IT'S A COLLABORATIVE TEAM EFFORT: COMMUNICATION SKILLS AND INTERVENTION PROGRAMS FOR THE YOUNG MINIMALLY VERAL CHILD WITH ASD AND CAS AND ONLY CAS

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SPECIAL EDUCATION STUDIES

Young children with Autism Spectrum Disorder (ASD) and Childhood Apraxia of Speech (CAS) often exhibit delays in the acquisition of spoken language. The purpose of this qualitative study was to: (1) examine the comprehensive ways minimally verbal children with ASD and CAS differ from minimally verbal children with only CAS; and (2) to examine why despite access and implementation of oral-motor intervention(s) for young minimally verbal children with ASD and CAS, many children fail to acquire spoken language. The study is significant because there are: (1) no current studies regarding the minimally verbal child with ASD and CAS; and (2) there is an absence of studies regarding the development of speech diagnostic markers for the young minimally verbal child with ASD that has led to a paucity of research regarding the effectiveness of oral-motor intervention(s) for these young children. This qualitative research design captured the inquiries regarding the experiences and perspectives shared by the educators and therapists. The methods included semi-structured individual interviews administered to fifteen participants. The participant responses to the five research questions were directly transcribed and categorized into five themes for the young minimally verbal child with ASD and CAS, four themes for the young minimally verbal child with only CAS and one sub-theme that corroborated the CAS responses. The findings suggest that the SLP's and SLPA were the least congruent in their responses to what motor-based intervention(s) would be implemented for the young minimally verbal child with ASD and CAS. AAC communication devices were reported as the primary intervention tool to implement for both sets of youngsters. Lack of awareness of the latest research on the development of diagnostic markers for CAS was evident with additional questions regarding assessments tools for the young minimally verbal child with CAS. All the participants shared congruent answers as to what motor-based intervention(s) they would implement for a young minimally verbal child with only CAS. Further research should be conducted in the development of diagnostic markers for ASD and AAC implementation.

TABLE OF CONTENTS

Chapter Page

Chapter I

Introduction

Introduction/Background

Spoken language is one of the greatest achievements of childhood; it opens the door to a variety of educational and social experiences. Not only is speech considered one of the most important achievements, it is also considered one of the fastest discrete human motor skills, involving hundreds of muscle fibers and relying on precise neuronal control (Kent, 2000). While we take this process for granted, not all children learn to speak with ease. Many children with developmental disorders display substantial difficulty developing speaking skills. Those difficulties are often due to neurodevelopmental and neurological disorders that result in speech and language delays, such as Autism Spectrum Disorders (ASD), a neurodevelopmental disorder and Childhood Apraxia of Speech (CAS), a neurological disorder. Young children with ASD are almost universally delayed in the acquisition of spoken language (Paul. Campbell, Gilbert, Tsiouri, 2013), as well as cognitive, social and stereotypical deficits. Speech sound disorders (SSD's), speech delays (SD's), language delays for young children with ASD, are a large component of the broader communication deficit involved in ASD and among the most frequent reasons for initial referral of young children with ASD (Chakrabarti & Fombonne, 2001; Ohta, Nagai, Hara & Sasaki, 1987; Sieger, Pliner, Eschler & Elliott, 1988). While many preschool-aged children with ASD present significant issues with speech and language development, most will eventually learn to use spoken language (Tager-Flusberg, Kasari, 2013).

Only about 25% to 30% will be nonverbal or minimally verbal by the time they enter Kindergarten (Anderson et al., 2007). Given that the goal that useful speech by the age of five consistently predicts better social and adaptive functioning later in life, the Interagency of Autism Coordinating Committee (IACC), set a long-term goal that 90% of children with ASD would acquire useful speech by age five (IACC, 2011). Thus, most efforts at increasing spoken language have been focused on children younger than five years of age (Tager-Flusberg, Kasari, 2013).

Tager-Flusberg (2013), conducted a study summarizing current knowledge based on research including minimally verbal children with ASD. She reviewed what is known about interventions that may be effective in improving language and communication skills and the need for further research, finding that joint attention skills (both responding and initiating) predict later language acquisition. Other researchers, considering attentiveness, joint attention and social motivation, have found that these skills are highly predictive of spoken language development. Children who scored high on measures of inattentiveness and demonstrated limited social motivation made far less progress in acquiring language. Thus, directly targeting problems in joint attention, social motivation, attentiveness and object play skills may be considered as important targets for children who do not make significant progress in developing language, while studies continue to reveal scant evidence for effective language interventions for minimally verbal or non-verbal children with ASD (Tager-Flusberg, Paul, Lord, 2005). Studies have indicated that therapeutic success has mostly been found in helping children increase requesting initiations and responses, primarily using visually based Augmentative and Alternative Communication (AAC) systems. No data exists on improvements in other communicative functions, such as the young child’s commenting skills and detailed verbal output skills (Tager- Flusberg, Kasari, 2013).

Research findings reveal a connection between oral-motor imitation and abnormal visual motor attention and interaction skills further identifying an underlying abnormality in the planning and processing of motor movements and visual-motor integration (Bishop, 2002). Other studies reveal that the presence of abnormal oral-motor imitation skills is found to be correlated with the presence of fine motor movements. These impairments in motor planning can broadly affect speech and motor development, including impairment in daily functioning in home and school settings. Thus, an evaluation for fine motor and praxis functioning by the Occupational Therapist (OT) should be considered as part of the developmental screening and/or assessment of a child with ASD and CAS who manifests SSD's (Newmeyer et al., 2007). Multiple studies for young children with ASD have determined that joint attention deficits, an ASD phenotype, as one of the most typical contributors to the young child's inability to acquire spoken language (Vaughan Van Hecke et al., 2012). The young child with ASD is often times dysregulated and requires an OT assessment to undergo a sensory integrative evaluation to determine how to sensorially co-regulate the young child until the child is ready to independently regulate incoming sensory input and be able to successfully engage in joint attention and understand spoken language (Kasari et al., 2011; Paul et al., 2013; Vaughan Van Hecke, Mundy, Block, Delgado, Parlade, Pomares, Hobson, 2012). Many research studies indicate that once joint attention begins to emerge in young children with ASD, the implementation of focused motor-based learning interventions should be administered (Dalton et al., 2017; Kasari et al., 2011; Lord, 2010; Mostofsky et al., 2006; Paul et al., 2013).

Young children with CAS are also delayed in the acquisition of language primarily affecting the planning and sequencing of specific oral-motor movement patterns involved in speech. This impairment also results in errors in SSD's and prosody (ASHA, 2007a; Shriberg et al., 2017), including inconsistent use of consonants and vowels in repeated speech productions, lengthened and imprecise co-articulatory transitions, and inappropriate lexical and phrasal prosody (ASHA, 2007a). CAS is estimated to occur in 1 to 2 children per 1,000 children in the general population (Shriberg, Aram, & Kwiatkowski, 1997), and in 3.4% to 4.3% of children referred for speech disorders (Delaney & Kent, 2004). Young children with ASD can manifest symptoms of severe SSD's that are similar to young children who are diagnosed with only CAS, who also exhibit SSD. Because speech and language deficits are so debilitating, and the acquisition of language is so important for speech and language outcomes, interventions with young children with ASD and CAS and young children with CAS have strongly focused on a variety of motor-based learning interventions and linguistic programs to help young children acquire functional language (Anderson et al., 2007; Rogers et al., 2009). The young child with CAS, typically manifests upper extremity and lower extremity praxis (motor planning and motor sequencing) as well, that requires an OT to assess an intervene with that holistically

Young children with CAS often-times manifest other disorders as well (i.e. Down's Syndrome, Fragile X, Intellectual Deficits, Childhood Integrative Deficits, and Galactosemia) (Shriberg, 2017). Additionally, young children with CAS are reported to be at risk for reduced development of reading, spelling, and writing skills, which may also result in decreased social communication skills and academic potential (Lewis et al., 2004). Recent studies (Hammer, 2009), have found that early intervention implementation is most effective when high collaboration and communication exists among the professionals involved in the delivery of services to eligible children and their families. Collaborative efforts among the Speech-Language Pathologists (SLP's), Speech-Language Assistant (SLPA), Occupational Therapists

(OT's), Certified Occupational Therapy Assistants (COTA), Special Educators (SPED's) and Early Childhood Special Educators (ECSPED) professionals in the implementation of specific strategies and techniques are highly recommended (Hammer, 2009). The SPED and/or ECSPED teacher can easily implement aspects of the SLP and OT interventions in young children with ASD and CAS. Since SPED and ECSPED teachers are often-times the first professionals who identify children with speech and language deficits, it is critical that the SPED and/or ECSPED teacher be knowledgeable of evidenced-based practices and early intervention services (Odom et al., 2010; Sandall et al., 2005).Most SPED and ECSPED teachers indicated willingness to facilitate the extension of SLP and OT interventions including implementation of specific learning goals in their classroom or children with and without identified disabilities (McDonnell, Brownell, & Wolery, 2001).

Statement of the Problem

Diagnostic guidelines which were recently established for CAS have heightened SLP's awareness of the effectiveness of motor-based learning interventions for young children with CAS (Maass, et al 2009; Shriberg, 2017; Strand, 2010). Although, a few studies indicate a high co-morbidity of CAS in the population of young children with ASD (Terband, Maassen 2010; Tierney et al., 2016), other studies indicate that children with ASD did not have the core features of apraxia of speech that has been reported in contemporary research in CAS or nonspecific motor speech signs (Shriberg, et al., 2011). Motor-based learning interventions have been used with young children with ASD and CAS who have made limited spoken language progress. Currently, there are no motor-based learning interventions for children with ASD and CAS that have reported to be consistently successful and no study currently investigating this problem (Mayes, 2012; Tierney 2016). Yet, young children with ASD who have profound SSD and language delays, such that they are minimally verbal or non-verbal, are often undiagnosed or diagnosed with CAS masked by their language deficits (Tierney et al., 2016). There are, however, recent studies that indicate efficacy of motor-based interventions for children with CAS. A recent study conducted by Murray, McCabe & Ballard (2014), reported two motor-based learning approaches (Integrative Stimulation (DTTC) and Rapid Syllable Transition Treatment (ReSt) and one linguistic treatment, Integrated Phonological Awareness Interventions, are best suited for interim clinical use, with sessions to be administered with at least twice a week and 60 trails per session. At this time, DTTC approach has the strongest evidence base, with replicated evidence of efficacy from several well-controlled single-case experimental design studies from different independent research groups (Maas, Gildersleeve-Neumann, Jakielski, Stoeckel, 2014). DTTC appears to work better for children with more severe CAS. Integrated Phonological Awareness Intervention appears to work better for children four to seven years of age with mild to severe CAS and ReST appears to work better for children seven to ten years of age with mild-to-moderate CAS (Murray, McCabe & Ballard, 2014).

Conceptual Framework

A constructionist epistemology utilizing the theoretical perspective of symbolic interactionism was implemented as a framework further addressing the research questions (Crotty, 1998). Crotty (1998), states that the
constructionist epistemology is "a way of understanding and explaining how we know and what we know." (p. 11). Furthermore, Crotty states that "truth, or meaning, comes into existence in and out of our engagement with the realities in our world." (Crotty, 1998, p. 8). The researcher chose a theoretical perspective that will allow her the opportunity to investigate the experiences, thoughts and perceptions of SLP's, SLPA, OT's, COTA, SPED's and ECSPED teachers who

work with young children with a diagnosis of ASD and CAS and a diagnosis of CAS. The constructivist epistemology confirms that “meanings are not discovered but constructed.” (Crotty, 1998, p. 9), as this epistemology will inform the researcher through the interactions, dialogues and experiences of the SLP’s, SLPA, OT’s, COTA, SPED’s and ECSPED educators. The research problem required a methodology that allowed the researcher to investigate the experiences, perceptions, ideas, thoughts, and beliefs of the SLP, SLPA, OT, COTA, SPED’s and ECSPED educators involved in teaching young children with ASD and CAS and young children with CAS in a school setting. Meaning, therefore, was constructed by each of the SLP’s, OT’s, SPED and ECSPED educators. Using symbolic interactions allows the researcher to examine how different therapists and teachers interact with each other exemplifying a meaningful matrix that is their lived experience with each other and that are directly involved in teaching and supporting a young child who is dependent on them (Crotty, 1998, p. 71).

Design of the Study

This study used a qualitative research design in studying how this research understood, described, predicted and explained through descriptive data, experiences and perceptions about the “variations in what goes on among the responses provided by the participants and the implication of those variations for the professionals, children and processes involved.” (Patton, 2015, p. 6). The contributions of qualitative inquiry specifically captured experiences and stories that understood the educators and therapists’ experiences and perspectives, understanding context and how and why it matters, identifying unanticipated consequences, and making therapeutic comparisons to discover important patterns and themes across domains.” (Patton, 2015, p. 13). The qualitative inquiry collected information from people, in order to verify the information and contemplate what they mean. The qualitative findings were based on: (a) “in-depth, open-ended semi-structured interviews and (2) written communication.” (Patton, 2015, p. 14).

Purpose of the Study

This qualitative study may shed some light in discovering what therapeutic and academic ways do minimally verbal children with ASD and CAS differ from young children with CAS. This study will also examine the possibility that, despite access to specific motor-based learning interventions, some children with ASD and CAS fail to acquire spoken language. Additionally, this study explored the need for continued collaborative work and support from the SLP’s, SLPA, OT’s, COTA, SPED’s and ECSPED professionals that directly work with young children with ASD and CAS to comprehensively communicate and share knowledge and understanding, improving upon the young child’s communicative, cognitive, academic and social impairments, as the child prepares to enter Kindergarten in the elementary school setting. By using semi-structured, focused interviews of professionals who have directly worked in helping and supporting young children with ASD and CAS and young children with CAS, a comprehensive picture will be demonstrated regarding the challenges, barriers and successes experienced by the SLP’s. SLPA, OT’s, COTA, SPED’s and ECSPED professionals involved in working with young minimally verbal children with ASD and CAS and young minimally verbal children with CAS.

Research Questions

(1) When intervening with a young child who has ASD and has the speech diagnosis of CAS or s CAS, what type of motor-based intervention(s) would you provide this child? Describe your answer.

(2) When intervening with a young child who may have another disorder but not ASD and has the speech diagnosis of CAS or s CAS, what motor-based intervention would you provide this child? Describe your answer.

(3) Upon re-evaluation, what young child would demonstrate verbal outpur gains, a young minimally verbal child with ASD and CAS or a young minimally verbal child with only CAS? Describe your answer.

(4) When working with these two sets of young minimally verbal children, describe the school-based collaborative, multidisciplinary efforts that are implemented to help the young minimally verbal child.

Additional question only asked to the SLP's and SLPA

(5) Are you aware of the latest research regarding speech guidelines and development of diagnostic markers for CAS?

Significance of Study

There is a paucity of research addressing the effectiveness of motor-based learning intervention approaches for young children with ASD and CAS and young children with CAS. While there are guidelines and diagnostic practices to be used with young children with CAS (Shriberg, 2014; Strand, 2010), there are no specific guidelines for minimally verbal or non-verbal young children with ASD. Studies indicate significant dissimilarities in speech, prosody and voice characteristics of participants with ASD compared to participants with CAS (Paul et al., 2013; Shriberg, et al., 2011). In a study by Shriberg (2011), the researcher discovered that children with ASD did not have slow speech rate, lengthened vowels, and common phoneme distortions that are signs of motor speech disorders in adults (Duffy, 2005) and in contemporary research in CAS (ASHA 2007b; Aziz et al., 2010). The participants with ASD had voice differences not reported in CAS such as inappropriate loudness, and inappropriate pitch. He also found modest higher prevalence for SD and substantial higher rates of speech errors in verbal children with ASD and a higher amount of speech errors are produced in comparison with the children with CAS. Although, there are a few additional unique factors that differentiate young children with ASD from CAS, such as joint attention impairments (Mundy, 2017; Mundy, Sigman, Kasari, 1990; Paul et al, 2013; Sigman & Kasari, 1990; Tager-Flusberg, Paul, & Lord 2005; Vaughan Van Hecke et al., 2012); speech attunement impairments (Gernsbacher et al., 2008; Paul et al., 2013; Velleman et al., 2009); object play skill impairments (Tomasello, 1995; Yoder & McDuffie, 2006); gesture impairments (Mostofsky, 2015; Shriberg, et al., 2011; Strand, 2010); voice and prosody impairments (Shriberg, et al., 2011); and generalized praxis deficits (Ayers, 1995; Dalton, Crais & Vellman, 2017), there continues to be limited studies explaining why some children with ASD do not learn to speak. Intervention plans for young children with ASD and CAS and young children with CAS, who manifest severe SSD's usually receive intensive motor-based learning intervention approaches that include multi-sensory approaches to motor planning and sequencing skills. In recent years, there have been a number of studies, which have identified groups of children with features that are consistent with a diagnosis of CAS (Ruscello, 2015). In the most recent study by Murray, McCabe, Ballard (2014), the researchers recruited a total of 47 subjects who underwent diagnostic testing by two examiners experienced in the diagnosis of CAS and 28 met the criteria for CAS. Following diagnosis, 24 different test measures were then evaluated by rater's blind to the original diagnosis.

The authors concluded that polysyllabic production accuracy and an oral motor examination including diadochokinetic rates may be sufficient to identify CAS. Strand et al., (2013), reported on the development of Dynamic Evaluation of Motor Speech Skills (DEMSS), which is an assessment measure for young children with severe CAS with severe SSD's that presents a detailed speech-sound profile that the child can realistically attain. The authors concluded the test had adequate reliability and validity and is appropriate for identifying children with severe SSD due to complete or partial problems in motor planning and programming speech movements. While accurate identification continues to be a challenge, research findings continue to provide data that help SLP's to advance knowledge in this area. Young children with ASD typically have a comprehensive multi-disciplinary program designed to aid any cognitive, communicative, social behavior and stereotypical deficit they manifest thus, a comprehensive motor-based learning intervention approach should be implemented to address their severe SSD's and SD. This study collected information from SLP's, SLPA, OT's, COTA, SPED's and ECSPED who work and have worked with young minimally verbal children with ASD and CAS and young children with only CAS regarding their intervention decisions and collaborative efforts. This information was thoroughly and comprehensively shared, explored, and explained.

Procedures

The research design involved collecting the perspectives of six groups of professionals, SLP's, SLPA, OT's, COTA, SPED's and ECSPED, who work with minimally verbal young children with ASD/CAS and young children with CAS. This research will discuss the use of motor-based learning therapeutic interventions with young children with ASD and CAS and young children with CAS. The methodology and research design drew data from semi-structured interviews of SLP's, SLPA, OT's, COTA, SPED's and ECSPED's. In individual sessions, these professionals will be asked a series of questions focusing on their experiences regarding implementation of certain motor-based learning intervention approaches, observations and perceptions of the similarities and differences observed of these two groups of young children

ASD and CAS and only CAS, and their perceptions, thoughts and opinions regarding the children’s therapeutic progress.

Data collected from the interviews was examined holistically to allow for a broader description of this phenomena. The history of qualitative research is one of telling the stories, and understanding processes, experiences and perceptions of groups of people who are directly working or have worked with this special need population. To be considered credible and trustworthy, qualitative research must occur within the context of the inquiry, represent multiple voices, and reflect particular quality indicators. The researcher will look for commonalities in findings across professional domains when intervening with the same population of young minimally verbal children, ASD and CAS and only CAS. Each experience existed among unique circumstances with distinctive voices. By telling these stories using qualitative methods, the researcher gave a voice to the group of professionals involved in working with these young children (Stake, 2006).

Limitations of the Study

Qualitative research can be very time consuming when the researcher engages in the interviewing, transcribing, analyzing, and reporting processes. Fewer people are usually involved resulting in a smaller study sample, as opposed to a quantitative research study, that includes a larger study sample to investigate. For qualitative research, the researcher would have to feel confident regarding their research interview skills and have the ability to ensure rapport and confidentiality, which can be challenging if sufficient time is not optimally allotted to allow relationships to grow. Since qualitative research is mostly open-ended, the participants have increased control over the content of the data collected so the researcher may not be able to verify the results objectively against the scenarios stated by the respondents. Moreover, one may derive different conclusions based on the same information depending on the personal characteristics of the researcher (Maxwell, 2005).

Definition of Terms

American Speech and Hearing Association (ASHA). Asha is the national professional, scientific, and credentialing association for members and affiliates who are audiologists; speech-language pathologists; speech, language, and hearing scientists; audiology and speech-language pathology support personnel; and students.

Augmentative and Alternative Communication (AAC): This is the term used to describe various methods of communication that can help people who are unable to use verbal speech to communicate. AAC methods vary and may be personalized to meet each individual’s needs.

Autism Spectrum Disorder (ASD). A neurodevelopmental disorder that affects young children across cognitive, communicative, social and stereotypical domains.

Certified Occupational Therapy Assistant (COTA): A certified occupational therapy assistant works directly with a licensed occupational therapist performing occupational therapy tasks under the supervision of a licensed occupational therapist. COTA’s can work in school, rehabilitation and hospital settings.

Childhood Apraxia of Speech (CAS). A neurological disorder that affects young children’s motor planning, programming and sequencing of their oral-motor movement patterns creating speech sound production and prosody errors.

Early Childhood Special Educator (ECSPED). A professional of early childhood special education who holds a teacher certificate through the state of Oklahoma and teaches youngsters with exceptional needs in the preschool setting. This professional may be a member of the IEP or

IFSP evaluation team within the schools setting.

General Educator (Gen Ed). A general educator is a teacher that teaches typically developing children. It's the preferred way of describing "regular education."

High tech devices: Devices involving the production of use of advanced or sophisticated devices especially in the fields of electronics and computers. This can include communication devices that can be pre-programmed.

Language Acquisition through Motor Planning (LAMP): This is a therapeutic approach using motor learning principles and a voice output communication aid to give non-verbal individuals with autism and other developmental disabilities a method to develop independent and spontaneous communication.

Low-tech devices: Devices that don't require much training. These devices may be less expensive and do not have complex or mechanical features. This can include communication devices that can be hand-made with large print or include communication devices that can be applied to old technology that are simply out of date.

Occupational Therapist (OT): A professional who is licensed through the Bureau of Occupational Licensures who is responsible for assessing fine motor skills implementing treatments for improving upper extremity/fine moor movements, including sensory integrative organizations and daily living skills. This professional may be a member of an IEP or IFSP evaluation team within the school setting.

Oklahoma ABLE Tech.: This is a program that offers over 2,500 devices in many AT categories including devices and equipment for speech communication, computer access, hearing, vision, daily living environmental adaptations, learning/development, recreation, mobility, seating and positioning.

Paraprofessional Special Educator (Para): A paraprofessional educator is a special education assistant or teacher's aide within a school that is generally responsible for specialized or concentrated assistance for student in elementary and secondary schools.

Picture Exchange Communication System (PECS): This system allows people with little or no communication abilities to communicate using pictures. People using PECS ae taught to approach another person and give them a picture of a desired item in exchange for that item.

Physical Therapist (PT): Physical Therapists are movement experts who optimize quality of life through prescribed exercises, hands-on care, and patient education. Physical therapists teach patients how to prevent or manage their condition so that they will achieve long-term health benefits.

Social Communication, Emotional Regulation, and Transactional Support (SCERTS): This is an overarching approach to autism education created by a multidisciplinary team of experts. This is a non-exclusive framework for delivering a curriculum specifically designed to address the key areas of difficulty experienced by young children on the autism spectrum. It has a significant research basis.

Special Educator (SPED). A professional in special education who holds a teacher certificate through the state of Oklahoma and teaches students with exceptional needs in the school setting. This professional may be a member of the IEP evaluation team within the school setting.

Speech Delay (SD): Speech delay is also known as "alalia" and refers to a delay in the development or use of the mechanisms that produce speech.

Speech-Language Pathologist (SLP): A professional who is licensed through the American

Speech and Hearing Association (ASHA) and is responsible for assessing and providing intervention to children and adults who demonstrate speech and language, voice, fluency, and other speech related disorders. This professional may be a member of an IEP or IFSP evaluation team within a school setting.

Speech-Language Pathology Assistant (SLPA): The speech-language pathology assistant works under the supervision of a licensed speech-language pathologist to help perform many tasks that are delegated in helping children and adults with speech-language deficits. SLPA's can work in schools, rehabilitation and hospital settings.

Speech Sound Disorder (SSD): A speech sound disorder is a communication disorder in which children and adults have persistent difficulty saying words or sound correctly. Speech sound productions describes the clear articulation of the phonemes (individual sounds) that makes up spoken words.

Suspected Childhood Apraxia of Speech (s CAS): Suspected childhood apraxia of speech is often given to a young minimally verbal child or non-verbal child cannot be formally assessed because the child's verbal output is too limited. Once the child demonstrates increased verbal output, the child can then be formally assessed for Childhood Apraxia of Speech (CAS)

Teacher Assistant (TA): A teaching assistant or teacher's aide is an individual who assists a teacher with instructional responsibilities in a regular classroom or special education classrooms setting.

Chapter II

A Review of the Literature

Childhood apraxia of speech (CAS), a motor speech disorder, has caused controversy within the field of speech-language pathology due to its challenges in diagnosing the condition and the consistent slow progress in the treatment (ASHA 2007a; Hall 2007). Once CAS is diagnosed, speech-language pathologists (SLP) face more challenges in terms of treatment approaches and prognostic indicators. There is limited evidence to support treatment approaches (ASHA, 2007a; Murray, McCabe & Ballard, 2014), and no clear prognostic indicators to provide children and their families. Nevertheless, ASHA (2007a) notes that intensive and individualized treatment and the principles of motor-based learning appear to be important in treatment (Kovacs, 2017). Children who do not receive an accurate diagnosis may receive treatments that fail to target the nature of the deficit (Strand & Debertine, 2000; Velleman, 2009). Given the wide-ranging effects of the disorder, the long-term needs of the young child should be considered from an early age (Lewis, Freebairn, Hansen, Iyengar, & Taylor, 2004). Over the years, many terms have been applied to describe Childhood Apraxia of Speech (CAS), including Developmental Verbal Dyspraxia (DVD), Developmental Apraxia of Speech (DAS), Speech Dyspraxia (SD), Apraxia of Speech (AOS), and Developmental Articulatory Dyspraxia (DAD) (ASHA 2007a; Shriberg, Aram & Kwiatkowski, 1997; Stackhouse, 1992). A licensed speech-language pathologist and developmental pediatrician are responsible for diagnosing CAS. For the purposes of the present study, the definition proposed by the American Speech-Language-

Hearing Association (2007a) in the recent CAS report will be utilized.

