331 RI
1151 SC
239 SD
1218 TN
5935 TX
621 UT
1711 VA
269 VT
1351 WA
1565 WI
475 WV
200 WY

Total: 80074

(2) All SLPs that work with youth 0-17 and have an area of expertise in AAC
Title: Count By State
Executed: Tuesday, September 27, 2016

Count State
27 AK
83 AL
86 AR
172 AZ
672 CA
197 CO
138 CT
16 DC
31 DE
394 FL

190 GA
32 HI
79 IA
44 ID
514 IL
117 IN
90 KS
103 KY
103 LA
345 MA
227 MD
57 ME
210 MI
192 MN
180 MO
54 MS
20 MT
274 NC
28 ND
64 NE
83 NH
417 NJ
70 NM
40 NV
970 NY
420 OH
104 OK
119 OR
418 PA
39 RI
88 SC
24 SD
121 TN
584 TX
90 UT
191 VA
46 VT
185 WA
207 WI
57 WV
20 WY

Total: 9032

The ASHA and NSSHLA list price is 21 cents per name and there is a ***1,000 name minimum*** charge for all orders ($210). Researchers and nonprofits receive a 15% off of their mailing list purchases. **Our mailing lists included members' names and physical mailing addresses.**These lists can be modified by geographic area, area of expertise, or I can take a random sample. To proceed with your mailing list order, please complete the Mailing List Order Form [PDF] and submit a sample mail piece via email or fax. Please let me know if you have any questions or if you would like me to modify the search areas to reach specific members.

Best,

Alexis

Alexis J. Redmond

Manager, Mailing List Sales
American Speech Language Hearing Association

AMERICAN
SPEECH-LANGUAGE-
HEARING
ASSOCIATION

September 27, 2016

Jennifer M. Ferreira., CCC-SLP
[redacted]

RE: ASHA Recruitment Information for IRB

Dear Jennifer M. Ferreira:

The American Speech-Language-Hearing Association (ASHA) is the national professional, scientific, and credentialing association for 186,000 members and affiliates who are audiologists; speech-language pathologists; speech, language, and hearing scientists; audiology and speech-language pathology support personnel; and students. ASHA member information is collected on a routine basis in accordance with our members' annual dues renewals, from our conferences and shows, and as members update their ASHA profiles online. Member data are collected, kept, and shared in accordance with ASHA's Privacy Statement (**www.asha.org/sitehelp/privacy-statement**).

ASHA's Privacy Statement states that "ASHA sells lists of names and mailing addresses to selected third parties. ASHA does not sell lists of e-mail addresses or phone numbers to third parties." Further, all parties that intended to purchase a mailing list must submit a sample of their mail piece before the list is released in order to ensure that the mailer (a) does not misuse or misappropriate ASHA's name or image; (b) adheres to the Continuing Education Board's (CEB) regulations (if applicable); and (c) does not intend to mislead ASHA members.

ASHA members are able to opt out of sharing their information and participating in mailing lists at any time by changing their status on their online member profiles or by calling the ASHA Action Center at 1-800-498-2071. Opt-out requests and list removals are tracked in real-time through netFORUM, ASHA's customer relationship management system. All mailing list requests are processed using netFORUM.

AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION

September 27, 2016

Guidelines and options for students and faculty who are interested in surveying members and/or affiliates of ASHA are available at **www.asha.org/Research/Surveying-ASHA-Members-for-Research-Purposes.** If you have any questions about obtaining a mailing list or the mailing list process, please call me at [redacted] or e-mail me at [redacted]

Sincerely,

Alexis Redmond
Manager, Mailing List Sales
American Speech-Language-Hearing Association

Appendix B: Survey Instrument

Profession? Pediatrician or SLP

Years in profession?

Age range you **primarily** work with?
0-5 5-10 10-15 15-21 over 21

In what setting do you **primarily** work?
School Hospital Outpatient rehabilitation Private practice

In what area or areas do you specialize?

Number of referrals to AAC intervention in the last year?

Number of referrals to AAC intervention in the last five years?

What age range do you primarily recommend the implementation of augmented communication for nonverbal children **diagnosed with autism**?
0-24 months 25 months – 3 yrs 3 yrs 1 mth – 4 yrs 4 yrs 1 mth – 5 yrs 5 – 7 yrs 7 -10 yrs above 10 yrs

What age range do you primarily recommend the implementation of augmented communication for nonverbal children **diagnosed with apraxia**?
0-24 months 25 months – 3 yrs 3 yrs 1 mth – 4 yrs 4 yrs 1 mth – 5 yrs 5 – 7 yrs 7 -10 yrs above 10 yrs

What age range do you primarily recommend the implementation of augmented communication for nonverbal children **diagnosed with intellectual disability**?
0-24 months 25 months – 3 yrs 3 yrs 1 mth – 4 yrs 4 yrs 1 mth – 5 yrs 5 – 7 yrs 7 -10 yrs above 10 yrs

What age range do you primarily recommend the implementation of augmented communication for nonverbal children **diagnosed with cerebral palsy**?
0-24 months 25 months – 3 yrs 3 yrs 1 mth – 4 yrs 4 yrs 1 mth – 5 yrs 5 – 7 yrs 7 -10 yrs above 10 yrs

To what extent do you agree with the following statements (AAC stands for Augmented and Alternate Communication):

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
AAC is a “last resort” in speech-language intervention					
AAC hinders or stops further speech development					
Children must have a certain set of skills to be able to benefit from AAC					
Speech-generating AAC devices are only for children with intact cognition					
Children have to be a certain age to be able to benefit from AAC					
There is a representational hierarchy of symbols from objects to written words (traditional Orthography)					

Appendix C: Sample Survey Cover Letter

Dear Participant:

My name is Jennifer Madaffari Ferreira and I am a graduate student at Walden University. For my dissertation, I am examining what influences age of referral for therapeutic intervention that incorporates a speech generating device for children with complex communication needs.

Because you are either a pediatrician or Speech-Language Pathologist, I am inviting you to participate in this research study by completing a survey. The questionnaire will take approximately 10-20 minutes to complete. There is no compensation for responding nor is there any known risk. Your participation will be completely anonymous.

If you choose to participate in this project, please go to the following website *"insert link to survey here"*. You are free to skip any question you don't want to answer, however, please note that I will only be able to use surveys that are completely finished for my final analysis. Participation is strictly voluntary and you may refuse to participate at any time. Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding what influences age of referral.

Attached you will find an informed consent form. This consent form provides an explanation of the study so that you can understand it before you decide to take part. A link is provided to allow you to indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at the number listed below. If you are not satisfied with the manner in which this study is being

conducted, you may report (anonymously, if you so choose) any complaints to Walden University.

Sincerely,

Jennifer Madaffari Ferreira