Childhood Apraxia of Speech: Diagnosis, Characteristics, Co-morbidity and Prevalence

Childhood Apraxia of Speech (CAS) is a neurological disorder that primarily impairs the planning and sequencing of specific oral-motor movement patterns involved in speech in the absence of neuromuscular deficits such as abnormal reflexes, abnormal tone. CAS may occur as a result of known neurological impairment, in association with complex neurobehavioral disorders of known or unknown origin, or as an idiopathic neurogenic SSD. The core impairment in motor planning and/or programming spatiotemporal parameters of movements sequences that results in errors in speech sound production and prosody (ASHA, 2007a; Shriberg et al., 2017). This definition recognizes key features commonly observed in young children with CAS and focuses on the presumed core deficit in speech movement ability. A deficiency in planning of skilled movement or speech motor control is generally conceptualized as CAS of speech (Murray, McCabe, Heard & Ballard, 2015; Maassen, Nijland & Van der Meulen, 2001), while an execution problem with skilled movement results in dysarthria. A broad range of characteristics have been suggested to be part of the symptom complex of CAS. These include inconsistency and high variability in speech production, prosodic anomalies, such as a tendency to stress unstressed syllables, vowel errors, increasing error rate with increasing length and phonetic complexity, sequencing difficulties, limited phonemic repertoires, and simple syllable shapes (Jacks, Marquardt & Davis, 2006). Additional features such as groping behaviors, heightened awareness of the intelligibility of the child’s own speech and the spontaneous development of gestures stems to compensate these deficiencies are also often reported (Forrest, 2003). Recent studies suggest that CAS is over-represented in certain populations, particularly in children with ASD (Shriberg, et al., 2011; Jouravlev et al., 2019). There has been a longstanding debate over the theoretical frameworks of CAS and the nature of motor control deficits in CAS that has led to over diagnosis and over-representation of CAS in children with ASD (Massen, Nijland, Vander Meulen, 2001).

A child with CAS will specifically demonstrate speech sound disorders (SSD) that manifest in inconsistent errors with consonants and vowels in repeated speech productions, lengthened and imprecise co-articulatory transitions, and inappropriate lexical and phrasal prosody (ASHA, 2007a). This faulty mechanism includes poor speech sound perception, disrupted somato-sensation of the tongue and palate, abnormally high levels of neural noise, atypical auditory-motor neural pathways or over-reliance on auditory feedback (Iuzzine-Siegler, Hogan, Green, 2017; Terband et al., 2019).

It is important to be mindful of certain critical factors regarding the young child with CAS. The child with CAS may be nonverbal or have an extremely limited expressive vocabulary and may not imitate speech stimuli. These issues create a clinical conundrum since the criteria for a CAS diagnosis is inconsistent errors on vowels and consonants, repeated production of syllables and/or words, lengthened and disrupted co-articulatory transitions between sounds and syllables, and inappropriate prosody, especially within lexical or phrasal stress. SLP's may feel very strongly that a young child has CAS, but the child may not have the verbal skills that are necessary to enable appropriate testing. If the SLP is unable to test the child's verbal skills but has a strong suspicion that the child has CAS, a provisional diagnosis of suspected childhood apraxia (s CAS) is usually given. Continue to administer speech-language therapy to the child allowing the child to acquire some communication skills towards a valid diagnosis of CAS.

There are now implemented diagnostic guidelines to define and classify CAS and distinguish the disorder from other disorders/etiologies. (Shriberg, et al., 2017). Shriberg's research (2017) was motivated by the clinical need for an evidence-based explanatory account of CAS. The lack of conclusive diagnostic markers to identify what is currently termed CAS has been a critical constraint on research to clearly understand, treat, and find ways to prevent this disorder, and a primary factor underlying its notable overdiagnosis worldwide (Shriberg et al., 2017). Diagnostic pause parkers (I-IV) were written to develop and discriminate early and persistent CAS from SD, a prevalent and typically severe subtype of childhood speech sound disorders. The diagnostic markers also clearly report other disorders that may display CAS such as, Down's syndrome, Fragile X, Galactosemia, Childhood Integrative Deficits, and Suspected Childhood Apraxia of Speech were among these included descriptions,

Speech-Sound Disorder Classification System (SDCS). Shriberg (2017), also developed a speech disorders classification system (SDCS) by etiology, that was included among the diagnostic markers. The SDCS elaborates upon three distinct speech classification: (1) speech delay (SD), (2) speech errors (SE), (3) motor speech disorders (MSD) not otherwise specified. By current consensus, the signature symptoms of CAS include inconsistent errors on vowels and consonants, difficulties with co-articulation, and prosodic abnormalities. To a lesser extent, children with CAS may demonstrate difficulties in forming, storing, and retrieving representations of auditory/perceptual information. In addition, CAS occurs in a variety of etiological contexts, including neurogenic, neurological, and idiopathic. The symptoms may contextually vary. For clinical purposes, CAS appears to provide a tentative explanatory label for children who have severe irregular and persistent speech disorders, in contrast to the mild-to-severe, regular and typically self-limiting error patterns of the common form of developmental, phonological disorders (Shriberg et Aram & Kwiatkowski, 1997; Shriberg et al., 2017).

A broad range of characteristics have been suggested to be part of the symptom complex of CAS. These symptoms include: inconsistency and high variability in speech production, prosodic anomalies, such as a tendency to stress unstressed syllables, vowel errors, increasing error rate with increasing length and phonetic complexity, sequencing difficulties, limited phonetic repertoires in simple syllable shapes (Jacks, Marquardt, Davis, 2006). Additional features such as oral-motor groping and labored behaviors from the young child, heightens the clinician's awareness of the young child's awareness of his/her speech intelligibility and the spontaneous development of gestures to compensate for these deficits frequently mentioned in many studies (Forrest, 2003, Hall, 1993).

A number of additional symptoms or features have been commonly reported in cases of CAS. These include language deficits, difficulties with literacy-related tasks, and motor coordination impairments. Deficits have been interpreted as either being commonly co-morbid with CAS, secondary effects of the core deficit underlying CAS, or part of the symptom complex of the disorder (Highman, 2010). The following are the reported deficits:

Pre-linguistic and Vocal Development Deficits. Clinical observations and parental observations shared delayed or absent "cooing" and "babbling" histories in young children with CAS (Maasen, 2002; Shriberg, Aram, and Kwiatkowski, 1997; Velleman, 1994). Due to the dynamic nature of the young child's development, the best time to observe such a deficit is very early in development before the speech motor control system interacts completely with higher language levels that can add to the complexity of early intervention (Yoder et al., 2006).

Speech-Motor Control Deficits. It has long been noted that children with CAS don't only have difficulty with the segmental aspects of speech. These children are often-times described to have a "staccato" type of speech output, and to be perceived as putting equal stress on multi-syllabic words. These prosodic issues often persist even when other aspects of speech, such as, phonological and syllable output productions have improved. The assignment of lexical stress was the only measure found to differentiate a group of children with CAS from those with phonological delays. Given these continued findings, it is stated that inappropriate stress might stand out as the first candidate to serve as a diagnostic marker for children with CAS (Maassen, 2002; Odell & Shriberg, 2001; Flipsen et al., 1999l Velleman & Shriberg, 1999). A recent study conducted by Murray and colleagues (2015) recruited 47 children that underwent diagnostic criteria for CAS resulting in 28 children who met the criteria for CAS. The researchers concluded that polysyllabic production accuracy and an oral-motor examination including diadochokinetic rates, the ability to make oral-motor movements in quick succession, may be sufficient to identify children with CAS. This recent study confirms previous findings that stress and reinforce that articulatory and prosodic variables are surface features of CAS furthermore highly recommending that assessment protocols need to include such measures to better identify children's verbal motor planning issues (Ruscello, 2015).

Many studies report that CAS is over-represented in certain populations, particularly in children with ASD (Chenausky, Tager-Flusberg, and Schalug, 2018; Juravlev et al., 2019; Lewis et al., 2007; Shriberg et al., 2011, Shriberg, Aram, Kwiatkowski, 2000). Findings from Chenausky, Tager-Flusberg & Schalug (2018), must however, be taken with caution because the inclusion criteria for intervention study may have inadvertently omitted children with ASD who cannot consistently verbalize on request. A replication study is highly recommended. In the past decade, dramatic discoveries have taken place in identifying genetic pathways underlying the phenotype of CAS. At a neurobiological level, clinical MRI scans, fail to reveal overt, neural anomalies in individual cases with CAS, although quantitative MRI methods have revealed subtle brain anomalies at a group level. Several single genes and copy number-variant conditions are now associated with CAS, either in relative isolation, as in the case of FOXP2 variants, or most typically in association with other neuro-developmental conditions, such as epilepsy, intellectual disabilities and motor impairments. CAS requires careful differential diagnosis from other childhood speech disorders, but when a severe and persistent diagnosis is confirmed, a genetic etiology should increasingly be pursued (Morgan & Webster, 2018). *Motor Coordination Deficits.* Several studies have indicated a consistent speech motor control deficit in children with CAS (Kent, 2000; Maassen, Nijland & Van der Meulen, 2001). Speech motor control encompasses the processes and systems involved in transforming a phonologic representation of language into an acoustic signal, comprised of phonetic encoding and articulation, that is often-times described as "idiosyncratic co-articulation patterns." (Maassen et al., p.125). Several studies have indicated a consistent speech motor control deficit in children with CAS further stressing that gestural control associated with perceptually normal sound production is deficient in children with CAS (Kent, 2000; Maassen, Nijland &Van der Meulen, 2001). Additionally, several studies have reported that the child with CAS may have oral-motor coordination deficits that further affect their feeding skills. These children are often-times diagnosed with a severe case of CAS (Bishop, 2002; Ruscello, 2015).

Language Deficits. Language areas reported to be affected include vocabulary acquisition and expansion of verbal output (Davis & Velleman, 2000), expressive language deficits (Lewis, Freebairn, Hansen, Sudah, Iyengar & Taylor, 2004), and syntactic deficits (Aram, Ekelman, & Nation 1984). Researchers have further speculated that there is an over-arching deficiency in organizing and sequencing linguistic units to account for the syntactic and speech production errors observed in children with CAS (Velleman & Strand, 1994).

Pre-literacy and Literacy Deficits and Spelling and Writing Deficits. Several studies have reported poor phonological skills and literacy acquisition in children with CAS. These studies have specifically reported poor rhyme detection, word segmentation, spelling and decoding skills along with other literacy-related skills (Lewis, Freebairn, Hansen, Iyengar, & Taylor, 2004). Most researchers acknowledge that the literacy difficulties experienced by children with CAS are likely to be directly related to impaired phonological awareness skills, as seen in children with other SSD's, rather than as a core part of the symptom complex of CAS itself. Since children with other disorders are challenged by phonologic awareness skills involved in literacy learning, isolating CAS as a core symptom complex is not warranted (Lewis et al., 2004). Along with reduced development of literacy skills, the young child with CAS displays spelling and writing skill deficits, which may further result in decreased social communication skills and academic potential (Lewis et al., 2004).

Childhood Apraxia of Speech: Motor-Based Assessment and Intervention Programs

Given that CAS is a complex disorder that encompasses many diagnostic characteristics, several considerations for planning and conducting assessments should be considered. As the literature documents, co-morbid language related deficits are present in children with CAS therefore, receptive and expressive language evaluations should be part of the comprehensive evaluation process in documenting a communication profile for the young child with CAS. Receptive language skills include the ability to understand words and language. Expressive language skills include, facial expressions, gestures, intentionality, vocabulary, semantics (word/sentence meaning), morphology, and syntax (grammar rules). Narrative language skills should also be included, which is a descriptive language sample of a child either composing or retelling an age appropriate story. This skill should be part of a battery of assessments, given the current functioning of the young child. A structural, functional evaluation should be performed in addition, in order to document any observations of abnormalities in structures, sensation, strength, range and symmetry. For young children who are a little older and in Kindergarten or preparing to enter Kindergarten, the evaluation of phonemic awareness and early literacy-related skills should be included in the comprehensive assessment plan. For the purpose of this study, only motor-based assessment and screening tools will be addressed. The speech evaluation must include assessment procedures that will allow the examiner to identify potential features of the speech disorder. There are only a few formal comprehensive assessment tools that have been developed to assess CAS. These comprehensive evaluations are the following: (a) *The Kaufman Speech Praxis Test for Children (KSPT),* (2-6 years old) (Kauffman, 1995), *(b) The Dynamic Evaluation of Motor Speech Skills (DEMSS,)* (3-12 years old) (Strand, McCauley, Weigand, Stoeckel & Baas, 2010), *(c) The Verbal Motor Production Assessment for Children (VMPA,)* (3-12 years old) (Hayden, & Square, 1999), *(d) Verbal Apraxia Profile (VAP),* (3-13 years old) (Hickman, 1997), *(e) The Screening Test for Developmental Apraxia of Speech (STDA),* (4-12 years old) (Blakely, 1982). It is also important to add a comprehensive articulation assessment tool since an optimal profile of specific phonemes productions are required: *(a) Fisher-Logemann Test of Articulation Competence* (2 years and above) (Fisher & Logemann, 1971), *(b) Templin Darley Test of Articulation* (2 and above) (Templin & Darley, 1969) and/or *Goldman-Fristoe Test of Articulation* (2 and above) (Goldman & Fristoe, 2000). With children who have 50 words or less, the clinician should present a limited number of picture items for the child to produce (Ruscello, 2015).

There are not many combined screening tools that can assess ASD and CAS. The one screening tool that is frequently used by speech-language therapists and developmental pediatricians is the Checklist for Autism Spectrum Disorder (CASD) screening tool (1-16 years old) (Mayes, 2012). This is the only tool that thus far is able to assess both disorders. It is important to mention this screening tool, given the popularity and frequency of usage of this screening tool by SLP’s and developmental pediatricians.

There is limited empirical research that has examined motor-based intervention efficacy for children with CAS. The current intervention concepts are based largely on single subject case study reports and the expert opinions of professional who work with this disorder (Bahr, Velleman, & Ziegler, 1999; Gildersleeve-Neumann, 2007; Murray, McCabe and Ballard, 2014). These three evidence-based intervention programs support motor-based efficacy in young children with CAS:

Integral Stimulation/Dynamic Temporal and Tactile Cueing (DTTC). This intervention program emphasized use of repetition and imitation with extensive use of auditory and visual models. DTTC is a variation that includes specific production steps for children with severe CAS. Intervention follows a “listen to me, watch me, and do what I do” sequences in which the child hears and sees how the clinician produces a target that should be sequenced and then imitated (Strand et al., 2010). DTTC utilizes a hierarchical method that includes auditory, visual and tactile cues, and systematically decreases support as the child achieves success at each level of the cueing hierarchy. Movement gestures are shaped beginning with direct imitation, moving to simultaneous production with tactile or gestural cues if discrimination was unsuccessful. As the cues simultaneously fade the level of difficulty is moved up to spontaneous direct imitation without cues (Strand & Debertine, 2000; Strand et al., 2006).

Rapid Syllable Transition Treatment (ReST). This intervention program incorporates sound and prosodic practices to develop sound production skills and appropriate prosody, particularly at the lexical level. Repetitions of varied sequences of real or nonsense syllables are used to train motor flexibility (Velleman, 2000, Velleman & Strand, 1994). Similarly, ReST applies principles of motor learning to maximize long-term maintenance and generalization of speech skills in children with CAS. ReST involves intensive practice in production of multi-syllabic, phonetically permissible pseudo-words to move accuracy of speech sound production, rapid and fluent transitioning from one sound or syllable to the next, and control for syllable stress within words. Pseudo-words are used to allow the development and practice of new speech patterns without interference from existing errors speech patterns (Murray, McCabe, & Ballard, 2014).

Nuffield Dyspraxia Program (NDP3). This intervention addresses motor planning and programming through the use of practice items that encompass isolated sound productions, different syllable shapes and transfer to sentences and connected speech. It is described as a "bottom up" approach, which aims to build accurate speech from core units of single speech sounds (phonemes) and simple syllables as new motor speech elicitations are established by utilizing cues and feedback through frequent practice and repetitive sequencing exercises (Beagley & Williams, 1985; Williams, Finders & Stephens, 2010).

There are other motor based interventions that are popular and utilized by many licensed speech-language pathologists, however, these intervention programs are not evidence-based. They are the following:

Kauffman Praxis Approach (K-SLP). This approach focuses on the young child's motor speech skills, shaping the vowels, consonants, and syllables. You assess the gestures that the child is capable of producing moving towards higher levels of motor-speech coordination skills. The child's speech and language skills are broken down into smaller units (vowels, consonants, syllables, and words), and built back up to the target age-appropriate motor speech and language target skills by additionally utilizing verbal, auditory and tactile cues. These cues eventually fade as the child is gaining more responses within sessions utilizing a variety of ways to generalize the child's skills to other settings. In this way, successive approximations of target vocabulary are reinforced, giving the child a functional avenue by which to become an effective vocal communicator (Kauffman, 1995).

Tactile Facilitation-Prompts for Restructuring Oral Musculature Phonetic Targets (PROMPTS). This intervention is a dynamic tactile intervention program based on touch pressure, kinesthetic, and proprioceptive cues. Using this approach, the SLP uses hand cues and stimulates articulatory movements and helps the child limit unnecessary movements, further helping the child for correct speech movement gesture or production of speech sounds and/or single words (Hayden, Eigen, Walker & Olson, 2010).

These comprehensive motor-based programs require intervention to be carried out on a frequent basis. Intensive intervention for periods of three to five times per week allow for distributed practice that emphasizes motor planning and production and/or co-development of phonological awareness and literacy skills. If this is not feasible, and many times it is not due to service limitations, home practice with the child's parents and/or caregivers is paramount. Parents willing to participate need training prior to the introduction of home practice using different naturalistic communication treatment strategies. For children with CAS on the severe end of speech production, an augmentative alternative communication (AAC) system exclusively or in combination with the initial speech treatment is warranted (De Thorne et al., 2010; Hayden, Eigen, Walker & Olson, 2010; Kauffman, 1995; Strand, Debertine, 2000). Research studies indicates that intensive treatment delivery in impairment-based conditions appears to be crucial for obtaining positive intervention outcomes (Edeal & Gildersleeve-Neumann, 2010; Warren et al., 2007).

Childhood Apraxia of Speech. Intervention Strategies

The following evidence-based intervention strategies have been proposed by a number of studies to utilize in therapy for the young child with CAS (Cumley & Swanson, 1999; Davis & Velleman, 2000; De Thorne et al., 2010; Gildersleeve & Neumann, 2007, Strand & Skinner, 1999).

Child Readiness. There are intangible factors that deal with the internal motivation of the child. Ideally, the child should have a vested interest in the intervention and believe that it will work. Some children may not be able to acquire productive speech that is intelligible, consequently the clinician must factor this into account when developing reasonable expectations for the child and the child's potential long-term improvement. Follow the child's lead in an interaction and encourage the child to focus on the tasks at hand in order for the child to be motivated to perform to his/her best abilities. Attempting to structure the intervention sessions in a way that does not cause anxiety and stress for the child, making sure not to make unrealistic demands by reducing communicative pressure, is highly recommended to assure therapeutic success. Increasing sensory stimulation to facilitate speech productions and imitating the child's actions and vocalizations when interacting with the child, as the clinician speaks in a variety of intonation contours, as his/her speaking rate slows, helps to reinforce and assure therapeutic progress. Furthermore, explaining the interactions/strategies that the clinician will be working on with the child and, having the child experience early success, substantially helps the child's readiness skills to learn and improve upon his/her speech sound productions (De Thorne et al., 2010; Gildersleeve-Neumann, 2007).

Motor Skill Learning Approach. Many of the studies emphasizes practicing at different levels of linguistic complexity. Contextual practice at the syllable, word, sentence phrase and conversational levels are recommended. The rationale is to provide systematic practice, so that there are numerous opportunities to provide the child with the internal feedback and provide the clinician the required knowledge base for decision-making purposes (Strand & Skinner, 1999; Strand, Stoeckel, & Baas, 2006).

Sensorimotor Planning. The principles of motor learning employs practice procedures directed to sensorimotor planning. The major features of this approach are based on specific stimulus presentations. The child's responses to intervention dictates these specific stimulus presentations. This approach was originally developed for very young children who may have more sensory integrative deficits. In order for this approach to work, the child must attend to a task for at least ten minutes at a time, maintaining eye contact and have the ability to imitate the treatment stimulation (Strand & Skinner, 1999).

Feedback. As the child progresses in therapy, feedback should gradually be reduced placing greater emphasis on meta-phonological analysis and self-monitoring tasks. Engaging in the analysis of where a sound is produced within the oral cavity and judging the accuracy of the child's productions are important components of intervention. As therapy progresses, rate of speech productions ideally should increase to normal prosodic expectations (De Thorne et al., 2010).

Autism Spectrum Disorder (ASD): Diagnosis and Characteristics

Autism spectrum disorder (ASD) is a complex neurodevelopmental disorder resulting in impairment across linguistic, cognitive, social and stereotypical domains (Weatherby & Prutting, 1984). Autism is included in a grouped disorder, ASD, which includes Autism, Asperger's Syndrome, Rett's disorder, Childhood Integrative Disorders and Pervasive Developmental

Disorders-not otherwise specified (PDD-NOS). (American Psychiatric Association (APA, 2000). Children diagnosed with ASD present with qualitative impairments in social interaction and communication; including SSD's and SD's, as well as restricted, repetitive or stereotypical behaviors, interest or activities (APA, 2000).

Young children with ASD are almost universally delayed in the acquisition of spoken language. Significant language delays in almost all the domains of language are observed early in childhood, such as poor phonological processing, motor planning and sequencing (Prizant, 2006; Tager-Flusberg, 2006), lower receptive language abilities (Luyster et al., 2008; Ventola et al., 2007), impairments in pragmatic language skills (Philofsky, Fidler & Hepburn, 2007), and poor expressive language skills (Prizant et al., 2006; Ventola et al., 2007). Although rates of functional speech use have increased in this population during the last decade (Rogers, 2006), the acquisition of spoken language remains an especially important attainment for children with ASD. Children who do not acquire speech as a primary means of communication by school age tend to have restricted outcomes in terms of independence and integration (Howlin, 2005). Persistent deficits in social communication and social interaction across multiple contexts comprise one-half of the current internationally recognized criteria for ASD (APA, 2013).

Autism Spectrum Disorders (ASD): Motor-based Deficits

Motor deficits associated with ASD appear to be evident as early as infancy manifesting as problems in sequencing movements and basic motor control; including poor coordination, slow response speed and clumsy gait. These difficulties in performing skilled motor gestures in planning and sequencing is one of the most inconsistently reported findings in children with ASD (Mostofsky et al., 2006; Rogers et al., 2003). These impaired motor performances are often times referred to as Childhood Apraxia of Speech (CAS), hence, many children with ASD that display these symptoms are also diagnosed with CAS, however, its neurological basis is not yet well understood. The question then arises, how many minimally verbal children with ASD also meet criteria for CAS? A study performed by Tierney et al., (2015), revealed that CAS and ASD are often times co-morbid, with an increased frequency of CAS in the population of young children with ASD. There have been only a few studies that have directly looked into co-morbidity issues with other disorders. For example, many children with ASD are initially diagnosed with ADHD and the ASD diagnosis is missed for several years (Hartley & Sikora, 2009), because all children with ASD have ADHD symptoms (Mayes, Calhoun, 2012), the presence of ADHD in a young child should cue the clinician to rule-in or rule-out ASD and not to stop with the ADHD diagnosis. For children with both diagnosis (i.e. ASD and ADHD, ASD and CAS), combined methods of intervention are key to speech production progress (ASHA, 2007a; Dodd & Bradford, 2000).

Nothing is known about the mechanisms that explain why some young children with ASD do not learn to speak. There are hints in the literature that oral-motor skills (Gernsbacher et al., 2008), auditory processing skills (Gage et al., 2011), or even genetic factors (Flax et al., 2010) differentiate this group, but there are no studies that specifically address this core issue. In the literature of language acquisition, the benchmark of acquiring some spoken language by the age of five is considered highly significant; thereafter it is unlikely that a child would acquire significant linguistic skills (Paul & Lord, 2005; Tager-Flusberg), nevertheless, there is one study that reports that some children with ASD do begin speaking after the age of five. (Pickett, Pullara, Gordon & O'Grady (2009). The researchers reported that while the majority of these children increased their single word utterances, only about one-third moved into phrased speech.

Useful speech by age five consistently predicts better social and adaptive functioning later in life, many efforts at increasing spoken language have been focused on children younger than five years of age. As these nonverbal or minimally verbal children get older, about 25% begin to show more significant adverse consequences of having no means for communicating, with increased social withdrawal on the social lethargy subscale of the Aberrant Behavior Checklist (ABC), (Lord, 2010).

Unique Factors to Consider with Young Children with ASD and CAS

Despite access to motor interventions, some young children with ASD and with CAS fail to make progress in acquiring language. What is clear is that this group of children is extremely variable, and therefore, no single explanation will account for all minimally verbal children. There are a few studies that attempt to explain the reasons why some children with ASD and CAS do not make the necessary language acquisition progress. These peer-reviewed studies are the most current and relevant that attempt to explain why this may be occurring in a young child with ASD/CAS:

Joint Attention Impairments. Although, studies indicate that there are many predictors for verbal language ability in young children with ASD, multiple studies highlight that the most reliable predictors are joint attention (Dalton et al., 2017; Mundy et al., 2017; Paul, et al., 2013; Mundy, Sigman & Kasari, 1994; Tager-Flusberg, Paul, & Lord, 2005). Joint attention refers to the perceptual and mental capacity to adopt a common frame of reference in order to share experiences and process information about a common referent with other people (Mundy et al., 2017). Joint attention is one of the most theoretically and clinically important dimensions of the social phenotype of ASD (Charman, 2004; Kasari et al., 2008; Lord & Jones, 2012; Mundy, 1994; Mundy & Newell, 2007). Joint attention can be measured in typical development by as early as six months, and in the development of infants at risk for ASD, by eight to nine months of age (Gredeback et al., 2010 Ibanez et al., 2013; Mundy et al., 2007). Joint attention in all of these studies strongly correlated to concurrent language ability. Sigman & McGovern (2005), determined that both functional play and joint attention acts in the preschool years continued to predict gains in language up to the age of adolescence. Additional studies regarding joint attention highlights strong positive relationships between joint attention skills and the ability to sequence non-verbal and verbal motor movements in young children with ASD. The combined sensory input approach involving auditory, visual, and tactile modalities contributed to significantly higher nonverbal oral and verbal motor imitation performance of all children with ASD and without ASD (Dalton, Crais, & Velleman, 2017). Further, joint attention and oral praxis, which is the ability to plan and execute oral-motor skilled movements, may serve as components of an important coupling mechanism in the development of spoken communication and later developing social cognitive skills. These findings are consistent with other recent findings by Dawson et al., (2004), and Rogers et al., (2003). The most recent study by Mundy et al., (2017) states that joint attention may be a significant social dimension of ASD that exhibits developmental continuity and influence beyond the preschool period in children with ASD. Knowing more about the characteristics of young children enrolled in intervention studies across a wide range of behaviors, will allow clinicians and educators to better understand children's responses to treatment (RTI), thus giving clinicians the potential of creating individualized treatment for optimal outcomes (Tager-Flusberg & Kasari, 2013).

Speech Attunement Impairments. Researchers have found that young children with deficits in joint attention are less likely to respond to speech-focused intervention and may derive more benefit from an approach focused more intensely on alternative augmentative communication

(AAC) systems (Gernsbacher et al., 2008; Paul et al., 2013; and Velleman et al., 2009). Reported in a recent study that young children with virtually no joint attentional behaviors are less likely to respond to speech-focused treatment and may derive more benefit from an approach focused more intensely on alternative augmentative computers (AAC). A concentrated effort to elicit functional speech, however, must be challenged with the AAC as a transitional modality for the young child with ASD. The deficits that are unique to early communication in ASD, including low levels of social motivation, inherent in ASD, reduce attention to child-directed speech (Paul et al. 2007); immaturity of speech motor development (Gernsbacher et al., 2008), reduced engagement in reciprocal babbling (Paul et al., 2013), an inability to use gaze cues to discern the relations between a speaker’s words and their intended referents (Baron-Cohen & Hammer, 1997), and generally poor imitation skills (Rogers et al., 2006), may lead in some children to lack sufficient attention to others, impaired verbal output and motor speech patterns along with fewer attempts to use these patterns for communicative purposes. Intervention that actively focuses attention on speech production and enables the child to learn through intensive guided practice to produce a few accurate word forms, combined with parent training to provide distributed opportunities for the child to observe the connections between words and their referents in affectively engaging settings may be enough for the child to “turn on” the speech learning process (Gernsbacher et al., 2008). This process is referred to as a “speech insights” which could lead generalized words and expansion of words beyond those taught in the intervention, as the child begins to “tune-in” to words in the environment, to see their connections to connecting objects and activities through responsive parent interactions, and to use newly gained vocal output skills to practice and reinforce word productions. These findings suggest that it may not be speech motor difficulties that obstructs the acquisition of useful speech, as some researchers have suggested (Gernsbacher et al., 2008; Velleman et al., 2009). It may be rather, the failure to seek out opportunities for reciprocal interactions mediated by vocal and verbal exchanges to "tune in" to speech models, and to "tune up" to production through emulation of significant others and extensive practice in the playful interactions. This "speech attunement" framework has been supported in several studies of early speech development in young children with ASD (Schoen, et al., 2009, 2011; Shriberg et al., 2011), which suggests that when young children with ASD learn to speak, their speech skills are commensurate with and driven by their language abilities and they show no evidence of apraxia or speech motor disorders in their verbal productions. The researchers suggest that SLP's should provide intensive-speech focused intervention for minimally verbal preschoolers with ASD that show minimal joint attention skills.

Intentional Communication Skills. A study by Yoder & McDuffie (2006), considered object play as a predictor for meaningful language in young children with ASD because children with many action schemas demonstrate greater object knowledge, thereby providing a greater number of nonverbal concepts onto which children potentially can map language, intentional communication often involves coordinated attention to object and person. Coordinated attention may be an early indicator of understanding other's intensions, a theoretically important precursor to linguistic communication and joint attention (Tomasello, 1995). Brunner (1983), suggested that nonverbal intentional communication provides the basis for later linguistic communication in that child only need to learn the work from meanings they are already communicating with. The researchers are suggesting that direct and explicit language therapy will probably be more easily implemented and more effective if children use frequent intentional communication and varied object play (Yoder & McDuffie, 2006).

Gesture Impairments. Recent studies by Mostofsky, Burgess & Gidley, (2015), Shriberg, (2014) and Strand (2010), found that CAS in children with ASD cannot be entirely accounted for by impairments in basic motor skills, suggesting the presence of additional contributory factors.

Given that young children with ASD also show poor motor execution (Jansieweicz, Goldberg & Newschaffer, 2006), a question remains regarding the association between those motor-based deficits and their SSD's. That is, are the speech sound deficits attributable to their basic motor impairments or are they a distinct impairment of gestures? (Dizuk et al., 2007). Moreover, the lack of motor development affects the use of social gestures and may contribute to impaired social interaction and communication. It is known that young children with ASD present with a comprehensive profile of social-pragmatic impairments all of which have an effect on the child's level of verbal functioning (Wetherby & Prutting, 1984). Certain areas of impairment in young children with ASD are used in early identification and may be predictive of later verbal language abilities, including gaze shifts, gaze/point following rate of communication, acts of joint attention (Shumway & Wetherby, 2009).

Voice and Prosody Impairments. Voice, sound produce in a child's larynx and uttered through the mouth, and prosody, the patterns of stress and intonation in language, have been studied by Shriberg et al., (2011). Shriberg analyzed continuous speech samples from 46 children with ASD between the ages of four and seven years of age in comparison with 40 typically developing children, 13 preschool children with speech delay and 15 participants with CAS between the ages of five and nine years of age. The specific hypothesis that was tested was that the speech, prosody and voice impairments in children with ASD are due to associated CAS in these children. They obtained accuracy measures on speech sound production in real words in continuous speech and non-word repetition in the structured syllable repetition task (SRT). In addition to measures of rate, stress, loudness and ten different indices of motor speech impairment.

Based on the accuracy of speech sounds, Shriberg (2011), found that the ASD group had significantly more speech delays and speech errors than found in the general population, where speech delays were defined as age-inappropriate errors of substitution, omission, distortion that severely affect speech intelligibility in children between three and nine years of age and speech errors were defined as errors limited to distortions of siblants (/s/ and /sh/ sounds) and rhotics (production of /r/ sounds), that do not affect intelligibility in children between six and nine years of age. The group with ASD did not differ from the typically developing (TD) group on the accuracy of syllable repetition task (SRT). While the rate of speech was found to be age-appropriate, differences were found on prosody measures vocal loudness, stress and pitch. The following indices of motor impairment were utilized: lengthened vowels, distorted rhotics, increased percentage of phoneme distortions, slower speaking rate, slower articulation rate, increased repetition and revisions, reduced percentage of glides, lowered sibilant centroids, increased vowel consonant intensity ratio and less stable whole word errors. The group with ASD was found to be significantly different from the group with CAS in terms of the number of positive markers. In order to find out if a sub-group of children with ASD have concomitant CAS, they compared only those children with ASD who also had a speech delay with the group with CAS. They found the two groups to be significantly different. Thus, they attributed the speech, voice and prosody impairments in children with ASD to the impairment in communication intent and social reciprocity that is a hallmark of the ASD disorder and not to motor planning issues as seen in CAS. This study analyzed continuous speech samples for the examination of speech motor skills (Shriberg et al., 2011).

Generalized Praxis Deficits. Generalized praxis means the neurological process by which cognition directs motor action involving in planning and executing a skilled movement, not specifically related to imitation deficits. Basically, it is the inability to know what motor movement to do and how to do it (Mostofsky, et al., 2006). In order to determine whether motor deficits in imitation in children with ASD were specific to imitation or whether they were a part of a generalized deficit associated with CAS, Mostofsky et al., (2006), studied 45 children with ASD. They specifically studied the performance of gestures to command, gestures to imitation and gestures with tool-use in children with ASD in comparison to typically developing children. Out of the 45 children, four children with ASD showed impairments not only in gestural imitation but also in gestures in response to verbal command and tool use. Thus, the researchers concluded that motor difficulties in children with ASD are associated with a generalized praxis.

Currently, there are no motor based language interventions designed specifically for children with ASD and CAS. One may be able to deduct, via current available research, since there seems to be a strong, positive relationship between joint attention in naturalistic contexts and oral-motor imitation skills, both with nonverbal oral and verbal motor skills in young children with CAS, it would stand to reason that these important unique deficits that are only displayed by children with ASD like joint attention and oral-motor deficits, must be carefully monitored and attained before the presentation of other higher cognitive and linguistic tasks are introduced, particularly if the child with ASD has also been diagnosed with CAS (Dalton, Crais & Velleman, 2006). A substantial achievement in the development of language is recognized when a young child demonstrates joint attention allowing the young child to engage in a number of language-learning interactions (Bloom, 1993; Mundy et al., 1986).

Occupational Therapy (OT): Assessment, and Diagnosis of Children with CAS

An OT is responsible for assessing and intervening with young children with CAS to address their fine motor, motor praxis and sensory deficits. Given

that motor impairments are predominant in young minimally verbal children with ASD and CAS and only CAS, it is imperative that the occupational therapist be an integral member of the multi-disciplinary team. An OT uses purposeful activities and play skills to work with the child through everyday activities. They help children to develop, recover, improve as well as maintain their skills needed to functionally live and work (Bureau for OT, 2018). An OT will first observe how the child manages with everyday functions both at home at school, comprehensively assess the child and then help the child develop skills specific to activities which may be troublesome, since apraxia is a neurological disorder characterized by the loss of the ability to execute or carry out skilled movements and gestures, despite having the desire and the physical ability to perform them.

Typically, most children do not spend time thinking about what is required to catch a ball or to combine sounds to say words. A child with apraxia has to work at each part of the movement to coordinate a complete task. A child with apraxia experiences a disconnect between what they want to achieve or accomplish, and the ability to plan and coordinate the movements required to reach the end results (Apraxia Kids, 2018). The characteristics of apraxia are varied, and may occur alone or together, and the licensed occupational therapy has to assess and determine what type of apraxia the young child with CAS is experiencing.

Ideomotor Apraxia. The inability to make the intended movement in response to a verbal command. The most widely recognized type of apraxia is ideomotor apraxia, or impaired performance of skilled motor acts despite intact sensory, motor, and language function. Typically, demonstrated when a child is asked verbally to perform a gesture. This also includes the inability to imitate another person’s gestures, to perform the appropriate action in response to a visually presented object, or to carry out a movement using the actual object. This type of apraxia affects timing, sequencing, grading of movement, and limb position in space. Children may exhibit differing degrees of impairment depending on testing conditions. For instance, children typically have greatest difficulty performing gestures elicited by verbal command, with less difficulty imitating a gesture or acting in response to a visual cue. They may be at least impaired when asked to use the object itself.

Limb-kinetic Apraxia. This apraxia is characterized by inaccurate or clumsy distal movements; the inability to make fine, precise movement with upper or lower extremities. Limb-kinetic apraxia differs from classical ideomotor apraxia. For instance, limb-kinetic apraxia tends to be independent of modality such as, verbal command versus imitation, and there is typically no voluntary-automatic dissociation.

Buccofacial or Orofacial Apraxia. This type of apraxia is characterized by an impairment of skilled movements involving the face, mouth, tongue larynx, and pharynx. This type of apraxia frequently presents with limb apraxia. The SLP will typically work with the child’s oral-motor movement patterns, however, occupational therapist will work with the mechanical aspect of feeding. For example, holding the spoon and coordinating muscle movement patterns to self-feed.

Ideational Apraxia. This type of apraxia presents with the inability to coordinate activities with multiple, sequential movements, such as dressing, eating, and bathing. A child with ideational apraxia exhibits difficulties carrying out a sequence of actions in performance of a complex multistep task (i.e. putting on shoes). Difficulty sequencing actions may not represent a high-order motor programming deficit; rather, this deficit may be due to a combination of executive, language, and memory limitations or to a general limitation in cognitive resources. Apraxia is often associated with: *Benign Congenital Hypotonia (decreased muscle tone).* Often results in delays in motor milestones such as sitting, crawling, and walking Children with hypotonia often sit with a rounded back and/or in a "W" sitting position due to the laxity of the ligaments of the lower extremities. Low muscle tone may affect oral motor musculature, impacting feeding and speech.

Gross and fine motor coordination deficits. This may manifest in lack of fluidity of gait, awkward running pattern, throwing and catching a ball, or difficulty performing activities of daily living (dressing, toileting, feeding).

Motor planning difficulties. A child with motor planning difficulties may have trouble imitating sequences of motor movements like playing pat-a-cake or doing jumping jacks.

Sensory Integration/Self-Regulatory Issues. Children may have difficulty processing the sense of touch, taste, smell, vision, and hearing. Some children can be sensory seeking, in that they seek out sensory input due to being under responsive to sensation. For example, a child who is sensory seeking might have decreased attention, crash into objects, and touch other people inappropriately. Other children are sensory-avoiding, and may have a heightened sensitivity to sensory experiences, dislike being touched, dislike loud noises, and avoid messy play, and be intolerant to daily tasks like hair washing, and tooth brushing, Children may also may have a mixed response to sensory input; they can be sensory avoiding as well as sensory seeking to different stimuli. For example, a child may seek out rough play and crave deep input via bear hugs, while at the same time, dislike walking on grass or touching sand. Some children may also display difficulty with self-regulation, difficulty calming themselves and self-soothing, and often have difficulty establishing regular sleeping and eating patterns.

Delayed Mixed Hand Dominance. Mixed dominance is often seen in children with apraxia. In typically developing children, hand dominance typically develops around two years of age, the time when the brain begins to allocate tasks specifically to the right and left hemispheres. In most individuals, language lateralizes to the left hemisphere, however, in children with apraxia, the emergence of hand dominance is often-times delayed or a child will show mixed dominance, indicating a delay in brain specialization.

The occupational therapist will begin a comprehensive assessment to carefully assess the young child's fine and gross motor strength, flexibility, posture, motor control, motor planning and sensory processing skills.

There are several comprehensive and standardized assessment tools the occupational therapist can utilize in order evaluate the child's motor praxis needs.

The Peabody Developmental Motor Scales (PDMS). This assessment tool is administered to preschool children and the Movement Assessment Battery for children (m-ABC) for children four years of age and above. This assessment tool can provide useful information on the nature of the movement difficulties. The PDMS can help to identify whether a young child is showing the characteristics of fine motor apraxia, and to determine the need for ongoing monitoring intervention and/or follow-up assessment.

The Movement Assessment Battery for Children (M-ABC). The M-ABC assesses a child's fine motor ability, their performance with ball skills, and their balance, and is intended specifically to identify children with some type of specific apraxia. The test scores provide information about how the child's motor performance compares to his or her peers and can provide an indication of the severity of the motor difficulties. This tool can also provide additional detail about the child's muscle tone, postural control, speed, bilateral muscle tone, bilateral coordination, hand use, grasp patterns effort attentions and behavior during task performance.

Additionally, two comprehensive evaluations are required to be administered for a child with CAS and ASD given the complexity of the symptoms that the young child might be manifesting. Typically, the child is demonstrating difficulty with self-care activities, motor praxis and sensory integrative deficits.

Daily Functioning Assessment. Through interview, questionnaires and observation, it is possible to describe the impact of motor skill delays and incoordination on; self-care activities such as dressing, leisure activities, such as arts and crafts, playing with friends and family, school activities and completion of homework assignments.

The Sensory Processing Measure-Preschool. This assessment tool covers all sensory integrative areas for 2 to 5 years of age. The eight functional areas that this standardized tool asses is social participation, vision, hearing, touch, body awareness balance and motion, planning and ideas and total sensory system.

Praxis Evaluation-Preschool (PEP). This is a comprehensive praxis evaluation determine what type of motor apraxia the young child may be manifesting.

Intervention and Strategies to Address Fine motor, Praxis and Sensory Integrative Deficits

Given the links between motor, social communication, and cognitive development (Dziuk et al., 2007; Fitzpatrick et al. 2016), it is imperative to realize the need for inclusion of movement-based interventions into the standard of care young children with ASD/CAS. In addition to the existing focus on promoting fine motor skills important for academic achievement of children with ASD, clinicians should also encourage gross motor play, imitation based activities, and cooperative games within structured and semi-structured contexts Recently, few studies have documented positive effects on balance, coordination, and flexibility following engagement in motor activities in children with ASD (Kaur, Srinivasan, & Bhat, 2018). These activities would be equally favorable for the young children demonstrating limbic apraxia and poor motor planning and programming. Moreover, to ensure that children find training activities fun and engaging, clinicians could encourage children to participate in creative, alternative therapies such a whole body yoga or music-based rhythmic activities that effectively promote motor and social communication kills in young children with ASD and CAS (Kaur, Srinivasan & Bhat, 2018, Case & Joonkoo, 2018).

Intervention strategies and techniques should address fine-motor, sensory, and praxis concerns, and repetitive activities that activate the part of the brain involved in regulating our emotions and activities which address rhythmic movements, that include, pushing, pulling and lifting objects; sports-related skills, like soccer, basketball, swinging and bike riding, texture explorations and ball handling. There are many different ways to address the necessary skills, but it is always most important to consider each child’s unique needs and interests (Fitzpatrick et al., 2016).

There are many research findings that reveal a connection between oral-motor imitation and abnormal visual motor interaction skills further highlighting an underlying abnormality in the planning and processing of motor movements and visual motor integration. Both high and low functioning children with ASD demonstrate consistent impairments in several aspects of motor function including gross and fine motor performance, praxis, imitation bilateral coordination, and interpersonal synchronous skills compared to age-matched, typically developing peers (Bishop, 2002; Dewey, 1993; Kaur, Srinivisan & Bhat, 2018; Natham et al., 2016; Newmeyer et al., 2007).

Since minimally verbal young children with ASD/CAS and CAS manifest severe speech sound disorders (SSD) studies now indicate that these children also present with fine motor functioning below the average range of age. In addition, the presence of abnormal oral-motor imitations and abnormal visual-motor integration appears to be in agreement with other studies concluded by Dewey (1993), who found that a significant number of children with neuromotor dysfunction also had difficulty with oral-motor skills. Newmeyer et al. (2007) discovered significant findings that the potential existence of a common underlying abnormality in the planning and processing of motor movements may be affecting both a speech and fine motor functioning. The results of several of these studies along with other studies in speech-sound disorders (SSD) and childhood apraxia of speech (CAS), stress that speech-sound disorders are often accompanied by a general underlying impairment in the planning and sequencing of motor movements, particularly in the presence of abnormal imitation of oral-motor movements (Bishop, 2002; Dewey, 1993; Goodgold, Edwards & Cermak, 1990). These impairments in motor planning can broadly affect speech and motor development, including impairment in daily functioning in home and school settings.

Sensory-Integrative Deficits or Sensory Processing Disorder is a condition in which the brain has trouble receiving and responding to information that comes in through the senses. Those children who have sensory integrative deficits receive the sensory input but perceive the information in an abnormal fashion (Ayers, 1995). Among the children with ASD, there exists vast literature associated with empirical accounts for atypical responses to sights, sounds and other sensory stimuli (Iarocci & McDonald, 2006). Although not included in the present diagnostic criteria (American Psychiatric Association 2000), the prevalence and persistence of these problems has led researchers to propose that disruptions in sensation and perception be considered a core deficit in ASD (Billstedt et al., 2007) and sensory abnormalities are included in the proposed revision of the diagnostic criteria (American Psychiatric Association, 2013).

Systematic investigation is necessary to determine which type of intervention will produce the most favorable results for children with ASD. Preliminary links between multisensory speech perception and communication and sensory processing symptoms suggest that perception of speech cues may be centrally related to core deficits associated with ASD. Further studies may shed some light into understanding why children with ASD display atypical patterns of speech perception and multisensory integration and, how OT's and SLP's may best target multisensory perception to improv outcomes of children with ASD.

Given the links between motor, social communication, and cognitive development (Bhat et al., 2011; Dziuk et al., 2007; Fitzpatrick et al., 2016), it is imperative to realize the need for inclusion of movement-based interventions into the standard of care for young children with ASD/CAS. In addition to the existing focus on promoting fine motor skills important for academic achievement of children with ASD, clinicians should also encourage gross motor play, imitation based activities, and cooperative games within structured and semi-structured contexts.

Team-Based Intervention

As the young child transitions to the school setting, the child will require continuity of SLP and OT interventions throughout the avenues of their daily interactions with others in order to make use of the specific strategies and techniques the child is learning though speech-language therapy and occupational therapy. Optimally, collaborating with the SPED and

ECSPED, should take place in day-to-day, authentic situations to assure communicative and fine motor improvements. We know through research and observations that early communication skills, such as social initiations and joint attention, are considered pivotal skills, making that success in those early skills can support the development of many subsequent skills (NRC, 2001; Sigman & Ruskin, 1999). Although SLP's are keenly aware of these types of communication needs, the goals are often less emphasized in the classroom settings.

What commonly occurs is that the expectations of developmental and academic learning is being prioritized and placed as more important (Steinbrenner, 2018). Those expectations may come at the expense of other skills including communication. It is critical for SLP's and OT's to address these early communication skills and to support ECSPED, SPED teacher and TA's, and other related service providers in finding ways to continue to support the development of early

communication skills for the child with significant communication needs, like a young child with ASD and CAS and only CAS, while still addressing the developmental and academic needs of the young child.

When the SPED and ECSPED teachers use strategies that are child directed and responsive to the child's communicative attempts, there are many opportunities to teach many functional skills without disrupting the flow of social interaction or the regular preschool classroom activities. Harjusola-Webb, & Robbins (2013), found that when teacher instructional practices are monitored on an ongoing basis, they can be improved to provide better quality learning environments for children. The provision of consistent and high-quality instructional practices specific to communication and language are critical for children with ASD. Teachers are responsive to data about their classroom behavior and use it to change their performance when SPED, ECSPED teachers and TA's planned for activities that were based on the child's interests, the target children were more likely to remain engaged with the activity for longer periods of time, which subsequently lent itself for more opportunities for adult-child conversational turns. The SPED and ECSPED teachers can easily implement aspects of the SLP and OT interventions the child with ASD and CAS is receiving to improve upon the young child's communicative, social and academic skills. It is estimated that close to one-third of children with ASD will be minimally verbal as they enter the elementary school years (Tager-Flusberg & Kasari, 2013).

For the young child with CAS, preschool children with isolated speech sound disorders have better achievement outcomes than do children whose SSD's are accompanied by additional language problems (Hall & Tomblin, 1978; Lewis, Freebairn, & Taylor, 2004). Children with isolated speech-sound disorders, for example, are less likely than children with combined speech-sound and language disorders to have later reading and writing difficulties (Aram, Morris & Hall, 1993; Lewis et al., 2004). Speech-motor programming difficulties may also contribute to reading, writing, and spelling difficulties. A study from Lewis et al., (2004), observed that symptoms of CAS may become more apparent with age as speech becomes more intelligible and errors more identifiable. Given, that all young children with CAS are at risk for language, reading, and spelling difficulties, teachers should be better prepared in training in phonological awareness and other pre-reading and spelling skills.

The young child with CAS will struggle with speech production and perhaps receptive and expressive language difficulties. Teachers should make sure that these young children can attain success at their level as reading gets particularly challenging. Children with CAS have deficits in phonological process, phonemic awareness, motor program execution, syntax and morphology that will readily interfere with the ability to acquire the necessary skills to become proficient readers. The academic approach to utilize would be in implementing a multisensory, structured, systematic, cumulative and repetitive reading program plus intensive therapy in phonemic awareness and phonological processing. Collaborative work with the SLP and OT is important to comprehensively approach all these strategies and techniques:

(a) *Multisensory teaching* is an important aspect of instruction for the child with CAS. Multisensory teaching utilizes all the sense to relay information to the child. The teacher accesses the auditory, visual, and kinesthetic pathways in order to enhance memory and learning. Links are consistently made between the visual, language we see, auditory language we hear, and kinesthetic-tactile, language we feel, pathways in learning to read.

(b) *Structured, systematic, cumulative and repetitive reading program.* The other significant component in helping the child with CAS learn to read is utilizing an Orton-Gillingham approach in Orton-Gillingham, the phonemes are introduced in a systematic, sequential and cumulative process. The teacher begins with most basic elements of the English language. Using repetition and the sequential building blocks of our language, phonemes are taught one at a time this includes the consonants and sounds of the consonants.

(c) *Phonological processing***.** The key to the entire reading is processing phonological awareness. This is where a child identifies the different sounds that make words and associates these sounds with written words A child cannot learn to read without this skill. In order to learn to read, children must be aware of phonemes. Through phonological awareness, children learn to associate sounds and create links to work recognition and decoding skills necessary for reading. Research clearly shows that phoneme awareness performance is a strong predictor of long-term reading and spelling success for children with speech and language disabilities (Richland, 2013). For the child with CAS who is already behind his peers in phonemic awareness and reading, the instruction must be delivered with great intensity. The child with CAS may require as much as 150 and 300 hours of intensive instruction. These children need more structure, repetition and differentiation in their reading instruction. For all of this to be applied to long-term memory, the child will need to do this by using their eyes, ears, voices, and hands (Richland, 2013).

Collaboration between SPED, ECSPED, SLP and OT

The field of intervention is a relationship-based discipline. Without an effective relationship with the child, the child's family, extended family, service providers, and professional staff that are working with the child, it is difficult to make meaningful changes in the child's development. To achieve this, professionals that are directly working with the special need child, SLP, SLPA, OT, COTA, SPED and ECSPED, must develop a respectful, nonjudgmental relationship with each other, the special need child and the family (Bennet, 2011). Support should always be provided to help families understand their important role in enhancing the child's development and to feel confident in implementing learning activities in their daily lives. Studies indicate that when working with preschool children, collaboration across disciplines and appropriate communication among disciplines is of great value (Finello, 2011). Under the Individuals with Disabilities Education Improvement Act Amendments of 2004, SPED, ECSPED and related services personnel are required to support a child with disabilities in the school setting deemed the least restrictive and most natural for that particular child.

These education professionals have unique skills and are responsible in the service delivery for young children. The SPED and ECSPED teachers are trained in early childhood special education and child development, brings a global, whole-child perspective of a child’s development, participates in screening, evaluations, and assessments; assists in developing Individualized Family Service Plans (IFSP’s) and/or Individualized Education Plans (IEP’s), and provides special instruction if he is the primary provider. The SLP has training in developing and improving communication, language and speech. An SLP addresses communication development; participates in screenings, evaluations, and assessments; participates in IFSP and/or IEP development; and provide specific speech and/or language interventions in natural settings. Some speech-language pathologists also work with oral-motor and feeding issues. The OT is trained to maximize fine motor development, play, feeding, and adaptive skills. Occupational Therapists also address sensory processing issues.
They participate in screenings, evaluations and assessments, and IFSP and/or IEP development and offer interventions in natural settings.

Teaming professional multidisciplinary skills can be effective for supporting a young child in reaching his or her potential. All team members need to understand the collaborative process and the different ways in which the process can be implemented in Pre-K settings (Harris, 2004). When a collaborative team is formed, they must spend time getting to know each other, establish a shared decision-making process, and determines the roles and responsibilities of each team member (Pretti-Frontczak & Bricker, 2000). They must also decide whether having a team leader helps the team best meet the needs and outcomes for the child.

Summary

This chapter reviewed research addressing the many factors influencing professional interactions and interventions as they care for and work with a young child with CAS and ASD. These factors include: the need to explore the efficacy of motor-based interventions that addresses the young child's oral motor planning and sequencing skills; motor-based interventions that addresses the young child's fine motor, praxis and sensory integrative skills; the many different types of motor-based intervention tools, strategies and techniques; and the importance of collaboration between the early childhood special educator, speech-language pathologist and occupational therapist. Each of these factors provides a piece of the foundational puzzle for beginning this research study.

The literature reveals strong evidence that young children with ASD demonstrate different motor-based challenges than young children with CAS and further explains varied reasons for these differences. The literature also revealed a lack of motor-based intervention tools, strategies and techniques to address the specific and unique needs of young children with ASD. Although , currently there is increased knowledge, effort and practices towards the development of standardized motor-based assessment and intervention tools for young children with CAS, there continues to be a gap in the knowledge, practice and efforts in the development of specific motor-based tools to comprehensively address the unique and specific motor-based needs of young children with ASD. Additionally, there is limited empirical research that has examined the efficacy of motor-based interventions on young children with CAS. This study will help explore, explain, discover and reveal the barriers and challenges when addressing the motor-based needs of these young children.

The rationale behind current line of study is to heighten clinical and academic awareness, knowledge and understanding regarding the differences among the core deficits between the young minimally verbal child with ASD and CAS. Research studies and evidence-based practices consistently informs us that language acquisition versus motor planning and motor sequencing deficits are the primary deficits to consider when a young child with ASD is manifesting SSD’s that mimic the SSD’s that young children with CAS manifest (Paul et al., 2013; Shriberg, 2014). It is important to comprehensively address this area, particularly in young children, who manifest challenges with their engagement and imitation skills and are in the process of acquiring their developmental milestones which includes the acquisition of speech and language skills.

Chapter III

Methodology

This chapter will provide a review of the problem statement, purpose of the study, research questions, and discussion of the epistemology and theoretical perspective which will inform the study. A comprehensive and detailed discussion of the methodology of how the study was identified together with a description of the research participants, settings, methods and analysis on how the data was complied, will be discussed.

Statement of the Problem

Diagnostic guidelines established for CAS have heightened SLP's awareness of the effectiveness of motor learning guided interventions for young children with CAS and have been reported in multiple research findings (Maass et al., 2008; Shriberg et al., 2017a; Strand, 2010). Young children with ASD, who have profound SSD's and language delays such that they are minimally verbal or non-verbal, may have undiagnosed CAS masked by their language deficits (Tierney et al., 2015). Research indicates that CAS and ASD are often times highly co-morbid with an increased frequency of CAS in the population of young children with ASD (Chenausky, Maassen, Nijland, & Van der Meulen, 2001; Tager-Flusberg, Shalug,2018; Shriberg et al., 2010; Tierney et al., 2015). A few young children with ASD and CAS, who have participated in motor-based learning interventions, have made limited spoken language progress (Tager-Flusberg & Kasari, 2013). In this case, researchers need to employ different sequence or tailored intervention designs and strategies to determine what are the specific key intervention elements that young children with ASD and CAS can most benefit from. Currently, there are no motor learning guided interventions for children with ASD and CAS that have reported to be consistently successful for young children with ASD. No study to date, has prospectively investigated this problem (Mayes et al., 2009; Tager-Flusberg & Kasari, 2013, Tierney et al., 2015).

Purpose of the Study

This qualitative study endeavors to shed light to discover what therapeutic ways young children who are minimally verbal with autism spectrum disorder (ASD) and childhood apraxia of speech (CAS) or suspected childhood apraxia of speech (s CAS) differ from young children who only have CAS or s CAS but not ASD. By carefully elaborating upon this discovery, the study was able to further examine the possibility that, despite access to specificoral-motor-based learning interventions, some children with ASD and CAS fail to acquire spoken language. This study explains how ancillary services (SPED, ECSPED, TA, OT, COTA's) are necessary to collaboratively work with the SLP and SLPA's in assuring that the minimally verbal youngchild with ASD and CAS or s CAS and the minimally verbal child with only CAS, will improve upon his/her communicative, social sensory integrative, gross motor, fine motor, and cognitive skills to become more independent and competent. By engaging these professionals in semi-structured interviews and asking them to share their perceptions and experiences regarding their interventions with these young children, a holistic picture transpired by the shared information regarding the many successes, challenges, and barriers these young children have encountered, further stressing how vital a collaborative team approach is in helping these young children's prognosis in becoming more functional, competent, and independent young children .

Research Questions

(1) When intervening with a young minimally verbal child who has ASD and the speech Diagnosis of CAS or s CAS, what type of motor-based intervention(s) would you provide for this child?

(2) When intervening with a minimally tong child who may have another disorder but not ASD and has the speech diagnosis of CAS or s CAS, what motor-based intervention would you provide this child?

(3) Upon re-evaluation, what young child would demonstrate verbal output gains, a young minimally verbal child with ASD and CAS or a young minimally verbal child with only CAS?

(4) When working with these two sets of young minimally verbal children, describe the school-based, multidisciplinary, collaborative efforts that are implemented to help the young minimally verbal child.

Additional question addressed only to SLP's and SLPA:

(5) Are you aware of the latest research studies regarding speech guidelines development of diagnostic markers for CAS?

The rationale behind my research questions was to highlight the importance of collaborative work between key team members, SLP's, OT's and SPED's, ECSPED's, that directly work and intervene with minimally verbal children with ASD and CAS and minimally verbal children with CAS, given the complexity of their core deficits. Comprehensively addressing the communicative, cognitive, social, fine-motor and academic needs of a young minimally verbal child with ASD and CAS and CAS, therefore, requires a holistic approach stressing the need of a collaborative team approach in assuring the young child's developmental, communicative and academic progress (Hancock & Kaiser, 2002: Luyster et al., 2008; Morin & Hollins, 2014;Posner & Rothbart, 2000).

Epistemological Stance and Theoretical Perspective

A constructionist epistemology utilizing the theoretical perspective of symbolic interactionism was used in the qualitative study to further address the research questions (Crotty, 1998). Crotty (1998), states that the constructionist epistemology is "a way of understanding and explaining how we know what we know." (p.11). Furthermore, Crotty states that "truth, or meaning, comes into existence in and out of our engagement with the realities in our world." (Crotty, 1998, p. 8). A theoretical perspective was chosen that allowed the researcher the opportunity to investigate the experiences, thoughts and perceptions of SLP's, SLPA, OT's, COTA, SPED's, and ECSPED teachers who are involved in intervening, facilitating, supporting, and academically teaching young children with a diagnosis of ASD and CAS and a diagnosis of CAS. The constructivist epistemology confirms that "meanings are not discovered but constructed" (Crotty, 1998, p. 9), as this epistemology informed the researcher through the interactions, dialogues and experiences of the SLP's, SLPA, OT's, COTA, SPED's, and ECSPED educators. The research problem requires a methodology that will allow the researcher to investigate the experiences, perceptions, ideas, thoughts, and beliefs of the SLP's, SLPA, OT's COTA, SPED's, and ECSPED educators involved in teaching young children with ASD and CAS and young children with only CAS in a school setting. Meaning, therefore, was constructed by each of the SLP's, SLPA, OT's, COTA, SPED's, and ECSPED teachers. Using symbolic interactions allowed the researcher to examine how different therapists and teachers collaborated with each other exemplifying a meaningful matrix that is their lived experience with each other, that are directly involved in teaching and supporting a young child who is dependent on them (Crotty, 1998, p. 71).

Design of Study

This study used a qualitative research design to examine how things work together to gain a deeper understanding the "phenomenon of interest to get detailed, descriptive data and experiences and perceptions about the variations in what goes on, and the implication of those variations for the people, children and processes involved." (Patton, 2015, p. 6). The contribution of qualitative inquiry specifically captured experiences and stories to understand the educators and therapists' experiences and perspectives, understanding context and how and why it matters, identifying unanticipated consequences, and making therapeutic comparisons to "discover important patterns and themes across professional domains." (Patton, 2015, p. 13). The qualitative inquiry included collecting information from people verifying them and contemplating what they mean. The qualitative findings are based on; (a) "in-depth open-ended semi-structured interviews, and (2) an examination of written communications retrieved from the participants" (Patton, 2015, p. 14).

Participants

The director of special services of the north Edmond city school district in the state of Oklahoma was contacted to help the researcher retrieve the participants that were contacted and recruited. This study comprised of fifteen participants that will include: five licensed SLP's, one SLPA, three licensed OT's and one COTA and four licensed SPED's and one ECSPED. The participant requirements were therapists and special and early childhood educators that are intervening or have directly intervened and taught young minimally verbal children diagnosed with ASD and CAS and young children diagnosed with the speech diagnosis of CAS. The requirements did not discriminate upon the participant's age, race, ethnicity, socio-economic status and gender. The sample was purposive and not random as the rationale for selecting these participants were therapists and special and early special educators who have directly worked or is currently working with young children diagnosed with ASD and CAS and young children diagnosed with only CAS. The researcher conducted the semi-structured interviews in a quiet environment, away from the work setting that was optimal to engage in dialogue and conversations without much interruption. The young children that the SLP's, SLPA, OT's, COTA, SPED's and ECSPED taught, supported, and served will be young children with ASD and CAS and young children with only CAS who are currently or have in the past received speech, occupational, and early childhood special education interventions.

The participants provided excellent opportunities to learn about their experiences, thoughts, and perceptions as they work and have worked with these young minimally verbal children. The young minimally verbal children that were discussed by the therapists and special educators were young children that are between three and seven years old. All these children were diagnosed with developmental delays, SSD, and SD delays. The two groups of children being discussed were children that have been diagnosed with ASD and CAS and with only CAS. The first group consisted of young minimally verbal children diagnosed with ASD that are manifesting ASD symptoms across the following domains: cognitive, communicative, social and stereotypical behaviors and additionally being diagnosed and manifesting CAS symptoms that entail SSD's and SD's involving their oral-motor planning, programming and sequencing skills creating sound production and prosodic errors. The second group consisted of young minimally verbal young children that are diagnosed with only CAS or may also be diagnosed with other disabilities including other disorders that may be Fragile X, Childhood Integrative Deficits, Genecomastia, Down's Syndrome, Intellectual Deficits. In the second group, these young children were diagnosed with CAS and other disabilities/disorders but not diagnosed with ASD.

Methodology

The specific method of this study entailed individual interviews of five licensed SLP's, one SLPA, three licensed OT's, one COTA, and four licensed SPED's and one ECSPED regarding their experiences, thoughts and perspectives regarding young children between the ages of three to six, with ASD and CAS and young children with only CAS in an early public education setting in rural, suburban and urban school districts, whom are working or have worked and intervened with. The extensive interview data was the primary source of information for the study. The detailed descriptions this group of professionals, based on demographic data gathered resulted in a deeper understanding of differences and similarities regarding therapeutic and academic progress or lack thereof, of young minimally verbal children with ASD and CAS and only CAS.

Interviews

Once IRB permission was received, the researcher conducted semi-structured, focused interviews with four licensed SLP's, one SLPA, three licensed OT's, one COTA, four certified SPED's, and one ECSPED. The semi-structured interviews were conducted separately with the professionals that intervened with young children with ASD and CAS and young minimally verbal children with only CAS that represented their multiple voices and demonstrated their varied experiences, thoughts, and perspectives. By interviewing each professional, the researcher focused on each individual experience. Such an approach provided descriptive information to help inform the researcher's "understanding of young children with these particular disabilities and those who work with them." (Brantlinger, et. al., 2005, p. 196). Each interview conveyed the participants' own distinct experiences and views at that "particular moment in time." (Emerson, Fretz & Shaw, 1995, p. 117), and provide a glimpse into "the nuances of each individual personality." (Angrosino, 1997, p. 100). The semi-structured interview protocol intentionally utilized open-ended questions to encourage the professionals involved to "use their own language and concepts in responding to them." (Emerson et al., 1995, p. 114). Each interview lasted approximately 45 minutes to 60 minutes and was conducted in a variety in quiet coffee shop settings. Fifteen total semi-structured interviews were conducted with the permission of each professional and then transcribed verbatim, an approach which enhanced analysis. The semi-structured, open-ended questions provided an opportunity for the group of professionals to describe the elements of the intervention/interactions they perceived as influential for the child's verbal/motor/sensory/academic progress. Based on the interviewee's response to the semi-structured question, probing questions were utilized as "follow-up questions to go deeper into the interviewee's responses." (Patton, 2015, p. 362).

The researcher actively listened to the responses and form appropriate probing questions to deepen the understanding of each response. Brief notes were taken during and immediately following the interviews to help the researcher analyze the transcripts later on, that included: facial expressions, vocal projection, body language, and any additional thoughts to retrieve any additional questions and other relevant information. To ensure confidentiality, the data from all the interviews was assigned alphabetical letters with no identifiers.

Study Sites

The sites for the interviews were chosen based on each individual professional's preferences. Interview sites included local quiet coffee shops.

Follow-up Interviews

Once the initial semi-structured interviews were conducted and transcribed, a few follow-up questions were identified. The follow up interviews included targeted questions to enhance clarity from the initial interview responses. Interviewees were informed during the initial interview that a brief follow-up interview could be requested after the initial interview has been transcribed if there were any issues that required further discussion or clarification. Two follow up interviews were conducted with a SPED and SLP to enhance clarity.

Data Collection

The diverse experiences and views of all three groups of professionals added to the overall story about how six different professional team members interacted to support the generalization of communication, fine motor/praxis/sensory motor and academic skills of a specific young minimally verbal child with ASD and CAS and a young child with only CAS. The stories that were generated from the interviews were legitimate sources of data that informed the research questions. Using semi-structured interviews with these involved professionals provided a platform for them to tell their stories and give access to the “human voice” behind the experiences (Crowley, 1994, p. 57).

The researcher collected demographic information on all the participants in order to determine if each individual professional is an optimal representative sample of the target population. Personal statistics that the researcher retrieved were regarding: the professional’s years of experience, area of professional concentration, trainings, degrees attained, and length of experience working with the target population of young children.

Group A-Speech-Language Pathologists and Speech-Language Assistant

This group was comprised of four licensed SLPS's and one SLPA who provided responses/answers to specific open-ended questions regarding motor-based learning interventions administered to young children with ASD and CAS and young children with only CAS. They shared the results of their experiences, thoughts, and perspectives regarding specifics on the motor-based learning approaches utilized, similarities and differences observed, and therapeutic progress or lack thereof of each individual young child.

Group B-Occupational Therapists and Certified Occupational Assistant

This group was comprised of five licensed occupational therapists (OT's), provided responses/answers to therapeutic fine motor/sensory integrative differences and/or similarities observed among young children with ASD and CAS and young children with only CAS. They shared the results of their experiences, thoughts, and perspectives regarding fine-motor/sensory integrative observations, changes, progress, or lack thereof of each individual minimally verbal young child.

Group C-Special Educators and Early Childhood Special Educator

This group was comprised of four licensed SPED's and one ECSPED who provided responses/answers regarding results of developmental and communicative progress, differences and/or similarities among young minimally verbal children with ASD and CAS and young minimally verbal children with only CAS. They shared their experiences, thoughts and perspectives regarding any changes/progress, or lack thereof of each individual young minimally verbal child.

The diverse experiences and views of all six groups of professionals, SLP's, SLPA, OT's, COTA, SPED's, and ECSPED added to the overall story about how these different professional team members interacted and collaborated with each other to support the generalization of communication, sensory motor and developmental/communicative skills of a specific young minimally verbal child with ASD and CAS and a young minimally verbal child with only CAS. The stories generated from the interviews were legitimate sources of data to inform the research questions. Using semi-structured interviews with the three groups of involved professionals provided a platform for them to tell their stories and give access to the “human voice” behind the experiences (Crowley, 1994, p. 57).

Coding Process and Data Analysis

The researcher chose to hand code the data. Hand coding was easier and more productive than if the data is entered through a computer program. The researcher strongly felt that “seeing the data in concrete form will be more vital in recognizing emerging themes.” (Patton, 2015, p. 530). Patton (2015) states that the real “analytical work takes place in your head,” (p. 531). As the researcher compiled the data and determined the codes, categories, themes and sub-themes, the researcher chose to utilize Saldana’s model of streamlined codes for qualitative inquiry (Saldana, 2015). Saldana has an informative, relevant model that allows the researcher to identify the real data in retrieving the necessary codes and categories to the abstract retrieval of codes, themes and sub-themes. and assertions. The researcher found this model to be helpful and effective as the data was carefully analyzed, coded, and broken down into important units.

The researcher chose to color code the categories, themes, and interviews for quicker retrieval and information processing. The transcripts were taken as a whole and placed in order to “identify, code, categorize, classify and label the primary patterns in the data.” (Patton, 2015, p. 410). The type of data analysis that the researcher utilized was cross referencing that analyzed across the professional comments of the SLP’s, SLPA, OT’s, COTA, SPED’s, and ECSPED experiences, thoughts, ideas, opinions, perceptions, and beliefs (Patton, 2015, p. 531). “Each case will be treated differently and then analyzed as an entire collection” (Yin, 2009, p. 156). Patton (2015) states that purpose drives analysis and the fact that there are no correct methods to participate in qualitative analysis. “The only way to distinguish signal from noise, detecting patterns and identifying themes, resulted from immersion in the data, systematic engagement with what the data reveals, and judgement about what is meaningful and useful.” (p. 552). The researcher utilized both analysis and synthesis to segment the interviews apart and put them back together to gain a clearer understanding of the meanings within and across the interviews. In order to assure trustworthiness of the results from the participants, the researcher utilized member checking. This is a validation technique for exploring the credibility of results by returning data to the participants to check for accuracy and resonance of the participant’s experiences. This opportunity offered the participants assurance that their feelings were validated further allowing the participant to gain more insight on their thoughts and experiences and, to see whether a “true” or authentic representation was made (Harper & Cole, 2012; Lincoln & Guba, 1985). This technique also allowed the researcher the opportunity to verify the accuracy of the findings which helps the validity of the study (Cohen & Crabtree, 2006).

Ethical Considerations/Trustworthiness

The researcher was careful in obtaining informed consent and confidentiality in stating the “purpose of collecting the information, for who the information was for, how it will be used, what was asked in the interview, how will the responses be handled including confidentiality, and what risks and/or benefits will be involved for the person being interviewed.” (Patton, 2015, p. 497). The researcher provided the information in advance of the interview and at the beginning of the interview. The researcher made statements of purpose simple and understandable. Establishing trustworthiness significantly depended on the credibility of the findings (Lincoln & Guba, 1985). “Prolonged engagement and persistent observation, focusing in detail on those elements that were more relevant to the study, were critical in attending to credibility” (Patton, 2015, p. 685). The credibility addressed the issues of the inquirer providing assurances for the respondents’ views and inquirer’s views. The transferability dealt with the issue of generalization in terms of each individual scenario, and the reflexivity depended on the researcher to be continually alert to her own biases, positionality and assuring trustworthy interpretations. The researcher was also aware of consciously observing and analyzing negative scenarios in the search to improve trustworthiness” (Patton, 2015, p. 685).

Summary

In conclusion, there is a paucity of research addressing effective motor-based intervention approaches for young children with ASD and CAS. While there are motor based learning guidelines and diagnostic markers established for young children with CAS (Shriberg et al., 2017a; Strand, 2010), there are no specific motor-based guidelines for minimally verbal or non-verbal young children with ASD. Little is known about the methods, processes, and procedures to explain why some children with ASD do not learn to speak after receiving motor-based learning interventions. Studies are needed that examine the transition from pre-verbal to verbal as children move into the school years, particularly around the age of four and five years. There may be specific developmental changes that place a young, minimally verbal child on a path to becoming verbal or to remain only minimally verbal (Tager-Flusberg & Kasari, 2013).

Multiple studies identify the need for a consistent definition and protocol for assessing communication outcome in young children with ASD with little or no functional speech (Kasari et al., 2011), strongly stressing the need for additional research (Mayes, et al., 2009; Tager-

Flusberg & Kasari, 2011; Tierney et al., 2015). There are two studies, Velleman et al., (1994), and Shriberg et al., (2011), that were conducted on young children with ASD that revealed that participants with ASD had significantly higher rates of inappropriate prosody and voice including increased repetitions and revision; loud words and phrases; high pitched words and phrases, and misplaced vocal stress. The conclusions of these studies state that the research designs assessing motor speech, prosody, and voice in non-verbal children with ASD are challenging. It is, therefore, imperative for the therapist and special educator to carefully look at specific motor-based intervention approaches that young, minimally verbal children with ASD and CAS and only CAS to verbally improve upon, along with investigating other factors and predictors that can play a significant role in language and improved communication outcomes that would allow to maximize the young child's developmental potential. There is a clear need to define a set of research agendas that can address the many gaps in our knowledge base.

CHAPTER IV

PROFESSIONAL REPORTS: CAPTURING A SENSE OF PROFESSIONAL PERCEPTIONS AND EXPERIENCES

This chapter presents a review of the perceptions, experiences, and beliefs of fifteen professionals that currently work or have worked with young, minimally verbal children with autism spectrum disorder (ASD) and childhood apraxia of speech (CAS) or suspected childhood apraxia of speech (s CAS), and worked with young minimally verbal children with CAS or s CAS without the diagnosis of ASD. The professionals consist of speech-language pathologists (SLP's), speech language assistants (SLPA's), occupational therapists (OT's), certified occupational therapy assistants (COTA's), special educators (SPED) and special education teacher assistants (TA's). Their responses to the semi-structured, face to face interviews of a total of fifteen professional participants whose responses were analyzed and synthesized. The names of the professionals are not divulged to maintain confidentiality. The purpose of this chapter is to convey, through data, what the professional perceptions, experiences, and beliefs are when directly intervening with both sets of youngsters regarding the young child's communicative, sensorimotor, gross and fine motor skills. Because of the unique positionality of the SLP's and SLPA's, their responses will provide more detailed perceptions and experiences than the other participants.

This chapter is best summarized with the following quote:

"We have only the gift of sharing perceptions that hopefully can help those on their journey. The human experience is an experience in movement and thought and form. The most

> that we can do is comment on the movement, the thought, and the norm, but those comments are
> of great value if thy can help people to learn, to think clearly, to form the matter of their lives," (Zukav, 2014).

Speech-Language Pathologists (SLP) and Speech-Language Assistants (SLPA)

Five SLP's and one SLPA were interviewed. Three were from urban elementary school districts, and three were from rural elementary school districts. Their experiences in the field ranged from five years to over twenty-five years. When asked the first question regarding what type of motor-based interventions the clinician would implement for a child with ASD and CAS or s CAS, one of the urban SLP's commented:

> A lot of times if the nonverbal or minimally verbal child with ASD plus, irrespective of any other additional speech diagnosis the child may have, will need a lot of support with augmentative communication to give the child language learning and language access immediately. Although the mother's don't like to hear this as much and are typically resistant to any type of augmentative communication device (AAC), it's important to show them how powerful language is from the onset and by understanding language, the world will open up for the child.

She also mentioned the importance of a good language application that is evidence based, comprehensive and very effective that includes motor planning for the child, a language application such as the Language Acquisition Motor Planning (LAMP) application.

> I am LAMP trained and certified and most of the clinicians at this school are LAMP trained. We did our homework and realized that LAMP was the most thorough,

> comprehensive and effective language application to implement for a kiddo with ASD and other issues.

Another urban SLP commented:

> I would start with building the desire to communicate with a visual communication system by using a LAMP application with an AAC device or Picture Exchange Communication (PECS) pictures with a communication board. My perspective is to make communication more valuable and important for the student. They will be more motivated to work on any other intervention you may have and, be more effective with any additional type of motor intervention program you implement. The idea is to build new neuronal pathways for this child to understand language.

This SLP was emphatic in stressing the importance of language acquisition as being the primary intervention for a minimally verbal child with ASD and CAS or s CAS. The motor-based interventions would follow in helping the child with the motor planning and motor sequencing skills to effectively articulate and verbal express his needs. This therapist also mentioned that she would additionally be cautious in diagnosing any child with ASD with CAS or s CAS because not all children with ASD who are minimally verbal or non-verbal have CAS. She commented:

> I would be very careful and observant in analyzing the student's verbal output. Often times the child might be occasionally making variated verbal sounds that demonstrate adequate oral-motor placement and planning. The only difference is that they are not saying purposeful words but engage in "jargon" or "babbling. This student then does not have CAS but may be labeled with CAS. I have seen overuse of the CAS diagnosis for children with ASD and sometimes this is not the case! I also think that it is more

> challenging for the child with ASD to generalize if you put in additional supports. If you add a structured, comprehensive motor-tactile program on top of his additional supports, it will get too overwhelming for the student with ASD to handle. When you layer the student with ASD, you've got a handful of things like sensory, behavioral and physical issues, such as allergies and gut sensitivities, for this child, which is a lot.

All of the SLP's, both urban and rural, stressed how important it is to immediately address the social language deficits that a child with ASD manifests, how important it is to add this component into his language application, and engage in social language scenarios to improve upon the child's overall language acquisition. One of the urban SLP's stressed evidence-based social language programs that have been very successful over the years. She commented:

> Barry Prizant and Pat Riddell have great approaches like the Social Communication, Emotional Regulation and Transactional Support (SCERTS) program that is comprehensive and extremely helpful. Prizant has been in our field for a long while and over the years, his strategies and techniques have only proven to be successful defying all sorts of other programs that have surfaced over the past ten to fifteen years! He has been such an awesome mentor for many of us.

All of the SLP's stressed the importance of utilizing the child's AAC device with language application in every area of the child's school setting, stressing that all staff involved in working with the child should be familiar with the child's device and effectively communicate with the child as the child transitions from one setting to the next, for example, class room to lunch room to the PE room etc. The SLP's reported that the responsibility falls primarily on SLP's to make sure this is carried through. The SLP commented:

> I will usually make sure to share the communication board or AAC device to the SPED

> teacher and ask her to make sure to tell me what she would like to add on (teacher names of classroom peers etc.). I like to give the device to the teacher since the teacher is with the child most of the time. It makes the teacher accountable for the use of the system and for us sharing as to what the kid needs added in their system! It's challenging though, I know teachers that don't get around to it and others that are so incredibly aware and will not function unless she uses the device with the child! I think it has everything to do with how much the teacher cares. It helps with me being in touch with the teacher on a consistent basis so, we are forced to communicate, although at times, I know they don't want to talk to me because they are so busy! Truly without the device so many of these non-verbal or hardly verbal children cannot become more independent, competent or spontaneous. If the child is older, I will make the kid more responsible to use his system.

The three rural SLP's and one urban SLP, shared increased frustration in not having funds to purchase high technology AAC devices. Typically, low-technology communication boards are made for the young child with ASD with PECS pictures. They shared their frustration that the school budget is so limited that there are no funds for materials. They commented:

> We are so limited with the things we have in the shelf. I always looked into my own personal tool-box. We do a lot of card-board communication boards with functional pictures. The only child that I currently have on a device is a severely disabled child who has cerebral palsy. The family and school struggled to get a Dynovox approved for him and finally it was purchased through the school. The mom could not take it home though, but at least we had something to work with him. We did get stuck in programming the device. I know there are places that can help us but once again the distance and time are big factors to contend with in this neck of the woods.

Another rural SLP shared:

> Our school had just sent us to receive LAMP training but cannot afford to purchase the I- Pads and the LAMP applications, although, I know ABLE Tech was contacted. I don't think there is follow through by the school because of lack of funds. The AAC devices are typically purchased by the school and not the parents. The parents usually do not want to purchase a system because they feel that the AAC device would be used as a crutch for their voice and they would not talk but make the computer talk, even though we continually let them know through articles that it isn't so, but the opposite. LAMP has literature that we can give the parents saying that their child will actually improve his verbal expression when he starts using his device! We are battling many issues.

Since CAS or s CAS is a speech-language diagnosis, an additional question was asked to the SLP's if they would diagnose a minimally verbal or nonverbal child with ASD with CAS or s CAS? Four of the speech-language pathologists answered "yes" given the child's non-verbal status, one SLP mentioned that she would prefer to diagnose the child with s CAS of speech since the child cannot be tested yet and assess the young child with a formal apraxia assessment. She said:

> I would choose not to tax the child with additional CAS interventions until I was absolutely sure the child had the condition, because I know that adding supplemental interventions to a child with ASD that already has many areas of cognitive and communicative issues to address, will further distract the child that is already quite distracted disengaged and not motivated.

One experienced SLP, who has worked with children with ASD for over twenty years, mentioned that she would not diagnose the child with ASD with CAS or s CAS because typically the child with ASD does not have CAS or s CAS.

> If the child is making oral-motor placement and sequencing sounds, although, they may not be purposeful or true words, any little sample of the child's utterance can help you determine if the child is actually having motor planning and motor sequencing deficits that a child with CAS manifests. If you observe that the child is making the proper oral-motor placements and oral-motor sequencing, CAS or s CAS is not the accurate diagnosis. The child with ASD's verbal expressive deficits is more than likely due, to his/her inability to have acquired functional language acquisition that is what is deterring his/her verbal expression instead of the child's inability to specifically motor plan and motor sequence sounds and words.

In answering the second question, regarding what motor intervention would the clinician provide a minimally verbal child who only has CAS or s CAS; she reiterated:

> I would feel that it was equally as important to give extra communication support to a child that only has CAS as well because of the verbal frustrations the child may be experiencing that are typically a lot. In order to ease his frustration, I would definitely implement an AAC communication device for him. I would then add the motor tactile intervention addressing his motor planning and sequencing oral-motor movements that the child needs to verbalize and articulate. Any program with tactile cues, I know will help the child with CAS. The child would need to be receiving therapy consistently to make any changes. I would probably use the PROMPTS or Kaufman Praxis programs to address the kiddos motor planning and motor sequencing issues. It's not a "one size fits all" principle. You have to tweak and make the necessary adjustments to fit the needs of each individual child. I do know that the child with ASD requires more one on one and

> much more structure and perhaps the motor-tactile cues are not as necessary for the child with ASD.

The two rural SLP's shared that therapy would be similar for a child with CAS as it would be with a child with ASD and CAS, citing a few distinctions. One rural SLP commented:

> I would definitely include sensory integration therapy to organize the child's attention and concentration. It's so important, without "sensory gadgets" and careful one-on-one structure, the child with ASD quickly loses his attention and you are having to verbally redirect the child consistently. Sometimes you think if the child is truly understanding what you are trying to convey! It varies from day to day and a child with ASD is different from child to child. They certainly keep you on your toes.

When asking about differences between both sets of young children and describing these differences in terms of successes, challenges, and efficacy of verbal output, all the SLP's stressed that ancillary services, such as OT, is imperative for the child to receive since both sets of children are in need of gross motor, fine motor and sensory integration intervention. All of the SLP's stressed that the child with ASD may require more sensory integrative intervention (SI) to further help the child engage and regulate sufficiently to be able to attend and understand language. It's different from the child who only has CAS and typically does not manifest the deficits in engagement and motivation to learn language. She commented:

> The children with ASD are more complex and have issues that a child with straight CAS would not display. Children with ASD typically demonstrate behavioral outburst, perseverative and stereotypical behaviors that need to be addressed as opposed to a child

with only CAS Upon sharing their perceptions and experiences regarding the need for collaboration, one urban SLP stressed:

> We have to see the child as a whole and not only see the child through our perspective (SLP), in order to better help the child. In the schools, however, there is incredibly limited time and funds to allow us to do this to the capacity that the kiddo requires. I discontinued working at the elementary school last year because of these frustrations and am working at a rehabilitation center where we can address the child as a whole and collaborate with all team members working with the child. Not only is that easier, but we co-treat with ancillary services, OT and PT that immensely helps with collaboration. At the schools, the only time I felt we collaborated was during the Individualized Education Program (IEP), where we state each professional's goals and communicate with each other what we were going to address for the child, after that, there was no time. You have to take the time to collaborate and establish a relationship with the teacher and OT. Hopefully create good rapport.

The other three urban SLP's also emphasized the need for collaboration. They shared their frustrations on how difficult it is to establish consistent collaboration with team members when all staff is so incredibly busy. One of the urban SLP's mentioned she developed a way, with the school administrator's permission, to do what she classifies as "speedy speech." Speedy speech is working approximately ten to fifteen minutes, five days a week with the student and the TA She emphatically reported:

> It's the only way neuronal pathways will be established for these children as they practice their AAC system or communication board every day in the classroom setting with the Para. I can also add motor-cueing steps in tandem with accessing the student's AAC

> device with the CAS student who requires this motor-cueing intervention consistently. Consistency is key and every day is possible if you are creative with your time! The idea of twice a week for thirty minutes is still predominant, however, I know we have better outcomes when we do it daily for a few minutes. It's more effective and the student gets used to learning repeatedly. If you tell a teacher, "I will "pop" in for a few minutes with your I-Pad, take your data right there and then either "pop" them back to class or keep them in class if you can. The teachers are usually so much happier because the student is not missing any course work like math or spelling that the teacher has to take time to catch up with the child. A few minutes does not radically disrupt the child's course work, and you can establish so much better rapport with the teacher and improve collaboration. You can truly communicate everyday with the teacher.

According to this SLP, "speedy speech" was an idea that has proven to be very successful and beneficial for the young child, the SPED teacher, and the SLP. She demonstrated a strong determination to try and make an idea that she knew would work. Her reflection indicate that she stepped out of her comfort level to get the approval she needed and, set up a new therapy protocol for children who required daily intervention. Sometimes that's what it takes, confidence and determination to bring about change that manifested beneficial results for all involved, particularly for the young child. The SLP continued to share:

> I will speak to the OT intuitively more, since I see we are both ancillary providers and our offices are situated close to each other, the challenge is often times working with the SPED and Gen ED teachers and TA's. I really think this new approach that has been instilled the past two years, in our school, has worked marvelously. Establishing rapport is very important. There are a few SLP's that struggle with rapport and if you don't have

> it, you miss out with the child. I truly don’t think the student does as well when the channels of communication aren’t open from the beginning of the student’s journey.

The SLP’s in the rural areas emphasized how challenging it is to establish collaboration with the team members in the elementary school. They mentioned:

> There is so much work to do and I spread myself thin working for different school districts as lead SLP. We were able to get a few SLPA’s, but I have to train them, and we all have to travel to different small surrounding towns that are close in proximity. It makes it so difficult to collaborate and be in touch with the Gen Ed and SPED teachers and other therapists. It also makes it challenging with the teachers because they feel over-worked and see you as adding more work for the special need child that they simply do not have time for. You can tell by their attitudes, right away! TA’s are very, difficult to find, so the SPED teachers, many times, are on their own! They do not see you as a collaborator but as a person who will add work to their already overwhelmed teaching responsibilities.

The rural SLP’s reiterated that:

> Sadly, being a rural school and more impoverished, most of the kids and parents do not have a lot of money and good medical insurance. The insurance does not provide for additional therapy, so the child is typically receiving only school therapy, which is maybe once to twice a week that is not ever enough for these kids that have multiple issues.

One rural SLP that has worked for over twenty-five years mentioned that the only way she has been able to establish consistent collaboration is by first establishing rapport with the teachers and understanding their perspective. Additionally, she mentioned:

> Because I have worked at the school for so many years, everybody knows me, particularly the SPED and general education (Gen Ed) teachers, they trust me and together we all know that we really care for the child and want the best for the child. We all become like family and look after the child as if it was our own. You can do this in small communities. You do need to work on it and make sure that you are not interrupting and imposing your time on anybody's. The teachers are always so busy, but I know they care. I can usually talk to my OT because we cross each other in the hallways but the teachers are different, especially now, since there is such a high turn-over, particularly with SPED teachers! I know that TA's are also hard to find! When you understand all these factors and see how you can help and work together so the kid can improve! It helps that our superintendent is very kind to all of us and reinforces harmony among all the staff. I think this makes a huge difference regarding collaboration. You know, everyone is a team member, including the PE teacher, the lunch lady and the child's bus driver.

Based on this SLP's shared experiences, it is clear that she values collaboration and realizes that by being transparent and prioritizing collaborative efforts with the school staff involved in working the young child, the child will ultimately reap the benefits. She shared, as she is getting older and adding more years working at the school, she values and appreciates the sincere care that most of the staff have for the children they support. It is with this sense of gratitude that she approaches her day, regardless of the circumstances. She continued to share an experience of collaborative efforts:

> I remember once when my kid was no longer motivated by the one song he loved to hear, but that would be a reward I would give him after he completed his work! He had to work

> to listen to his favorite song. I noticed one day that he was not motivated by listening to his song any longer and that really bummed me out! I e-mailed his mom to ask what could have changed and she could not give me a reason, so I noticed as my kiddo was getting ready to catch the bus, he was literally bumping over the kids to get into the bus! I wondered why?! I found out that the bus driver was playing his favorite song on the way to school and on the way back from school! I had to stop and talk to him and mention that if he could use another reward because that was mine and I needed him to work for me! He did not realize it and the next day he had gold-fish crackers for him as a little after school treat, which made him happy! Without searching and collaborating with everyone that is involved with the kid, I would have continued to be so frustrated and it would have immensely affected my sessions with him.

When asked which young child would demonstrate an increase in their verbal output when it was to time to re-evaluate, the young child with ASD and CAS or the child with only CAS, the SLP's had more similar than varied responses. One urban SLP reported:

> In a perfect world where frequency of therapy is good and the child is receiving the additional therapies he needs with great collaboration between team members and it's time to re-valuate both sets of children….in terms of verbal output, I would think that the child with ASD/CAS would not demonstrate the consistent verbal gains that a child with straight CAS would, only because the child with ASD and CAS would have additional goals that need to be worked on that may be directly affecting the child's verbal output. It's a slow process.

Another urban SLP's mentioned:

> When you layer the ASD, you’ve got just a handful of things that need to be addressed as well, like sensory, social and behavioral that may preclude the student’s ability to fully acquire verbal language.

Occupational Therapists (OT’s) and Certified Occupational Assistants (COTA’s):

The SLP’s responses to the perceptions and experiences regarding both sets of youngsters emphasizes the integral need for OT intervention for the child. These include: SI intervention for the child with ASD and CAS and only CAS if required; effective transitioning and continued use of the AAC device or low-tech communication board in the OT setting for both sets of children; and the urgent need for collaborative efforts to be put in motion between all team members (SLP, OT, SPED, etc.). Pertinent and relevant questions were asked to the OT’s and COTA’s. Their responses reinforced and stressed the importance of OT intervention and collaborative efforts to be immediately implemented towards these affected youngsters.

Three OT’s and one COTA were interviewed. Two OT’s were from urban elementary school districts, one OT from rural elementary school districts and one COTA from a rural elementary school district. The questions administered connected the concerns, perceptions, and experiences the SLP’s voiced that includes OT’s and COTA’s as an integral part of the child’s team in administering comprehensive interventions. Additionally, collaborative efforts in sharing pertinent and relevant information regarding the minimally verbal young child further helps the involved child become the best version of himself/herself.

The first relevant inquiry that was asked was to describe the OT’s differences observed between a young minimally verbal child with ASD and CAS and only CAS and, if so, to describe these differences in terms of intervention and observations. The three OT’s and one

COTA mentioned that there are clearly distinct differences between these two sets of children. One OT reported:

> Yes, the kids with apraxia want to do what I want them to do, they just can’t do it yet. For the kid that has ASD, I have to be a lot more structured, because they typically don’t want to do what you want them to do! We usually do motor tasks that are fun but not for the kid with ASD! I have to encourage the kid to stay on task using lot of reinforcers. The kid with ASD is usually not as engaged, even with fun gross motor activities. I have to carefully structure these tasks usually while working on regulating their sensory integrative deficits. I have to definitely be more one-on-one to find what is going to work for them. It’s a slow process! A kid that only has CAS and may have another condition but not ASD, it’s different. They will show gross motor limbic apraxia, yes, but perhaps not all the other issues and behaviors a child with ASD shows. Usually not, although, there may be a kid out there who does, but usually not. Sensory integrative intervention will be incorporated depending on the kid’s needs. Usually, the kid with ASD requires more SI, regulation tasks, and a lot more one on one attention because they need to understand what is being asked from them! I know there is always a lot more redirection for a child under the spectrum, you have to get to their level, which requires more planning and time.

When asked whether any type of AAC device or low-tech communication board is utilized with the child in the OT session, the responses were varied. An urban OT commented:

> I have to say often times, whether it’s an ASD kid or a kid with only CAS, they don’t typically bring their communication board or device with them! I did have a few that would and if so, I knew that they were actively using it and I would do a shout out to the

> SLP or SPED teacher. Usually not in my therapy time but afterwards! That can eat up all my time. I have to say though, I have not had many kids who would bring their device or who were mastering their device! Since my goals address OT stuff, I usually focus on OT goals, but I know if the kid can communicate more effectively through their system to let me know what they want or need, the session would be smoother for me and maybe less time spent guessing what the kid wants.

Another urban OT mentioned:

> Depending on the kid, usually for the child with ASD, I may have to do the intervention in a quieter room than an open sensory room to decrease the child's level of distraction. It's always helpful if I have some tool to help them with their communication and if I do, I will grab it. If the kid comes with some type of communication aid or a computer, I will use it if it is easy to understand and I find that the kid is motivated by it. If its' too complicated, I don't because I only have a short time with the kid, and I have to work on OT tasks that are more quality, function and integration. I feel that the communication board or computer is more speech related so I quite frankly do not take as much time with it. I also know with and ASD kid, that regulating and organizing his sensory skills will help him attend to commands and any type of communication system he may have.

The third urban OT reported that she would briefly touch base with the SLP to find out what method is being used to help the child communicate. She reported:

> I think the biggest factor, in terms of setting up the therapy sessions, is getting organized with all the support systems the child needs and then relate with the child. In all my years of working, I knew that If I have the luxury of preparing and setting up the session ahead

> of time, I would make a huge difference for the child and for myself! I know that, in my school, the SLP usually worked with an iPad or other computerized system that had the LAMP application, an application that most of the kids with ASD had who were struggling with talking. With a child with ASD, everyday can be a new day! Some days, I may have to start the day with a lot more sensory work, other days the kid may be able to attend better, we can do more structured table tasks. I think with a child with ASD, whatever OT goal you are addressing, you have to include sensory support. With a child with only CAS, you may not have to do this at all. Typically, we work with his apraxia on the limbs, for the upper extremities and/or lower extremities. They are motivated to learn and do not have stereotypical behaviors as the kid with ASD has.

The one rural COTA also voiced her concerns and concurred with the urban OT's, further stating:

> I would watch the child with ASD more carefully and see what is going on and try to figure out his patterns because I know they are saying something to me through their body movements but certainly not with words! I know that a sensory type of intervention will work for the child but sometimes it takes time to figure out what will work for him for the day! I truly think that what they show me with their behaviors and motor actions is controlling their speech! We have to meet the child where the child is at, and sometimes that is difficult. If I know that the kiddo has some way to make his needs known through gestures, grunting, pointing or he has something that he brings from speech, I will use it. Most of the time, the kid does not come with any type of tool to help him request or make his needs known. Now the child with CAS does not have those behaviors like a child with ASD has! It's much easier to figure out what the child needs

> and wants because the kid will let you know with gestures and pointing or grunting. They typically don't need as many reinforcers but maybe a "good job" or extra time on the swing!! Two totally different kids.

Regarding OT collaboration and how effective team-work is with both sets of children, one of the urban OT's mentioned that with a child with ASD:

> I may be providing a lot of support for their sensory needs, not so much in direct treatment but in the classroom to help educators understand what's going on with the child and what's going on in the classroom, and what he is doing in the classroom. That's such a huge component. I stressed this a lot at my school because I have the child for only a short while, but the teacher has him for a much longer time. I have to use my time more effectively to help the teacher who is asking and sometimes tearing her hair apart! Truly ideally, it is best if we go into the classroom and functionally help the child particularly, if the child is manifesting behavioral issues, largely because of his sensory demands and lack of regulation. The teacher truly tries to understand but, given her time limitations, it's often very difficult.

She further elaborated upon her frustrations in functionally collaborating with the teacher by reporting:

> Other issues are teacher's flexibility and level of trust with us. If the teacher is not in the same page, she will not welcome you and the TA will certainly not be in the same page as well. The TA's matter a whole lot! You don't ever want to go into a classroom telling the teacher what to do. That will never go down well. Some of the young OT's would quickly find out that there isn't any cooperation by the teacher. That's a challenge. We

> were always torn between the one on one therapy, but really our job would have really better been spent to go into the classroom, not necessarily bringing hands on but to be able to explain and provide sensory support, strategies for the teacher who is usually quite overwhelmed! There is never enough time. The key is to use the time wisely that the kid can benefit from, as he is in the classroom for so long! If there is an over-stimulating classroom, there are many ideas that we could give but we have to be careful how to direct and not impose. It was always very touchy and delicate. A catch 22. I retired last year due to my age, but I tell you my biggest frustration was this one, you hit my Achilles tendon.

The 2nd urban OT mentioned that she tried to collaborate with teachers and other SLP's to keep the communication open regarding all the kids in her case load, particularly those children that were more involved and required more of her one on-one attention. She mentioned:

> We usually catch each other when we are leaving the school and take a few minutes to talk and typically there is a kid or two that I ask about and would like suggestions. There is not a set time to gather the team though, I do wish this could happen at some future point. We OT's will get together to chat regarding g the child on Friday's but with other team members, it's random! I have to say in our school, the SPED teachers are few and they are so incredibly busy. Truly the SPED assistants do all the work, but we have to follow protocol and speak with the SPED teacher before anything happens, which I agree with, but it makes it much more difficult! With the speech person, I can talk with more frequently. I know the SLP's for a while and that helps a lot! It helps to know the people so we have an understanding and an established relationship that we are freely able to share without feeling like we are imposing! Our collaboration, however, does not happen

> in a formal setting, it’s definitely informal but productive! We know each other’s eccentricities.

The 1st urban OT shared increased frustration when engaging in collaborative efforts within their elementary schools.

> Collaboration is never as much as we need to be doing for our kids. I am too busy and not around the school as much because I serve other schools that do not have OT’s or COTA’s in my case. It just does not happen frequently at all! I would love for parents to be involved as well, but unless I am e-mailing them after hours over some type of concern of mine or any changes I need to know, it does not happen. I have one kid that I have been seeing for a while and mom and I communicate more through e-mail. I think now she knows me, and I know her, so we trust each other. She has five children and it’s really hard for her to have a kid with special needs! I will get more responses from my mom’s than the teachers! With the speech therapist, I know her well enough that we can call each other and talk “therapy” when we can! She is the only one though, the other SLPA is not that “chummy.”

The 3rd urban OT mentioned:

> There are too many kids. Truly not enough time. We are all quite overwhelmed in our schools and even after school, we want our break, we are tiered, and don’t want to have to work after hours, but we always do! There are no efforts put forth by any of the school team members to get together to talk about the kids. Out efforts in collaborating does not create revenue! I know that sounds ugly, but that is what we have been told! I think around here we are hurting so much with funding just to keep our schools afloat. It’s

> survival. No time for what the school considers incidentals! The thing is that working as a team does not cost the school anything, particularly if we do it outside the school setting.

Special Educators (SPED's), Early Childhood Educators (ECSPED's) Teacher Assistants (TA's):

The SLP's responses to the perceptions and experiences regarding both sets of young children additionally emphasized the need for another set of professionals to be an integral part of the team, which are the SPED's, ECSPED's, Gen-Ed's, and TA's. These educators are with the child most of the school day. It is imperative they also be an integral part of the team involved in working with a young child with disabilities. The needs for effective transitioning of the child's AAC device or low-tech communication board to the classroom setting and, the need to keep the collaborative efforts working through shared information and learning with all the team members involved (SLP, OT, PT, etc.) is essential.

Due to the unique educational focus of the SPED's and ECSPED's in viewing the young minimally verbal child holistically based on the young child's level of function and development versus the young child's individual label, the semi-structured questions were answered globally and not specifically when they shared their perceptions and experiences when intervening with the young minimally verbal child. The relevant question asked to the SPED's, ECSPED, and TA's involved effective transitioning of AAC device or low-tech communication board to the classroom setting and continued collaborative efforts in sharing all pertinent information regarding the child to all team members (SLP and OT). It is imperative to highlight these strong connections between these professions, who are actively involved as team-members in working together for the well-being of the child. There are many connections, but two are imperative: the effective transitioning of the child's AAC device for the child to effectively and functionally communicate his/her needs and requests within the classroom setting and collaborative efforts to share information and changes regarding the child's well-being. These connections assures that the child with disabilities is optimally being supported. Four urban SPED teachers and one suburban ECSPED teacher participated in the interviews. Their years of experience ranged from eight years to twenty-five years.

Regarding AAC devices used in the classroom setting and its efficacy, the 5th urban SPED educator commented:

> I make it a point to talk to everyone that I am working with my kid. We are good about it at my school. I often times "pop" into the SLP room to observe or share information. I really need to know how the kid works his communication system and will bug my SLP first and try to work it myself. Sometimes these devices are difficult to understand, but I know I have the SLP to help me and, other support systems I can count on. I really think it's what I prioritize, and I prioritize these "talking machines" for them. Everything can be placed in these devices and there are a ton of different devices and applications. We are using the iPad more and more. I know I need to make it work and with a lot of repeating, the child will get it. It takes patience and perseverance.

The 3rd urban SPED mentioned:

> I do make sure that my Para's are understanding any system that the kid may have to communicate, simple or complicated! That is my biggest pet peeve! Everyone needs to know about the system! Everyone from the person at the cafeteria, the PE teacher, music teacher and the janitor! Everyone that is in contact with the kid. I really think the kid needs to have one to make all his/her needs known. Although, the kid may struggle

> pushing the buttons and understanding what he wants to say, it's his voice for now! We all just have to take our time and make it work for the kid and for us. It makes a huge difference when the kid gets it and we do too! I will try to understand how to work it through my SLP. It takes time and sometimes I get so stuck, but it's so important that we expose the kid to it as much as possible and that everyone be in the same page. The parents may like it or may not. Some think it's great, but many think it's something they will grow out of and use the system only in school. That one is a battle! They need one at home, but I don't think it's put to use at home like it should. Although, there are some mom's that love it because they can finally communicate with their kid. It so varies.

The SPED teacher shared the use of the young child's AAC device. For many young children, the ability to communicate is considered such an integral part of life that they may seldom pause to appreciate its value, not only in developing their communication skills but in relating to others, which is so critical for the formation for the child's development throughout his/her life.

Regarding collaboration, the 2nd urban SPED teacher shared:

> It is tough sometimes, but we make it work! We have to be intentional and try our best for the good of the child. It takes over our time and we have to be sensitive to everyone's workload, but it must be done. I think teachers and SLP's and OT's and PT's may not want to do work after hours, but we all signed up to work with special needs and they require a lot more of our time and brainstorming! So much of what we do is not written in books, we have to individualize everything! When we communicate with each other, we have to make sure that we are not replicating the work. Our time is limited with the child and we have to make it work for the child to the best of or abilities. I really think it's

> important to collaborate with everyone including people like the bus driver, and all the people that the child is in contact with throughout the school day. I am especially sensitive to the parents. I am not a parent but if I was, I know that I would want to know everything that is happening. The mom knows about all the team members in the IEP so she should know what every team member is doing with her child every week, not only when she finds out through another IEP meeting. I am always on the phone with the parents. If they don't answer me on the phone, they will answer me though an e-mail. They will usually always respond to me even if it takes time. Some of the children's home lives are so stressful!

The 4th urban SPED educator reported that making herself known to all teachers and therapists involved is of key importance. She does this by going into a classroom and observe the class, a session, ask questions, and participate in the child's activities within the school surroundings. She mentioned:

> I make it a point to talk to everyone that I am working with my kid. We are good about it at my school. I often times "pop" into the SLP room to observe or share information. The SLP will always "pop" into my room as well. We get so much information from one another and we are able to share our concerns for a few minutes, which makes a world of difference! I also make sure that all my Para's are communicating with one another and observing the child's surroundings. I have eight of them this year, they all communicate with one another and I always hope that they get along with each other and that they talk and share with the OT, SLP and PT on a regular basis. Many questions will surface! They are incredibly busy, talk about heavy case-loads! They have it all! I hand out a lot of responsibilities, and they do it! I make sure they do. I appreciate and love them so much!

> I could not do it by myself! Impossible!

Collaborative efforts are immediately put in motion by this SPED teacher. Often times the expectations of academic learning are considered so important that these expectations may come at the expense of the child’s communicative learning skills. It is the SLP’s responsibility to initially address the early communication skills of a minimally verbal or non-verbal children and support the SPED teachers, OT’s and other related service providers in finding ways to continue to support the development of the young child’s early communication skills. The SPED teachers also need to address the young child’s early communication skills, while stilladdressing the child’s academic requisites. It’s a complex task.

Another urban SPED commented:

> I communicate a lot with the SLP who is housed at the school and the OT if I catch her! At our school, we are good about it! We do get a lot of information from one another and it’s usually effective. I always say more heads for one is so much better than just one head. I think we talk “shop” a bunch between us, and I am the SPED teacher! Working so many years, I have found out that I truly don’t know it all, I NEED to be talking to everyone involved with the child. Together we can work so much better if we want to!! I also make sure that all my TA’s are communicating with one another and observing the child’s surroundings.

The professional efforts that are being made to collaborate and share information regarding the communicative progress of the young child with ASD is invaluable. The SLP must to help identify effective yet easy to implement strategies, techniques, and practices which will help facilitate meaningful communication in the classroom of the young child.

The suburban ECSPED commented:

> We just share during break times or lunch times. I make sure that my Para's are well informed and never micro-manage anyone! I will often ask them how they think the child is doing? What do they think should be done for the child to improve and I ask them for their immediate feedback. They usually know what works and what doesn't work. I let them tell me. I do not have to micro-manage. I get a lot better cooperation and "we" are all included as working together with each other and with the child as a team. I have been doing this for a very a long time and I know what has changed with me as far as collaboration is in HOW I approach those who I want to share with. I had to understand and find effective ways to work together! Been there done that! I speak to my parents everyday as they come and drop their kids. I prefer to directly talk to the parents because with parents you have to be extra sensitive. It's their kiddo we are talking about. I tell my Para's to greet and be cordial but I typically share any additional news if there are concerns that are troubling me, I will let the parent know that I will talk to mom later on but not while she is picking up her kid. It can wait for a more appropriate time. My Para's are so busy and being so busy, they may say something that sounds a little insensitive that will definitely affect the parents. So, with parents, I make it a point to communicate directly with them carefully and daily.

The 5th urban SPED teacher shared:

> I have worked in different schools over the years, I have to say it's all about establishing rapport with the people you are working with. There is no time for anything! We are getting more and more kids that are going into special education, the general educators often times wants the kids to be with us. Without our TA's we are toast! I have to set the pulse on how we are going to collaborate as a team. The TA's typically know the SLP

> and the OT and sometimes the PT. If we can, we reach out and ask, if the TA's don't have the time or forgot to ask the SLP or OT a question they want answered or a comment they want to share, I will ask for them.

To allow all professionals involved in working with the minimally verbal young child with ASD to collaborate and problem solve together is optimal. It takes intentionality and availability to take a few minutes to find out what are the young child's unique style of learning and processing and what is working and not. Given that so many children with ASD demonstrate multiple communication needs and stereotypical behaviors that may impede their communicative learning, it is imperative to take time to share specific pertinent information that is specific to that child. SPED teachers do not have the extra time to collaborate in this fashion. However, they make the time to do so because they are aware that it truly takes a team of professionals to cooperatively work together with a child with ASD who manifests complex issues.

The perceptions and experiences shared by these dedicated SLP's, SLPA's, OT's, COTA's, SPED's, ECSPED's and TA's, were incredibly thoughtful, insightful and revealing. Upon concluding the semi-structured interviews, the researcher realized that these professionals are truly kind, transparent, and very gracious to answer these thought-provoking professional questions with candor, honesty and vulnerability. Their genuine care for children as they daily and consistently set forth their best efforts, regardless of the external circumstances and limitations, is impressive. The encounters were revealing.

CHAPTER V

FINDINGS

Chapter five reviews the purpose of the study and presents the patterns and findings which emerged from analysis across the SLP, SLPA OT, COTA, SPED, ECSPED and TA professional domains. The conclusions elaborated upon are supported by observations and specific quotations from all the participants involved and evidence of specific documentation examined (Brantlinger et al., 2005). Many examples are exemplified from the gathered data and are provided, emphasizing the holistic interventions and interactions provided by the participants in order to facilitate optimal communicative gains for the young minimally verbal young child, and how the collaborative communicative exchanges occur within the professionals.

Purpose of the Study

This qualitative study endeavored to examine specific therapeutic ways young children who are minimally verbal with autism spectrum disorder (ASD) and childhood apraxia of speech (CAS) or suspected childhood apraxia of speech (s CAS) differ from young children who only have CAS or s CAS but not ASD. By carefully elaborating upon this discovery, the study further examined the possibility that, despite access to specific oral-motor-based learning interventions, some children with ASD/CAS fail to acquire spoken language. This study explains that in order for the young minimally verbal child with ASD and CAS and only CAS to demonstrate communicative, social, sensory integrative, gross and fine motor improvements, the provision of ancillary services, such as OT, SPED and ECSPED are necessary. By engaging these professionals in semi-structured interviews and asking them to share their perceptions and experiences regarding their interventions with these young children, a holistic picture emerged by the shared information regarding the many successes, challenges, and barriers encountered. This holistic picture stresses how vital a collaborative team approach is in helping these young children's progress to become more functional, competent and independent young children.

Theme One: The majority of the SLP/SLPA's shared that the most important intervention tool to implement for a young child with ASD and CAS or s CAS is a functional communication system.

Through semi-structured questions, SLP's emphasized that the most prevalent deficits of a young minimally verbal child with ASD is language acquisition. Most of the SLP's reported how imperative it is to have the young, minimally verbal or non-verbal child with ASD use a communication system to make the child's functional needs and requests known. There were variations on what type of communication system would be incorporated for the child among urban and rural SLP's. However, the consensus was unanimous that a communication system must be incorporated. To understand the professional thoughts of the SLP's, it's important to note that literature indicates children with ASD may experience communication deficits (Sigafoos et al., 2016). The SLP's that frequently these communicative deficits markedly affects every facet of the child's capacity to function and learn; highlighting once again, why it is so critical to teach the young child how to effectively communicate and transition the child's AAC device to all areas within the elementary school settings.

The rural SLP's emphasized the use of incorporating an effective communication system through an alternative augmentative communication (AAC) device that is speech generating. The

SLP's shared that the AAC device would be implemented to supplement the young child's vocal and verbal communication skills. This intervention is supported by past and current evidence-based literature (Drager, Light & MacNaughton, 2010; Johnston, Reichle, & Evans, 2004; Mustonen, Locke, Reichle, Solbrach, & Lindgren, 1991). The research suggests benefits of AAC interventions on the functional communication skills, challenging behaviors, language development, both receptive and expressive language skills, and speech production of young children with complex communication needs. The AAC devices recommended by the rural SLP's would include digitized speech output so when the child activates the device, a sound or true word is elicited for each motor pattern the child accesses. There are unique words produced for each motor pattern that the child elicits in pressing a communicative, functional picture. This auditory output aid provides the child additional sensory feedback to further help the child develop his/her receptive and expressive language skills. The SLP's reported that they utilize I-Pad computerized devices that can be utilized as an AAC communication device, as well as a compact Dynovox, a dedicated device, one that is designed specifically for communication purposes. The more experienced SLP's voiced their confidence regarding the utilization of these compact computerized devices that are now on the market. These devices can be adapted to accommodate the needs of a child with multiple disabilities who may have visual and fine motor deficits.

One SLP commented that on a cognitive level, the AAC device is easier to tackle rather than having the child spontaneously verbalize their wants and needs. Simple cause and effect tasks on the AAC device appear to be the least threatening and an entertaining application to engage the child when first introduced to the device. The SLP can then introduce language by hearing words connected to experiences of occurrences that typically interest the child. One of the SLP's reported:

> By making the experience entertaining and consistently exposing the child with these tasks, you truly get a win-win situation because the child enjoys it, as I do. I know that the kid is doing is so much more purposeful tasks that will lead to the acquisition of language, which is the primary goal.

She stressed that there are many modifications which can help the child meet his/her needs and current level of language and motor learning. There was a consensus which all the urban SLP's would incorporate the Language Acquisition Through Motor Planning (LAMP) application as soon as the young child becomes more familiar with his/her AAC device. "LAMP is a therapeutic approach based on neurological and motor learning principles," (Bedwani, Bruck & Costly, 2015). The principal idea of the LAMP application is to allow children who are minimally verbal or nonverbal a way to spontaneously express themselves throughout all settings within their environment. The language and vocabulary are providing verbal/vocal output and allowing the child opportunities to engage in motor planning as he/she accesses their needs and wants. Emerson is an SLP, who created the application to give access to core words on an AAC device and Halloran is an OT who created teaching words via sensory rich activities, allowing each word to be accessed with a consistent unique move or pattern that provides a means for developing independent communication. The first vocabulary words chosen, are what is of interest to the child. The words are powerful and likely to be used and encountered in multiple contexts determined by logic, which are elements in the application in derived from clear reasoning to perform a specific communicative task (Halloran & Emerson, 2000).

The urban SLP's emphasized the need for a communication system, however, due to financial constraints their elementary schools are typically not able to purchase any AAC devices, let alone language applications. The standard iPad costs between $250.00 and $350.00 and has to be adapted to use with a LAMP language application, which adds to the total cost to make this happen. The Tobii/Dynovox specialized communication AAC device costs between $1,200 and $1,800. The LAMP language application costs $299.00 to place on the iPad or Tobii/Dynovox AAC device. Additionally, one SLP mentioned that to understand the LAMP language application, it requires training, and regrettably, there is also no funding for any type of training. LAMP training costs between $115.00 to $125.00 per person for a full-day of training. She said:

> I have to use what is in my tool-box which is limited, but it works! I remember in my times, there were no computerized devices for the children or if so, they were so expensive and difficult to use. I have developed great communication boards with PECS.

The Picture Exchange Communication System (PECS) is a low-tech communication system which allows the minimally verbal child to effectively communicate by utilizing special functional pictures. The PECS materials are offered in kit formats. The starter kit costs $75.00 to more advanced levels that cost approximately $100 to $130. Typically, PECS are used by approaching another person and giving them a picture of a desired item in exchange for that item. Elementary school districts will purchase PECS pictures/kits to be shared by all professionals working with PECS. The SLP’s mentioned that they could get as sophisticated as they can with the child’s language by utilizing PECS pictures.

Social language intervention is equally as important to implement for the minimally verbal child with ASD.

Many of the SLP’s additionally reported that a young child with ASD also has a high degree of social impairment which a young child with only CAS may not exhibit. The SLP's described how a nonverbal young child with ASD will manifest difficulties in effectively communicating through gestures, eye contact and facial expression. Two of the rural SLP's reported the young child's social needs are equally as important as the child's language acquisition needs, as these kids may experience life-long implications affecting peer, family, academic and community interactions. The young child's social impairments encompass social awareness, social competence, and social development. These social skill deficits are common to all individuals with an ASD diagnosis which can manifest at a very young age (APA, 2000; Gillis & Butler, 2009).

One of the rural SLP's mentioned utilizing a program that covers social language embedded in the child's AAC device. This is the Social Communication, Emotional Regulation and Transactional Support (SCERTS) program that was developed out of 25 years of research by Prizant (Prizant, 1993). She mentioned that this program proposes using visual materials, such as topic boards and cue cards that can support children's understanding of verbal language embedding it in the child's AAC device to enhance communication, receptive, and expressive language, and understanding of emotions and emotional regulation. This clinician mentioned embedding social scenarios to enhance social interactions with peers, such as play skills, by engaging in pretend play and turn taking skills with games and social communication skills by initiating and responding. One other urban SLP mentioned that, by programming daily routines in the child's AAC device, the child was able to improve upon his/her communication skills and improve his social and functional behaviors as these daily routines occur in the classroom setting. She mentioned that the more she engaged in these tasks with the young minimally verbal child with ASD, the more the child would anticipate and respond to these tasks appropriately to a variety of simple age-appropriate social tasks.

Research relating to the understanding and assessment of inter-relationships between communication and social behavior has been prolific in the last decade and has created numerous new research opportunities for promoting communication in autism (Koegel, 2000). There has been a substantial amount of research on different types of social skill interventions for preschooler with ASD. Even though there are published social skills curricula and guides on social skills interventions, many of these curricula have not been empirically tested (Baker & McLeod, 2004; Quill, 2005; Weiss & Harris, 2001). The SCERTS comprehensive model, however, is derived from two decades of empirical and clinical work and is consistent with recommended tenets of "evidence based" practice espoused by researcher and clinical scholars in ASD and related disabilities (NRC, 2001; Prizant & Rubin, 1999) More specifically, the developmental, social-pragmatic focus on the model has been the hallmark of research work for many years (Prizant, 1982a, Prizant et al., 1997; Prizant & Wetherby, 1985, 1987, Wetherby et al., 1997; Wetherby & Prutting, 1984). The model is also built upon work addressing relationships among communication, socioemotional development, and emotional regulation (Hummel & Prizant, 1993; Prizant, 1999; Prizant & Meyer, 1993; Prizant & Wetherby, 1987) is consistent with the work of Rogers and Lewis (1989) and Greenspan and Wieder (1998, 2000) addressing socioemotional factors, and DeGangi (2000) and Tronick (1989) addressing arousal modulation and emotional regulation.

These findings have also been influenced by other developmentally based communication intervention models outside of ASD (Bricker, Pretti-Frontczak, & McComas, 1998; McLean & Snyder-McLean, 1998). It is now well documented that positive long-term outcomes for children with ASD are strongly correlated with the achievement of communicative competence (Garfin &

Lord, 1986; Koegle, Koegel, Yoshen, & McNerney, 1999; NRC, 2001; Venter, Lord, & Schopler, 1992). Additionally, those children who display a greater capacity to establish and follow the attentional focus of their communicative partners are more likely to initiate bids for communication, use more contingent language, acquire conversational skills, use more sophisticated gestures and symbolic language, recognize and repair communicative breakdown, and respond to contextual and interpersonal cues (Carpenter & Tomasello, 2000; Wetherby, Prizant & Huchinson, 1998). As the child makes the transition to language, the capacity for joint attention facilitates the development of a more sophisticated and explicit system of communication. There is a rapid expansion of vocabulary and linguistic concepts, and emergence of more sophisticated sentence structures for the purposes of sharing intentions and emotions (Wetherby, Prizant & Schuler, 2000). Unfortunately, children with ASD often actively avoid social interactions (Carr & Durrand, 1985). Even when language teaching is provided, many programs do not work on communication in social and natural community settings. This has become increasingly important as children with ASD are having more contact with typically developing children as school and community inclusion increases (Harrower, 1999; Kennedy, Shukla, & Fryxell, 1997). Although there continues to be a need for social-pragmatic communication research, it is important to give increased attention to all the components of social skills interventions that help identify strategies that work best for children with ASD who present with different skill levels.(Gillis & Butler, 2009). It is now well understood that improving the child's communication skills leads to improving the young child's social interaction skills leading to the manifestation of less challenging behaviors.

The last urban SLP interviewed mentioned how easy it is for the young child with ASD to be communicatively "isolated." Regrettably, being isolated does not carry over to increase communicative development and social competence. She mentioned that the need to involve the immediate environment in terms of peers, teachers, and family involvement is incredibly important. The child must see that there will be social advantages to acquiring language and, once they do, the child may improve in all areas: social, comprehension, verbal, and pragmatic language.

Using the lens of Symbolic Interactionism to further analyze exchanges, two rural SLP's elaborated upon play skills, particularly for the younger toddlers and how much of a priority this is in the intervention plan for a young minimally verbal child with ASD as opposed to a child with only CAS. These SLP's re-iterated the need to work hand-in-hand with the OT to address the child's sensory regulation skills in order to enhance the child's joint attention skills when engaged in pretend play activities. The SLP's shared, with this collaboration, the children would improve upon their gestures and pointing skills along with occasional purposeful verbal output. The SLP's would intervene with social language opportunities and then the child would be successful in acquiring purposeful verbal output. They reiterated:

> We would play with cars and trains, dolls and action figures and, incorporate scenarios where the child had to figure out how the car would drive to school or the grocery store and who would go shopping. I really think the kids like this! It's important to frequently engage in these tasks so they can start creating new neuronal connections.

Children with higher play levels are able to use more appropriate functional spoken language, as opposed to children who only played with objects indiscriminately, such as banging and mouthing (Carter et al., 2011; Stone & Yoder, 2001). Furthermore, initiating joint attention and play levels are both associated with better language outcomes that concurs with recent longitudinal data (Kasari et al., 2011).

Ancillary services such as OT/COTA's, SPED/ECSPED/TA's additionally play an integral part in further helping the young minimally verbal child effectively communicate.

The OT and the COTA play a very important role in aiding the young child with ASD with his/her communicative skills. Regulation of the child's sensory system to enhance joint attention and reciprocity is among the most fundamental and effective intervention the OT and COTA can do for the young child with ASD to engage and become more attentive to his immediate environment. The OT and COTA are integral team members that are crucial for organizing the young child's sensory integrative deficits which further precludes him/her to attend, follow commands, and react to non-verbal and verbal cues.

The semi-structured questions addressed the OT's and one COTA's perceptions and experiences regarding the differences between the young minimally verbal child with ASD and CAS and the minimally verbal young child with only CAS. All OT therapists shared that sensory integrative deficits are more pronounced with a child with ASD. These children typicallyprocess and integrate sensory information in an atypical manner which is strongly linked to core impairments in communicative and social abilities, particularly regulating their integrative skills and joint attention. It is understood through literature that if the child with ASD does not perceive the auditory and visual components of the environment, the child can miss critical social cues, not to mention being unable to process language information and missing major contents of messages that are trying to be conveyed (Just et al., 2044; Rippon et al., 2007). Given that joint attention is a significant developmental milestone of infancy (Adamson, 1995) that contributes to childhood intellectual social-emotional, and interpersonal development (Sheinkopf, Mundy, Claussen & Willoughby, 2004; Ulvund & Smith, 1996), as well as language development (Carpenter, Nagell, & Tomasello, 1998; Mundy et al., 2007), it is imperative that

OT be included from the inception of the young child's intervention trajectory. It is understood that impairments in early joint attention development also contribute to developmental disorders, such as ASD (Mundy, Sullivan & Mastergeorge, 2009; Sigman & Ruskin, 1999), and contributes to the young child's social-emotional and, interpersonal development, as well as language development (Carpenter, Nagell & Tomasello, 1998; Mundy & Newell., 2007). The need for the OT and SLP to work together is essential. Together many great outcomes can transpire. All the OT's shared that one-on-one structured intervention is necessary for the young child with ASD.

Two OT's stated they would encourage gross motor play from the onset with imitation-based activities and games that included turn taking tasks within structured contexts. These tasks would undeniably encourage social interactions and participation with other peers. One OT stated that young children with ASD demonstrate impairments in several aspects of motor function that includes gross and fine motor performance, imitation, and bilateral coordination. She stressed how important it is for her to engage the young child with ASD in gross motor activities and, once the child is used to these gross motor tasks, finer motor tasks including participation and peer game playing tasks, can ensue. She stressed that since every child with ASD is different, different interventions must be implemented to fit the child's specific needs.

When asked if AAC devices or low-tech communication devices were transitioned into the OT session, overall, the OT's commented that if the young child did not transition to the OT or COTA session with a communication AAC device or low-tech communication board, it wasn't searched for. One OT stated:

> I am so much more concerned about the child's gross motor and sensory function that if the kid does not have his device or board with him, I do not fuss with it. I have only a short time to address the kid's gross motor and sensory needs that I typically do not

> address his communication device. Often times the kid does not come with a device or board but if he does, I will take my time to see how he can effectively use it to communicate with me or I will help him to do so, but I truly do not take that much time with it.

One OT stated she would definitely consult with the SLP if the child had an AAC communication device and find out what the child is able to do with the AAC device. If the child, however, would not come to the session with the AAC or low-tech communication board, she would not take time to locate it and utilize it. She added that there simply is not enough time. The other OT's mentioned it is their experience that there are only a few children who have AAC devices in their school and they typically do not use them. Transitioning AAC devices to OT settings are typically very challenging, although, the SLP is responsible for the AAC devices and should ensure the child has their AAC device in all settings and transitions.

The range of needs from the young minimally verbal child with ASD continues in his/her SPED classroom setting. These needs should be supported, hence SPED, ECSPED, and TA's, are most definitely included as integral team members in optimally working with the minimally verbal child with ASD. When asked to state differences between the child with ASD and CAS and the minimally young child with CAS only, the educators were in agreement that they have to recognize that children with ASD respond differently particularly to different social and sensory environments. Given these sensorial deficits that the young children encounter, two SPED educators mentioned that, for the minimally verbal child with ASD, it is imperative to prepare the environment to ensure the child is not over-reacting or under reacting and feeling anxious to bright lights, loud noises, and additional sensory input. Young children who have difficulty processing verbal instructions in noisy environments and who often focus on sensory-seeking behaviors appear more likely to underachieve academically (Ashburner, Ziviani & Rodger, 2008). Adapting the physical environment is paramount.

Because the SPED and ECSPED teachers spend the majority of the school day with the children, they offered the most diverse types of interventions for children with ASD. They would typically utilize token boards, schedule boards, transition boards, first-then boards, or visual communication boards for a child with ASD. When asked if they would transition an AAC device or low-tech communication board from the SLP to the classroom setting, all the SPED's said that they would and would add the repertoire of icons to include what is pertinent for the child within the classroom setting. One creative SPED teacher mentioned that for two seven-year old children, she developed social scripts with other peers for the children to understand. These scripts provided ready phrases to use when they needed to use them. The phrases were practiced to effectively use at their control in a range of social situations. This provided the children with a communication strategy which reduced the pressure of knowing what to say. The child with ASD seemed less anxious and more confident to be able to retrieve these social scripts, even though they were rote, they were appropriate. It helped reduce the pressure to spontaneously know what to say and connected the child more with their peers. She mentioned:

> I loved this method because the kids could read well, they just did not know what to say in certain situations that I would purposefully put them in. They would search the phrase wall and eventually pick the correct one and learned that some phrases were more appropriate than others! Their friends would help them out as well additionally adding some phrases for them that were sillier but appropriate for their age.

One SPED teacher shared how she would embed opportunities for the child with an AAC device. Activities that the child may be involved in were programmed in his device in order to engage in social games and interactions with the TA or peers. She mentioned:

> Although it took me time to do this on the AAC device, once I did, I understood how to work it which was not too difficult and, it made a world of difference to the kid. He loved to play maze games and Clue with his peers and, he was able to follow the rules with some verbal redirection. It worked for that particular kid and he wanted to do it all the time! It became a reward for him after he did all his schoolwork!

Using the etic approach to examine the communicative exchanges between and among these professional domains, it appears that information is shared and imparted to the best of their abilities given the time constraints, budget, and large amounts of children they must support with on a daily basis. Overall, the team professionals shared a few distinctions and many similarities when individually interviewed, regarding intervention approaches and abilities to transition AAC devices and communication boards, share multidisciplinary strategies and techniques from one setting to the next within the school setting. There is awareness and knowledge of the particular needs the minimally verbal child with ASD requires and how diverse and complex these needs are. All domains sincerely appreciated and respected the work of the other professional domains involved in working with the child with ASD and CAS.

Theme Two: The SLP's shared varied perceptions regarding intervention difference with a minimally verbal young child with only CAS, whereas the OT's shared unanimous specific interventions differences with a minimally young child with only CAS.

All of the SLP's interviewed recognized that ASD and CAS are highly comorbid with an increased frequency of CAS in the population of children with ASD. The SLP's also shared that they noticed an upsurge of young minimally verbal children with ASD being diagnosed with CAS. Literature supports these shared views by stressing that identification of possible comorbid diagnosis for all disorders is critical because evidence-based treatments are available to treat the co-occurring conditions and to greatly improve outcomes for children who receive these intensive interventions in comparison with a child who only receives traditional speech therapy (Tierney et al., 2015; Shriberg, et al., 2011; Strand, Stoeckel & Baas, 2006). Out of the six SLP's interviewed, three rural SLP's commented that the intervention for a child with only CAS would be different. They commented that the only similarity would be in the use of an AAC device for both sets of youngsters. The other three rural SLP's reported that the intervention would be similar for both sets of youngsters. One of the urban SLP's commented:

> For a child with CAS, I would make sure and assess if the child is communicating effectively either by gestures or by pointing, if not, I would recommend an AAC. These kids show a high amount of frustration in their inability to verbally communicate because they want to talk and are motivated to learn but cannot talk on their own. I would then begin an oral-motor tactile cued program to work on the child's motor planning and motor sequencing skills. I would use either a Talk Tools or Kaufman Praxis program to elicit tongue, lip and jaw movement to produce sounds. For a child with ASD and CAS, I would not mess with CAS treatment at all. I would not address an oral-motor program but concentrate more on the child's receptive, expressive language and social language skills. For both kids I would continue to use visuals, manipulatives, reinforcers and sensory input.

The other urban SLP also mentioned differences in intervention with a young child with only CAS. She reported:

> For a child with CAS only, I would be more focused on administering oral-motor based interventions because these children usually have deficits with oral-motor tasks. I would

> not be as concerned about their receptive and pragmatic language acquisition as I would a child with ASD because the need is different. I would use a Kaufman or a PROMPTS comprehensive oral-motor program. The child with only CAS, will not have the stereotypical and social behavioral deficits that the child with ASD would. I would never add supplemental intervention to a child with ASD to address his CAS because it would be just too overwhelming. I would wait and address it later, after the child has acquired more language.

Literature supports the experiences and perceptions of these two SLP's regarding differences with intervention approaches for both sets of youngsters (Strand, Stoeckel & Baas, 2006). For a young child with ASD, learning language is difficult because the child is not learning new motor skills by integrating sensory input related to the task, therefore, addressing the child's language acquisition is primary. (CARD, 1990). The young child with only CAS typically has acquired language and understands language but is unable to verbally produce sounds and words to verbally communicate. The young child with only CAS is not able to motor plan and motor sequence his/her articulators to form words, which are two distinct conditions and interventions. Literature also supports AAC devices to be considered as a tool to facilitate the development of communication and speech for the young minimally verbal child with CAS (Alant 2005; Bornman, Alant & Mering, 2009).

The last rural SLP mentioned:

> If the child only has CAS, I would make sure to use tactile cues to elicit sound production using a lot of different oral-motor programs. The interventions would definitely be different than for a child with ASD. I have seen many young kids with ASD and although they may have a CAS diagnosis, I would not address the CAS until I was convinced it

> was CAS or s CAS. I only have to carefully listen to the child's verbal repertoire, even if it's extremely limited. If the quality of the verbal output demonstrates varied oral placement movements with variated sound productions, the child probably does not have CAS. I rarely see young kids who truly have both ASD and CAS. When I assess the young child with ASD, I typically do not assess for CAS even if the child is minimally verbal or non-verbal. To be honest, I don't know of a reliable CAS assessment tool, although lately I haven't checked. I have only been exposed to CAS checklists. If the child is referred with the dual diagnosis, I would have to be convinced that the child truly has CAS and treat it.

Research supports this SLP's perceptions and views regarding young minimally verbal children with ASD and CAS (Shriberg et al., 2011; Tierney, 2015). There are currently no recent studies conducted regarding minimally verbal young children with ASD and CAS, even though there are many minimally verbal children diagnosed with CAS (Chenausky et al., 2018; Shriberg, et al., 2011). There is a need for this type of research, particularly in finding out how many children with ASD also meet the criteria for CAS and what CAS looks like in these children who are severely affected. Reliable clinical measures can help the profession understand which minimally verbal children might respond to speech treatment and which children are unlikely to. This information would help the SLP make clinical decisions about treatment much earlier than we do now and, given the SLP an opportunity to create and refine treatments that can help the child who can achieve useful speech (Chenausky et al., 2018; Shriberg et al., 2011).

Regrettably, as Strand et al., (2013), mentions in her study, "a young minimally verbal child with ASD does not typically fall neatly into a binary pattern of either having a particular impairment phonology vs CAS or not." (p.5), therefore, creating an assessment tool that covers all these complex factors has been challenging. According to the most recent study conducted by Terband et al., (2019), no measure so far has proven to have clear diagnostic value on its own. Terband suggests that the first step to improve this situation is to adopt a more analytic process-oriented way of theorizing about measurements and their relations with underlying deficits in speech disorders. The second step is to conduct clinical research to come up with validated consensus measurement protocols to operationalize, quantify, and eventually standardize assessments (Terband et al., 2019). Typically, the most common assessment and screening tool the SLP's administer to rule out CAS is through a dynamic assessment which seeks to identify the skills that the individual child possesses, as well as their learning potential. The dynamic assessment procedure emphasizes the learning process and accounts for the amount and nature of the examiner's investment (ASHA, 2016). By using a dynamic type of assessment, the SLP can provide cues such as slowed rate gestural or tactile cues to better judge the speech production and to determine how much cueing is necessary to facilitate performance. Many of the behaviors and signs associated with CAS are also found in children with more broadly defined SSD's (Murray, McCabe & Ballard, 2014). Additionally, it is important that the diagnosis of CAS not be based solely on the severity of a child's SSD's, as this may result in overdiagnosis. The current gold standard for diagnosis continues to be a professional SLP's expert opinion (Maas, & Farinella, 2012).

One rural OT that shared specific differences on how limbic apraxia is imperative to address when working with a child with only CAS. This rural OT commented:

> With a child with only CAS, I would probably identify limbic apraxia for this kid as well. Most of the times when these kids have apraxia of speech, they will have upper and lower extremity apraxia. I would add gross motor movement activities like: kicking a soccer

> ball, climbing ladders, rock climbing and then move on to fine motor tasks like; throwing a basketball, bean bag toss and manipulatives I would then move on to table tasks and address coloring/handwriting tasks to help with their impaired motor planning and sequencing skills. I would also probably address their sensory integrative skills as many of these kids have kinesthetic and praxis sensory deficits.

Another rural OT reported that basic functional daily living tasks would also be added to the repertoire of interventions with a young minimally verbal child with only CAS, adding that many times the young minimally verbal child begins to vocalize as the child becomes more active. She reported:

> For a child with CAS only, limbic apraxia is almost always present. Gross and fine motor tasks would be primary. Daily living functional tasks would also be a priority to address as well. Sometimes these kids cannot put their shoe on or tie their shoes or appropriately put their shirt and pants on. Playground activities can also be challenging for these kids, going up and down the slide, swinging on the swing or playing on the monkey bars. The child will often say sounds or words, particularly when they are active with their whole bodies.

Research supports these shared experiences. In a study by Newmeyer et al., (2007), the findings of his study revealed that children with severe SSD and CAS often present with fine motor functioning below the average range for their age, along with the presence of abnormal oral-motor imitation skills. Another study conducted by Dewey et al., (2007) reported limbic apraxia as a general underlying impairment in the planning and sequencing of gross and fine motor movements, particularly in the presence of abnormal imitation of oral-motor movements. Professional OT's suggest that instigating sign language to aid the young child with CAS communicative skills is counterproductive, given their limbic limitations (Missiuna, Gaines & Pollock, 2002).

The SPED and ECSPED teachers reported that intervention would not be different for a child with only CAS versus a child with ASD and CAS.

One urban SPED teacher reported that accommodations and visual supports would be similar for both sets of youngsters. She mentioned:

> I would structure and accommodate the classroom setting to where the child can easily see me, the TA and the materials he is working with. I would not be as concerned about the young child's stereotypical behaviors as I would with a young child with ASD. Hopefully the support systems will be in place from what the SLP and OT suggested regarding the child's communication, gross, fine and sensory motor information. The TA would be providing the child one-on-one intervention and making sure she is repeating, modeling, slowing speech rate and presenting the child with plenty of functional visuals. If the SLP has an AAC device for the child, I would definitely incorporate this for the young child. It's always based on function and not diagnosis.

There is a paucity within the literature regarding SPED and ECSPED's teacher perceptions of children with SSD's and CAS. SSD's are the most prevalent speech-language disorders for children entering school (Shriberg, Tomblin, & McSweeney, 1999) yet there are minimal studies that examine the effects of SSD's on teachers' perceptions of student's academic, social, and/or behavioral skills (Shriberg, Tomblin & McSweeney, 1999). Because the child with only CAS does not typically demonstrate stereotypical behaviors that may disrupt a general or special education classroom setting, imbedded and naturalistic instruction in Gen Ed classrooms may be feasible for a child with only CAS. When team members use strategies that are child directed and responsive to the child' communicative attempts, there are many opportunities to teach many functional skills without disrupting the flow of social interaction or he regular classroom activities. It is important to foster communication-rich social environments for minimally verbal young children (Harjusola-Webb & Robbins, 2012).

Sub-theme: Relevant terms and concepts in the classification, speech processes, and diagnostic markers for CAS now currently exist in the literature.

Research is no longer constrained to understand, treat, and prevent CAS and the primary factor in underlying its notable overdiagnosis worldwide. There now exist contemporary research in SSD that includes studies to identify, explicate, and treat the genomic neurocognitive and neuromotor substrates of CAS (ASHA, 2007; Childhood Apraxia of Speech Association of North America, 2013; Royal College of Speech and Language Therapists, 2011; Shriberg et al., 2017a). A diagnostic marker is a disorder as "one or more operationalized and standardized signs with a sensitivity to and specificity for persons with prior, present, and/or future expression of the disorder at estimated levels of accuracy." (Shriberg et al., 2017a c, p. 3). There are four diagnostic markers:

1. **Pause Marker I (PM I):** A diagnostic marker to discriminate childhood apraxia of speech from speech delay: Development and description of the pause marker. There are seven proposed attributes or measurements, four speech disorder classifications and ten linguistic domain analytics (Shriberg et al., 2017a).
2. **Pause Marker II (PM II):** A diagnostic marker to discriminate childhood apraxia of speech delay: Development and description of the pause marker through research studies.

Studies support the pause marker as a near-conclusive diagnostic marker of CAS (Shriberg et al., 2017b).

3. **Pause Marker III (PM III):** A diagnostic marker to discriminate childhood apraxia of speech from speech delay: Theoretical coherence of the pause marker with speech processing deficits in childhood apraxia of speech (Shriberg et al., 2017c).
4. **Pause Marker IV (PM IV):** A diagnostic marker to discriminate childhood apraxia of speech from speech delay: The pause marker index. Speech, prosody, and voice precision stability data to scale the severity of CAS (Shriberg et al., 2017d).

SLP's can now feel less ambiguous and better informed to make knowledgeable decisions pertaining distinctions between CAS characteristics and distinctions between SD's that occur mostly on children with ASD and SSD's that occur mostly with young children with only CAS (Shriberg et al., 2011).

Improved verbal output gains for a minimally verbal young child with only CAS over the young minimally verbal child with ASD and CAS reported by all of the SLP's, OT's, SPED's, and ECSPED's.

The SLP's unanimously commented that a young minimally verbal child with only CAS would probably demonstrate improved verbal gains versus a minimally verbal child with ASD and CAS. One urban SLP mentioned:

> If I had to choose which child would demonstrate verbal gains after a certain amount of consistent intervention, I would have to say the child with only CAS. A child with ASD is so much more unpredictable and has a lot more behavioral and stereotypical issues to

contend with that may be impeding upon his verbal expression. Verbal output gains may take longer to see with a child with ASD.

There is varied congruence among the interviewed SLP's in comprehensively identifying the characteristics that they use in determining CAS. Literature indicates that it is clear that the diagnostic criteria used to identify CAS has been controversial for many years, resulting in professional confusion (Strand et al., 2013; Tierney, 2015). However, despite the difficulty noted in determining the characteristics that differentiate CAS from other speech acquisition disorders, many children are identified with CAS (Shriberg et al., 2011; Strand et al., 2013).

Most researchers agree that the core deficits for children with CAS is a reduced or degraded ability to convert abstract phonological codes to motor speech commands, referred to as motor planning and/or programming (ASHA, 2007b; Shriberg, et al., 2017). This consensus has been supported by behavioral studies (ASHA, 2007a, 2007b), classification paradigms (Shriberg et al., 2010), and computation modeling studies (Terband & Maassen, 2019). The impairment then manifests itself as a disorder in articulation, difficulty sequencing sounds and syllables, inconsistent production or repeated sounds and syllables, and distortion at the suprasegmental level, known as dysprosody (ASHA, 2007a, 2007b). Evidence suggests that children with CAS can only improve their speech motor skills with a variety of oral-motor based intervention protocols. To date, findings of research indicates that motor-based interventions can produce gains in speech production abilities with children with CAS (Maass, Gildersleeve-Neumann, Jakielski & Stoeckel, 2014). Successive approximation or multisensory approaches to motor planning are key to speech production progress (Tierney et al., 2016). To rule out any more confusion regarding diagnostic criteria for CAS, there now exist recent research studies that optimally define CAS via diagnostic markers (Shriberg et al., 2017).

One urban OT mentioned how the child with CAS would typically begin to speak more in the OT session. She reported:

> The child with CAS will often begin talking in the OT session. I know the SLP in our school often comes into our therapy room and observes and sometimes plays with the child when the child is involved in gross motor activities. It's nice to see because speaking for the child is so labored to spontaneously speak but not when the kid is playing. It always excites our SLP I think having the OT session before the SLP session is clearly very important for the kid to have a more productive speech session.

As reported by this OT, research studies indicate that motor performance can affect the child's verbal output. In his study, Pulvermuller et al., (2005) demonstrated that the left hemisphere's cortical systems for language and action are interlined and that activation of motor areas can influence the processing of words semantically related to arm and leg actions. The results of his study provided evidence that there exists a functional link between two systems and that there is an interaction in the processing of meaningful information about language and motor action (Pulvermuller et al., 2005). It is important to integrate OT and SLP therapies to maximize the effectiveness of therapy. If these children are not identified and treated early, they will more than likely show problems in everyday living skills, including their academic skills. Early information about these children with speech-language and motor impairment could lead to early occupational therapy services and other interventions to address motor and speech deficits (Rechetnikov & Kinsuk, 2009).

An urban SPED teacher also commented on how a young minimally verbal child with CAS is more predictable with his/her verbal output gains. She reported:

> I think the child with only CAS would not be demonstrating the behavioral issues that a young minimally verbal child with ASD and CAS would. Every child with ASD is different an it clearly sets them apart from other young children that do not have ASD. One can predict and give a more realistic prognosis for a young child with CAS. without having to deal with differences in behavior that may change day by day. There are more issues that the child with ASD has to deal with and therefore, I believe that a child with CAS would be more consistent and quicker to make progress with his/her verbal output after a certain amount of interventions.

It is important to report that among the professionals working with these two sets of youngsters, the only professional that shared different experiences and perceptions regarding intervention with the minimally verbal young child with ASD and CAS and the young minimally verbal child with only CAS were the SLP's and SLPA's. The other professional team members, OT's, SPED's, and ECSPED's did not report varied experiences and perceptions regarding intervention with these two sets of youngsters. These findings warrant further investigation since SLP's are the primary professionals who diagnose and intervene with young children with CAS or s CAS and yet the SPED's and ECSPED's spend the most time with these students. These shared experiences from the SLP's may highlight reasons why there exists diagnostic and literature confusion and differences in the communicative progress when it comes to intervening with a child with ASD and CAS.

It is additionally interesting to report that the SLP's and SLPA joined the OT's, COTA, SPED's, and ECSPED in unanimously agreeing that the child with only CAS would demonstrate improved verbal output gains as opposed to a young minimally verbal child with ASD and CAS, yet the SLP's differed with intervention approaches when working with the young minimally verbal child with ASD and CAS. As team members, there is clearly a need to conduct research which examines the effectiveness of approaches for specific children. Important responsibilities are placed on SPED's, ECSPED's, Gen Ed teachers, related school professionals (SLP's and OT's), and parents to determine the unique characteristics of each child and match the appropriate communicative intervention and practices that will allow the child to make progress (Iovannone, Dunlap, Huber & Kincaid, 2003).

Theme three: It is essential that SLP's, SLPA's, OT's, COTA's, SPED's, ECSPED's, and TA's engage in collaborative efforts for young minimally children with ASD and CAS.

Many of the SPED's, OT's, and SLP's shared their frustrations regarding lack of time to engage in collaborative efforts with other team members. School-based practices increasingly employ collaborative consultation among SPED, ECSPED, TA's, Gen ED. School counselors, SLP's, SLPA's, OT's, COTA's, PT's, and PTA's (Blosser & Kratcowski, 1997; Friend & Bursuck, 2000; Idol, 2006). "Collaboration is an interactive process that enables people with diverse expertise to generate creative solutions to mutually defined problems," (Ritzman, Sanger & Coufal, 2006, p. 1). Collaborative efforts alter and enhance goals and outcomes to produce comprehensive solutions for the young minimally verbal child with disabilities. These comprehensive solutions would not be possible if produced independently by individual team

Members (Ritzman, Sanger & Coufal, 2006).

What often occurs within the team members is referred to as co-activity. The SLP focuses on speech and language skills. The OT focuses on fine/gross motor skills, independents of the academic curriculum. The SPED's ECSPED's, and TA's deliver curricular content without attempting to integrate SLP goals. Although in the IEP individual professional goals are established independently, general goals can be established cooperatively between team members. Collaboration is considered a continuum that involves jointly establishing these general goals rather than specific goals for the individual young child (Friend & Bursuck, 2012). In order for this to occur, coordination and group cohesion is imperative, where the team members can share opinions and instructional strategies relating to the specific young child they are working with together. The major outcome of collaborative consultation efforts is to provide comprehensive and effective programs for children with special needs within the most appropriate context (Idol, Paoloucci-Whitcomb, & Nevin, 2010).

Although experts have identified these service delivery options as best practices, school-based SLP's have reported they continue to spend a majority of their time in traditional pull-out services (ASHA, 2016). One urban OT commented upon her repeated frustration in establishing optimal rapport with the classroom Gen Ed or SPED teachers. She commented:

> It is quite challenging to establish good rapport with the teacher. You cannot go in thinking that you can dictate and tell the teacher what to do. You are walking into their territory and you must establish good rapport with the teacher, or else it will not go well. Many new OT's have an extremely hard time with this issue. My experience is that most teachers feel imposed upon when they have a lot of other children to work with. My ideas and suggestions were always to make the classroom more sensory friendly and to offer suggestions to what the teacher may do to help the child. I think the teachers think it's helpful but always seemed challenged in implementing the suggestions into the classroom setting. You kind of give up because you feel like you're alone in a constant battle. It's easier to work independently with the child.

This OT was willing to be flexible and work with the teacher, which are important qualities to have when collaborating with other team members (Salend, 2005). However, sometimes that is not enough. Advocacy is equally as important. Making sure that the SLP's and OT's are advocating for themselves is an essential component in order not to feel so "alone." Team members and staff members may not be aware of the SLP's and OT's scope of expertise, knowledge base, and concerns that should be imparted for the good of the young minimally verbal child. The voices of these professionals need to be heard by the parents, teachers, and administrators. Additionally, it is equally as important that the SLP and OT receive administrative support in order for collaborative, cohesive work to be effective. The administrator's support can be solicited by emphasizing the compatibility between collaborative service goals and those goals included in school plans that reflect current educational reform initiatives. Administrators can promote the success of the collaborative model and significantly contribute to the SLP's and OT's success in attaining collaborative goals for the young child (Elksnin, 1997; Ritzman, Sanger & Coufal, 2006). Collaboration does require diligence and determination but without establishing optimal advocacy, the SLP and OT may not be able to implement a variety of service delivery options in providing a full range of services (Ritzman, Sanger & Coufal, 2006).

Literature validates professional OT's concerns in creating a sensory friendly atmosphere in the young child's inclusive classroom or SPED classroom setting (Mauer, 1999). Literature stresses how important it is to implement sensory integrative intervention. Sensory integrative intervention is intended to result in the normalization of sensory processing, and thus, enhance the development of higher, dependent, cortical functions, such as oral and written language (Mauer, 1999). Although, there is limited research data that exists on the effectiveness of integrated treatment programs and outcomes of sensory integrative (SI) therapy (Mauer, 1999), an integrated treatment plan can capitalize on ways in which sensory-motor and speech-language interacts. The team members may be better able to identify the nature of the underlying neurobehavioral dysfunction and its possible contributions to delayed communication skills. In accomplishing this goal, these team members can then identify intervention strategies that are most effective in enhancing language, learning, and academic success for individual young special need children (Mauer, 1999). As a treatment approach, (SI) intervention was never intended to be provided apart from special education services or speech and language services (Ritzman, Sanger & Coufal, 2006).

Regrettably, the school-based OT literature has revealed that the structural and administrative barriers limit opportunities for educators and OT's to establish and maintain effective partnerships that are viewed as crucial to supporting meaningful outcomes for students (Bose & Hinojosa, 2008). The literature cites limited funding, large caseloads, and shortages of OT's as factors supporting the adoption of consultation as a service delivery approach (Reid et al., 2006), School based OT consultation is characterized as collaborative when the integration of strategies to support educational programming for special need children only involves sharing expertise between educators and OT's (Villeneuve, 2009). School-based OT practices and research indicates that OT's continue to employ direct methods of intervention (Villeneuve, 2009). Available research provides limited understanding of factors that facilitate collaborative interactions between educators and OT's. Instead, emphasis has been placed on barriers to collaboration (Villeneuve, 2009). Lack of a clear understanding concerning the roles and responsibilities of stakeholders involved in school-based OT has been identified as a significant challenge to collaboration (Barnes & Turner, 2001). On an informal basis, research indicates that

OT's take the time to observe the young child and suggest adjustments within the environment for that individual young child, depending on what works best for that child. Each individual young child needs a slightly different approach (Greenspan, 2007; Atchison & Dirette, 2012).

A good example of advocacy was shared by an SLP who was determined to implement a collaborative program with the SPED and Gen Ed teachers regarding AAC usage. This urban SLP was adamant about implementing a protocol that she was confident would work well for all involved in working with the young child's communicative needs. She reported:

> I went to my administrator, talked to him and stressed how important it was for the non-verbal or minimally verbal child to utilize his AAC device every day. I suggested that I use "speedy speech" and go into the class and offer 10 minutes AAC usage every day. I also mentioned how the pull-out method of seeing the child in the therapy room twice a week for thirty minutes would be counter-productive. I emphasized how the teachers would appreciate this method so, they wouldn't have to make up the work the young child may miss when he/she goes to speech. He agreed and it went smoothly, the memos went out and I made sure I talked to the teachers with consideration of their time. It worked so well in our school! At the same time, I had opportunities to catch up with the teachers about the young child, and stress AAC use with the child, sharing my thoughts and answer any concerns they may have, I think it was a "win-win" situation. We are still using "speedy speech" because how successful it was for everyone, particularly the child.

A number of researchers have supported the important role of advocacy in implementing a successful speech and language program (Larson & McKinley, 1993; Prelock et al., 1995; Ritzman, Sanger & Coufal, 2006). It is critical that the SLP's access the support and expertise required to provide highly qualified instruction for their students. SLP’s need to be effective consumers of a service delivery option. There needs to be more intra-and interdisciplinary dialogue about the roles of SLP’s and SPED’s as related services providers. Additionally, Ritzman, Sanger & Coufal, (2006), pointed out that other variables such as enthusiasm, student engagement, and motivational strategies will continue to be important factors impacting successful academic outcomes. Regarding AAC usage, team members providing AAC services require skills in successful collaboration when working on AAC teams in order to transition the AAC device from one setting to the next within the school setting (ASHA, 1989; Da Fonte & Boesch, 2016; Soto, 1999).

Another SPED teacher mentioned the importance of introducing pre-reading and reading tasks that the young minimally verbal child must be exposed to from the onset of his/her academic year. She shared effective collaborative efforts from the SLP and SPED teacher:

> I typically work on pre-reading and reading skills with the kids. It’s incredibly important and something that will be intervened with right away. I am a SPED teacher and a licensed reading specialist, so beginning reading with the children is imperative. The SLP would always come in the most inopportune times and I could not release the child to pull out therapy. The reading programs are usually an every-day thing. Although, I realized how important speech was for this child, I did not like the idea of forfeiting his reading session for speech. Since the Flight Reading Program had a lot of oral-motor visual feedback cues, the SLP came up with the idea of working together, as the child was acquiring his reading skills, the SLP worked on specifically “tweaking” his oral placements to make sounds tying it with his reading tasks. I thought that was clever and it worked! We learned a lot together. It made us both “time happy” and the child appeared

> to be less anxious to only spend one hour with both of us instead of separately. I think nowadays, this co-treating type of intervention needs to occur more and more, there is simply not enough hours in a day to fulfill all the needs the schools require.

This is a strong example of collaborative efforts put in motion to functionally help a minimally verbal child. The classroom always presents a vastly different context in terms of demands it places upon the child's communication skills. Services may then be provided in a multiple context, but all are connected to the curriculum in the young child's classroom. Ultimately, the challenges that arise represent opportunities for professional growth. Working collaboratively within a climate of mutual respect and generous sharing of expertise, school professionals can better serve the young special need child (Giangreco, Prelock & Turnbull, 2010).

It is necessary to emphasize teacher training, continuing education and professional development for SLP/SLPA's, OT's/COTA's, SPED's/TA's involved in working with minimally verbal young child with disabilities.

Literature reports that the experience of all active team members SPED's, ECSPED's, TA's, SLP's, SLPA's, OT's, and COTA's receive from comprehensive multi-disciplinary services impacts their perceptions and professional dispositions of working with children and families with special needs. All team members involved were able to conceptualize the importance of collaboration and how their role as partners with families and other professionals impacted the overall outcomes for children with disabilities (Carter, Asmus, & Moss, 2013). Increased national and international interchange of professional knowledge, information, and education in communication sciences and disorders is a means to strengthen research collaboration and improver services. SLP's in various settings work collaboratively with other school or health care professionals to make sound decisions for the benefit of children with communication and swallowing disorders (ASHA, 2016).

Recently, SLPA's have been working at school, private practice, and rehabilitation services, assisting licensed SLP's. The SLP's that were interviewed in the two urban areas (Edmond and Stillwater) did not include SLPA's in their school settings. Only licensed SLP's, worked in these urban areas. However, in the rural areas (Guthrie and Claremore), SLPA's are assisting SLP's due to the shortage of licensed SLP's in these rural areas. It is the SLP's responsibility to design and implement a supervision system that protects the students' patients' and clients' care and maintains the highest possible standards of quality. Because the SLPA provides services as "an extension" of those provided by the professional, the SLP is responsible for informing the SLPA about the Code of Ethics and monitoring the performance of the SLPA. The SLP must conduct ongoing competence evaluations of the SLPA, provide and encourage ongoing education and training opportunities for the SLPA consistent with competency and skills and needs of the students, patients, or clients served, make all management decisions, adhere to the supervisory responsibilities for SLP's, retain the legal and ethical responsibility for all students, patients, and clients served, adhere to the principles and rules of the ASHA Code of Ethics, and adhere to applicable licensure laws and rules regulating the practice or SLP (ASHA, 2019).

The urban SLP's shared that they are able to choose one to two trainings or conferences they can attend per academic year. Typically, the conferences or trainings attended are relevant to the children they are serving. For example, one SLP mentioned that given the increased rate of children with ASD that they are seeing in their schools, more training is needed. She attended the SCERTS conference and the other SLP in her school attended the LAMP training. These SLP's shared that they would like to attend conferences that the school will approve, however, they are grateful for what they are allowed to attend since there are many budget cuts affecting the SLP's. They also have in-service opportunities after attending any training/conference to share what was learned to other SLP's. For the urban SLP's, who typically have SLPA's working with them, trainings are minimal. One rural SLP shared that if a training or conference was approved, she would often choose for her SLPA to attend versus herself, since the SLPA was the one who would be working with the minimally verbal child. She mentioned that she would typically request a training or a conference to attend at the beginning of an academic year and hope that it will be approved. Often times they are not approved due to budget cuts for ancillary services. One rural SLPA mentioned that her SLP supervisor is very informative and helpful and that she has learned so much from her. She was elated when LAMP training was approved for her to attend in the Dallas area that did not cost too much. She shared:

> My supervisor sent me to the LAMP training because she wanted me to be able to work on the communication iPad of a student. I learned so much and saw how helpful it was for him. She taught me a little about how to use the application but decided for me to go and take the training so I can know what to do when I am with the student and she isn't. I wish we can use the iPad and LAMP app for more students, but our budget does not let us do this.

As more SLPA's are working in rural elementary school districts, more COTA's are also working in rural elementary school districts. Similar to the SLP's, the urban areas of Edmond and Stillwater do not hire COTA's to work in their elementary school settings. However, in the rural areas (Guthrie and Claremore), COTA's are typically hired to help the licensed OT's to provide therapy for the young children due to a shortage of licensed OT's. The COTA's primary responsibilities are to assist the licensed OT to implement interventions under the supervision of a licensed OT in accordance with the intervention plan and level of service competence to support client participation in areas of occupation throughout the occupational therapy process. Additionally, the COTA's must uphold professional standards and responsibilities by achieving service competence and applying evidence-based interventions to promote quality in practice. Supervision is categorized as direct and indirect supervision (AOTA, 2018). Trainings should also be provided for the COTA's as needed. However, the rural COTA shared that within the school district that she works with, all ancillary budget has been cut. She shared that she has been working for fifteen years in different rural elementary school districts. The school previously provided at least one training or conference attendance a year, however, the past three years, the schools have not approved any money towards continuing education. There is simply no funding to allow this. She additionally commented that there are simply not enough licensed OT's and COTA's around to provide services in these rural elementary school districts, much less funding provided to them for continuing education. She commented:

> I provide intervention for Langley, Claremore, Pryor and Chelsea areas. I have one supervisor that I am always in contact with and we get together at least once a week. There simply are not any licensed OT's or COTA's around these areas. We have to make it work. Two to three years ago, I attended a few training sessions, however, nowadays there is simply no money provided for that any longer. I will pay my way if it isn't too expensive around Oklahoma and maybe the Dallas area but typically cannot afford to do it on my salary! I know my supervisor tries to get one or two approved that I am interested in attending, but lately it has not been possible.

Although duties vary slightly by location and employer, TA’s support Gen Ed, SPED’s, and ECSPED’s instruct students. Under the supervision of Gen Ed and SPED teachers, TA’s work in classrooms to reinforce the day’s lessons, provide more personal instruction to students, and help maintain behavioral standards and order. They perform administrative tasks such as taking attendance and grading papers, offer feedback to teachers who request it, and give more attention to special education students both inside and outside the classroom and in SPED classes. TA’s also work in other school locations such as in lunchrooms, in computer laboratories to explain the use of software, and in playing fields to organize games. Qualifications of TA’s vary by school district and can range from a high school diploma to an associate degree. Helpful qualities for the professional include good communication skills to talk with students and teachers patience for dealing with students of different abilities, and interpersonal skills for interacting with administrators, teachers, parents, and students. Those working under Title 1 programs, which focus on low-income students, need a degree, two years of post-secondary education, or successful completion of a local or state assessment. New assistants then receive on-the-job training to learn the procedures of the hiring school and the expectations of supervising instructors (NASET, 2018). The TA’s assist students in maintaining and generalizing learned skills, organize the environment for seamless teaching, and protect the teachers valuable instructional time. School district administrators have an obligation to educate and maximize the potential of these professionals through an ongoing professional development.

The role of the SPED teacher as the leader of ongoing and daily professional development for TA’s is one that is critical to the field, as children with disabilities need and deserve instruction from highly qualified teachers and highly qualified TA’s (Stockall, 2014). Preparing SPED or ECSPED teachers to be confident, instructionally competent, and cognitively capable is a challenging and complex task (Feng, & Sass, 2013). The literature supports effective strategies for training, managing, and supporting TA's as being an integral part of teacher preparation (CEC, 2018). Pre-service training curricula should align with research literature that show TA's can contribute to improved outcomes for students with disabilities. This can occur when TA's are provided professional development that is sustained beyond an initial training session which includes effective training strategies (i.e. modeling, and performance feedback). By participating and completing these pre-service trainings the TA's are held accountable for targeted implementation behaviors (Feng & Sass, 2013).

An example of the need for increased training with all professionals involved in intervening with a young minimally verbal child is with AAC devices. It is necessary that a team of professionals be adequately trained and work together with these young children with minimal verbal abilities and their families to improve upon the efficacy of the child's communicative skills. This is an area of continued concern in identifying and developing the competencies of the various disciplines of professionals that provide services to individuals who use AAC's (ASHA, 1989; Collier & Balckestine-Adler, 1998; Locke & Mirenda, 1992; McCord & Soto, 1998; Soto, 1999). Additionally, team members providing AAC services require skills in successful collaboration when working on AAC teams. One rural SPED teacher commented her desires to attend a LAMP training since it is the application that she utilizes on the children she sees who are on an AAC device. Instead of asking the SLP how to navigate the application and the AAC device, she would like to attend a training so she can become competent in problem solving this on her own.

> I would really like to attend a LAMP training. This is the language app that the SLP usually uses on the AAC devices at our school, but there are never enough funds to go.

> Ideally, it would be great if all of my TA's go, because they are the ones that are providing the one-on-one with the child. I am requesting if I can only go and teach my TA's when I get back, which is challenging because they are the ones that really need to know how to utilize the system well.

Results of one study by De Bortoli et al., (2011), suggest that preprofessional training may not occur or may vary. More specific information is needed regarding comprehensive training in the area of collaboration as related to AAC, not only for SPED's and TA's but other related professionals. In both preprofessional training and continuing education, there is a need to understand the effects of varying types of classroom-based and clinical instruction on the development of general collaboration skills as well, as on those skills specifically related to collaboration and AAC (De Bartoli, 2011).

The SPED'S and ECSPED'S also voiced their concerns regarding children with ASD, and the specific training they may need to have to better understand the child with ASD, given the unique manifestations of skills each, individual child with ASD demonstrates. Children with ASD are a heterogenous population (Morrier, Hess & Heflin, 2011; Paynter et al., 2017), and possess a wide range of social, academic, behavioral, and other needs (Brock, Huber, Carter, Juarez & Warren, 2014). Meeting each child's individual needs present challenges to SPED, ECSPED teachers, and TA's. Teaching strategies that are successful for some children may not be as successful for other children (Morrier et al., 2011). A study conducted by Simpson (2004) reported that "there is no single universally best suited and effective method for students with ASD" (p. 139). One ECSPED teacher commented that the area she feels the least informed is working with children with ASD. She commented that she has learned a lot through experience and asking other professionals what to do but attending a conference would answer many of her questions. She reported:

> I wish I could attend more training conferences, but budget cuts don't give us much for this any longer. I have been working for a long time in my field and I know enough about ASD through experience and what these kids need like: visuals, prompting, reinforcements, repetition, and social or pretend play activities with lots of imitation, however, I don't necessarily follow a specific program. I will always make sure to talk to the SLP over how the kid is talking and what he is using to talk and the OT for anything sensory that I know the kid will need, but I don't typically follow a program specifically geared for the child with ASD. I could be doing other things that I may need to learn, but overall, the kids seem to be doing okay and I usually see a change in them by the end of the school year, even if it's a small change.

In a recent study conducted by Hsiao & Peterson, (2019), the findings revealed that many SPED and ECSPED teachers of children with ASD have received training in evidence-based practices in their professional development, such as how to utilize visual supports, schedules, prompting, functional behavior assessment, social skills training, task-analysis, antecedent-based intervention, differential reinforcement of alternative, and social narratives-based intervention that were either taught though direct instruction or discussed. These strategies are not only fundamental techniques (Alberto & Troutman, 2013; Cooper et al., 2007; Wong et al., 2013) but also essential components of classroom management skills. Although many SPED's, ECSPED's, and TA's have received these fundamental types of training, many SPED, ECSPED and TA's do not feel that they are well prepared on these skills (Freeman et al., 2014). It is expected by school protocol that these practices related to classroom management skills are addressed in service professional development. There are many schools that offer in-service training practices to address only problem behaviors (Brock et al., 2014). Additionally, in this study, some SPED and ECSPED teachers were never taught evidence-practices or the practices were incidentally mentioned for children with ASD in their in-service professional development. This may be due to teacher preparation program not offering more than six-hour training in evidence-based practices (Barnhill, Sumutka, Polloway, & Lee, 2014).

Another SPED teacher commented that, because budget cuts have been prevalent for the past few years in her elementary school, she is requesting to attend specialized trainings and will gladly train her staff and TA's on what strategies she has learned. She voiced:

> I try to keep up with my continuing education in the most economical way I can, since it comes from my pocket. When and if there is money allocated for training and professional development, I will represent and go and teach my staff and all of my TA's. I am wanting to go to an ABA conference to learn how to work with difficult behaviors that some of my kids with ASD show. I need to learn new strategies that can work because it can be so disrupted on certain days. With these kids, every day is a completely different child, you almost have to be a very intuitive investigator. Moms can tell you details that sometimes you see more of the negative behavior in the classroom and other times you don't. Their behaviors can affect the entire class.

There is research to support that a train-the-trainer model can be an effective model and be a cost-effective training and ongoing support to teachers and TA's. Suhrheinrich, (2015), studied SPED trainers in training that were very effective in disseminating learned information to the staff and TA's. The results of his findings indicate that SPED trainers that obtained approximately 15 hours of direct training were able to successfully train the majority of the staff and TA’s. The cost of sending teachers to workshops and paying outside consultants can be dramatically reduced. School districts are under increased strain to provide high-quality services for children with ASD, and application of the train-the-trainer model may be one strategy for increasing the number of qualified teachers without additional training costs (Suhrheinrich, 2015). Individual coaching is also an added benefit to group in-service training. Coaching may help SPED teachers apply the methods they learn in a group in-service training to their lessons, because it is more individualized, more concrete, and more relevant to their own students. In addition, coaching allows for immediate feedback related to specific teaching behaviors, which teachers found helpful (Kretlow, Wood & Cooke, 2011).

Professional preparation programs have a responsibility for preparing SPED’s, ECSPED’s, Gen ED’s, SLP’s, OT’s for collaboration with a focus on strategies to minimize potential barriers and support outcomes for minimally verbal children with ASD and CAS.

Summary:

The professional participants across speech-language, occupational therapy and special education domains reported strengths and weaknesses regarding how they specifically intervene with each individual young child with ASD and CAS and only CAS. Analysis of the responses of the fifteen participants; five SLP’s, one SLPA, three OT’s, one COTA, four SPED’s and one ECSPED, revealed three major themes with one sub-theme. Because the questions were specific regarding the successes and failures of the different types of interventions administered to both sets of young children, the perceptions and experiences reported by each participant became a prevalent theme. All of the participants engaged in clinical and personal conversations with the researcher. The participants answered all the questions specifically and descriptively sharing their experiences and perceptions as they intervene or have intervened with both populations of minimally verbal young children. Four relevant questions were administered to the SLP's and SLPA, four relevant questions were administered to the OT's, COTA, SPED's and ECSPED. Due to the specific topic of investigation regarding CAS and s CAS, one additional relevant question was administered to the SLP's and SLPA, given that assessments and interventions regarding CAS are typically administered and implemented by the SLP's. Although OT's and SPED's play an integral part of the young minimally verbal child's comprehensive and communicative skills, given the nature of this study, these professional team members were viewed as ancillary services. A general consensus by all participants was shared regarding specific interventions for a minimally verbal young child with ASD. These interventions include use of a digital AAC devices or low-tech communication board to improve upon the young child's receptive and expressive skills, social language intervention to improve upon the young child's social behaviors and, sensory integrative intervention to improve upon the young child's regulation and joint attention skills.

The experiences and perceptions were the most varied among each individual SLP and SLPA regarding CAS intervention for a child with ASD. Two urban SLP's who have worked extensively with young minimally verbal children with ASD emphasized that it is their experience that a young minimally verbal child with ASD typically manifests language acquisition deficits with receptive, expressive and pragmatic language deficits, and not oral-motor planning or oral-motor sequencing deficits, as a young child with only CAS would. They further shared that even though they see the speech and language diagnosis of CAS more frequently on young children with ASD, they would not address the CAS with oral-motor tactile interventions. They questioned the efficacy of oral-motor tactile intervention on a child with ASD, stating that adding another aggressive intervention approach would quickly overwhelm the young child with ASD. The other three SLP's shared that when intervening with a young child with ASD and CAS, they would imbed tactile oral-motor interventions along with other communicative goals into a comprehensive speech-language intervention plan. The one SLPA was unsure if interventions would differ for both sets of minimally verbal young children and mentioned that she would like to be more informed regarding CAS. The use of AAC or low-tech communication boards were agreed upon all the SLP's and SLPA as an intervention tool for a child with only CAS if needed.

When the additional question was asked to the SLP's and SLPA's whether they are aware of recent evidence-based research regarding CAS, they all answered that they were not aware of the latest CAS research. Given these revelations, the researcher chose to include the recent development of diagnostic pause markers for CAS by Shriberg et al., (2017), as a sub-theme to present SLP professional clarity in carefully defining and delineating CAS characteristics and manifestations.

The three OT's and one COTA shared that interventions would be different for a young minimally verbal child with only CAS, as they would address the young child's limbic apraxia. They shared that limbic apraxia typically manifests when the young child also has CAS. Sensory integrative intervention would also be utilized if the child with CAS required this intervention. They all stressed not to utilize additional communicative modalities such as a sign language for a child with limbic apraxia. The four SPED's and one ECSPED shared unanimously that interventions would not change substantially for both sets of children. The classroom setting would accommodate the child with the necessary visual/manipulatives and communication systems as needed with the necessary SLP and OT supports implemented. Although frustrations were shared among participants regarding collaborative efforts between team members, all the participants shared their united desire to engage in consistent collaborative efforts. These professionals all agree that collaborative efforts are effective in assuring that the young minimally verbal child with ASD and CAS and only CAS effectively and functionally communicate throughout all settings at their elementary school.

Chapter VI

Discussion and Implications

This chapter will elaborate upon findings from the current study and discuss how the literature connects with these findings, emphasizing the significance of the subtleties expressed and discovered in the data. Six different sections will be presented: implications for research in ASD, CAS and collaboration and for practice in ASD, CAS and collaboration. I will substantiate the conclusion using sufficient information presented by the professional participants interviewed. The implications for research and practice are derived from semi-structured interviews administered to SLP'S, SLPA's, OTs, COTA's, SPED's, and ECSPED's who intervene with and support the young minimally verbal child with ASD and CAS and only CAS. The limitations of the study will also be elaborated upon including suggestions regarding future research that should be conducted.

Relevant and important findings were revealed by carefully listening, transcribing, and analyzing every descriptive perception and experience each individual participant shared, including successes, challenges, and barriers experienced when working with the minimally verbal young child with ASD and CAS and only CAS. The compelling narratives transparently share the importance of a connected team approach among the participants when working with these young children that encompass: (a) both sets of young children require a team of professionals working collaboratively to assure that these young children effectively and functionally communicate their needs and requests via an AAC device or low-tech communication board in all areas of their schools settings, (b) both sets of young children require a team of professionals to be sensitive to the young child's social, pragmatic language skills to further support the young child's functional communicative skills, (c) both sets ofyoung children require a team of professionals to be sensitive to the child's sensory integrative and gross motor needs. The OT is the principal professional addressing these needs, as the other active professionals may utilize appropriate OT strategies, sensory materials, and sensory gadgets to optimally help the young child organize his/her sensory integrative skills, ensuring improved engagement and attention skills to functional tasks, in order to help the young child's verbal expressive communicative skills and, (d) both sets of children who require a team of professionals to collaboratively share their knowledge, experiences, ideas, and thoughts to better serve the young minimally verbal child and, in doing so, assures that the child is able to optimally make his/her needs known, learn, and become competent, independent young children.

Other findings revealed differences and key contradictions regarding interventions, strategies and techniques utilized on young minimally verbal children with ASD and CAS, from the SLP's and the SLPA. Chapter 4 and Chapter 5 documented the differences regarding implementation of specific interventions for the young minimally verbal child with ASD and CAS. Two SLP's would not address the CAS diagnosis of the young child with ASD. Two of the six SLP's would not implement any type of oral-motor tactile cue intervention protocol, typically used with young children with CAS, but would directly address receptive, expressive, and social language acquisition to the young minimally verbal child with ASD. Research supports their findings. Three other SLP's would address the CAS diagnosis of the young child with ASD and create a comprehensive intervention program adding the oral-motor, tactile cue intervention program to be delivered on a consistent basis. One SLPA did not know how she would address the CAS diagnosis in a child with ASD. These varied responses revealed a lack of professional cohesion regarding intervention strategies in achieving shared communicative verbal expressive goals. Additionally, multidisciplinary, collaborative efforts are stressed to optimally and effectively help the young minimally verbal child effectively and functionally communicate his needs known in all areas of the young child's life, including the school, home and community settings

Implications for Research and Practice

For Research for ASD

Autism Spectrum Disorder is a complex disorder that includes many areas of deficits, however, there are no specific, defined guidelines and diagnostic markers that could be implemented for young minimally verbal children with ASD, regarding the young child's specific quality of verbal output. There are, however, extensive research studies that specifically delineates and defines clear guidelines and diagnostic markers that can be implemented for the young minimally verbal child with CAS, by distinguishing the child's verbal output and explaining the differences between SSD's and SD's (Shriberg et al., 2017). Because of the absence of studies regarding guidelines and diagnostic markers for young minimally verbal children with ASD, there is a paucity of research addressing the effectiveness of oral-motor based intervention approaches for young minimally verbal children with ASD and CAS. The data reveals professional confusion among the SLP's perceptions and experiences upon identifying, defining, and determining CAS and implementing specific interventions for the young minimally verbal child with ASD and CAS.

When asked if any of the SLP's were aware of the recent studies on CAS, they were not aware of the latest research studies. The data discovered that two experienced SLP's were sufficiently aware, given their extensive clinical knowledge and experience working with young minimally verbal children with ASD, about the specific distinctions between the quality ofverbal output among these two sets of children. Both SLP's shared they are also aware of the current overdiagnosis of CAS and they would not choose to address the CAS speech and language diagnosis, knowing through experience, that language acquisition is the primary deficit of a child with ASD. They were confident to report that once the young child's language acquisition is more established, the young child will begin to talk. Furthermore, they shared that when supplementing motor-based approaches to the varied intervention goals, it was apparent that those motor-based interventions did not seem to be effective further overwhelming the young child with increased therapeutic demands. Their experiences and perceptions are substantiated by research. Research supports their experiences, perceptions, and views.

Research studies regarding successful interventions with the young minimally verbal child with ASD and CAS primarily involved addressing significant dissimilarities in speech, prosody and voice characteristics of children with ASD compared to young children with CAS (Paul et al., 2013; Shriberg et al., 2011). Research also reveals that young children with ASD do not have slow speech rate, lengthened vowels, and common phoneme distortions that are a sign of motor speech disorders typically seen in children with CAS (Duffy, 2005), and reveals that children with ASD do not have the core features of CAS reported in contemporary research in CAS or non-specific motor speech signs including increased spatiotemporal vowel errors, increased uncommon phoneme distortions and slow speech rate (Shriberg et al.,2011). There are currently no recent studies conducted regarding minimally verbal young children with ASD and CAS, even though there are many minimally verbal children diagnosed with CAS (Chenausky, 2018; Shriberg et al., 2011).

Two SLP's concurred with research findings regarding accurate implementations of interventions for a young minimally verbal child with ASD and CAS. Three SLP's, however, did not. They shared that they would imbed motor-based interventions along with the other ASD interventions creating a comprehensive intervention program to implement with to address the additional speech-language CAS diagnosis the ASD young child was diagnosed with. There are no research studies supporting the efficacy of combining both types of interventions. Research studies have however reported that young minimally verbal children with ASD and CAS have not demonstrated verbal output gains in comparison to young minimally verbal children with only CAS (Tager-Flusberg & Kasari, 2013). These findings contribute to professional confusion that is currently evident in this study when accurately identifying the child with CAS and accurately and appropriately implementing intervention programs that guarantees speech/verbal output improvements.

The data revealed that all the SLP's and SLPA accurately identified the unique factors that differentiate a young child with ASD, specifically highlighting the complexity of deficits the young minimally verbal child with ASD manifests. They shared how unique and individual each young child with ASD is and how the child needs to have more structure. They stressed how the intervention is uniquely catered to their needs, as every child with ASD is different. Research supports these SLP's experiences and perceptions. The few research studies that pinpoint additional unique factors that differentiate young children with ASD from CAS begins with joint attention impairments (Dalton et al., 2017; Dalton et al., 2004; Mundy et al., 2017; Mundy, Sigman & Kasari, 1990; Paul et al., 2013; Vaughan Van Hecke et al., 2012); speech attunement impairments (Gernsbacher et al., 2008; Paul et al., 2013; Velleman, et al., 2009); object play skills impairments (Tomasello, 1995; Yoder & McDuffie, 2006); gesture impairments

(Mostofsky, 2015; Shriberg, et al., 2015; Strand, 2010); voice and prosody impairments (Shriberg, et al., 2011) and generalized praxis deficits (Ayers, 1995; Dalton, Crais, & Velleman, 2017). There continues to be limited studies explaining why some young children with ASD do not learn to speak.

The data revealed that all the SLP's and SLPA agreed upon the primary goal of intervention for a young minimally verbal child with ASD being the immediate implementation of an effective communication system. At the inception of intervention, the SLP's would implement a digitalized AAC system or low-tech communication board. Research supports these experiences and perceptions indicating that young children with ASD experience communication deficits and how this deficit markedly affects every facet of the young child's capacity to function and learn, stressing how critical it is to teach the young child with ASD to effectively communicate (Sigafoos, 2016). Research supports the benefits of AAC interventions on the functional communication skills, challenging behaviors, language development, both receptive and expressive language skills, and speech production of young children with complex communication needs (Drager, Light & MacNaughton, 2010; Mustonen, Locke, Reichle, Sobrach, & Lindgren, 1991). It is now well documented that positive long-term outcomes for children with ASD are strongly correlated with the achievement of communicative competence (Garfin & Lord, 1986; Koegle, Koegel, Yoshen, & McNerney, 1999; NRC, 2001; Venter, Lord & Schopler, 1992).

The data also revealed that if the SLP does not instigate a communication system for the young child with ASD, the SPED's and OT's will not. They shared that they are typically guided by the SLP to understand the AAC device or low-tech communication board. Research supports these views regarding ancillary services. Drager, Light & MacNaughton, (2010) states that it is primarily the SLP's responsibility to involve all other team members to learn and to be trained to understand an AAC device or low-tech communication board.

The data revealed by three SLP's, three OT's, three SPED's, and one ECSPED how imperative it is to address the young child with ASD's social skills. They shared the difficulties these young children experience with their non-verbal skills in effectively communicating through intentional gestures, eye contact, and facial expression. The SLP's shared that it is challenging to teach the child to be engaged, attentive, and intentional in the therapy and classroom settings. Research supports these experiences and perceptions. The young child's social impairments encompass social awareness, social competence and social development (APA, 2000; Gillis & Butler, 2009). The young children who display a greater capacity to establish and follow the attentional focus of their communication system and patterns are more likely to initiate bids for communication, use more contingent language, acquire conversations skills, use more sophisticated gestures and symbolic language, recognized and repair communicative breakdown, and respond to contextual and interpersonal cues (Carpenter, Nagell & Tomasello, 2000; Wetherby, Prizant & Huchinson, 1998). As the young child makes the transition to language, the capacity for joint attention facilitates the development of a more sophisticated and explicit system of communication. There is a rapid expansion of vocabulary and linguistic concepts, and emergence of more sophisticated sentence structures for the purpose of sharing intentions and emotions (Shumway & Wetherby. 2009). Although there continues to be a need for social-pragmatic communication research, it is important to give increased attention to all the components of social skills interventions that help identify strategies that work best for children with ASD who present with different skill levels (Gillis & Butler, 2009). It is now well understood by professionals in the field that improving the young child's social interactions skill leads to the manifestation of less challenging behaviors (Gillis & Butler, 2009). There is a need for future research in acquiring evidence based social-pragmatic curriculums for young children to follow.

Through the lens of Symbolic Interactionism, two SLP's and two OT's elaborated upon the efficacy of play skills, collaborating with the OT's to address the young child's sensory regulation and joint attention skills when engaged in pretend play activities. Research supports these experiences and perceptions. Young children with higher play levels are able to engage in more appropriate functional spoken language, as opposed to children who only played with objects indiscriminately, such as banging and mouthing (Carter et al., 2011; Stone & Yoder, 2001). Furthermore, initiating joint attention and play levels are both associated with better language outcomes that concurs with recent longitudinal data (Kasari et al., 2011). Both functional play and joint attention in the preschool years continue to predict gains in language up to the age of adolescence (Carpenter, Nagell. & Tomasello, 1998; Mundy et al., 2007; Sigman & McGovern, 2005).

The data revealed that all the OT's, COTA, four SPED's and four SLP's shared the importance of sensory integrative intervention for a young minimally verbal child with ASD. They stressed the importance of SI intervention, particularly to organize and regulate the young child's sensory skills that may preclude the young child to optimally engage, attend, follow commands and react to non-verbal and verbal cues. Research substantiates these experiences and perceptions by stating that these young children typically process and integrate sensory information in an atypical manner which is strongly linked to core impairments in communicative and social abilities, particularly regulating their integrative skills and joint attention (Just et al., 2004; Rippon et al., 2007). It is well documented in research literature that if the young child with ASD does not perceive the auditory and visual components of the environment, the young child can miss critical social cues, not to mention being unable to process language information and miss major contents of messages that are being conveyed (Just et al., 2004; Rippon et al., 2007). Given that joint attention is a significant developmental milestone in infancy (Adamson, 1995) which contributes to childhood intellectual, social-emotional, and interpersonal development (Sheinkopf, Mundy, Clausse & Willoughby, 2004; Ulvund & Smith, 1996), as well as language development (Carpenter Nagel, & Tomasello, 1998; Mundy et al., 2017), it is imperative that OT intervention be instigated from the inception of the young child's intervention trajectory. Joint attention is one of the most theoretically and clinically important dimensions of the social phenotype of ASD (Charman, 2004; Kasari et al., 2008; Lord & Jones, 2012; Mundy, 1994; Mundy et al., 2017). It is understood by professionals in the field, that impairments in early joint attention development also contribute to developmental disorders such as ASD (Mundy, Sullivan & Mastergeorge, 2009; Sigman & Ruskin, 1999), and contributes the young child's social-emotional and interpersonal development as well as language development. The combined sensory input approach involving auditory, visual and tactile modalities contributed to significantly higher non-verbal oral and verbal imitation performance of all children with ASD and without ASD (Dalton, Craig & Velleman, 2011). Further joint attention and oral praxis, the ability to plan and execute oral-motor skilled movements, may serve as components of an important coupling mechanism in spoken communication and later developing social and cognitive skills. The most recent study by Mundy et al., (2017) states that joint attention may be a significant social dimension of ASD that exhibits developmental continuity and influence beyond the preschool period in young children with ASD.

For Research for CAS

The data revealed that four SLP's shared the need to specifically identify possible comorbid diagnosis for all disorders in order to develop the appropriate and relevant speech and language goals. Research literature supports these experiences, stating that evidence-based treatments are available to treat the co-occurring conditions and to greatly improve outcomes for young children who receive these intensive interventions in comparison with a child that only receives traditional speech language therapy (Shriberg et al., 2011; Tierney et al., 2015). The data further reveals varied experiences and perceptions regarding the comprehensive identification of characteristics used in determining the speech-language diagnosis of CAS. Two of the SLP's shared they would specifically identify CAS in a young child. They both sharedthat they would be observant and cognizant in analyzing the young child's verbal output. The young child would not have to demonstrate a sophisticated repertoire of verbal utterances, it can be displayed in the form of jargon and word approximations.

If the young child demonstrates difficulty in motor planning and motor sequencing and was unable to produce diadochokinetic rates (i.e. bilabial, tip-alveolar and velar) phoneme productions, the child may have CAS. Both SLP's reported that they have intervened with many young minimally verbal children with ASD but not with both ASD and CAS. They have seen an overdiagnosis of CAS for many young children with ASD but have disregarded implementing intervention for CAS since they have found motor-based interventions ineffective and contra-indicated as it only overwhelms the young child. Research supports these experiences and perceptions. Despite the difficulties noted in accurately identifying the characteristics that differentiate CAS from other speech acquisition disorders, many children continue to be identified with CAS (Shriberg et al., 2011; Strand, 2013). Research is no longer constrained to understand, treat and prevent CAS and the primary factors in underlying its notable overdiagnosis worldwide.

There now exists contemporary research in SSD that includes studies to identify, explicate, and treat the genomic neurocognitive and neuromotor substrates of CAS (ASHA, 2007; Childhood Apraxia of Speech Association of North America, 2013; Royal College of Speech and Language Therapists, 2011, Shriberg, et al., 2017). There are now four determined diagnostic markers that help identify, classify, and delineate CAS characteristics (Shriberg et al., 2017). These speech diagnostic markers serve as a CAS baseline to optimally determine a diagnosis for CAS. Most researchers agree that the core deficits for children with CAS is a reduced or degraded ability to convert abstract phonological codes to oral motor speech commands, referred to as motor planning and/or motor programming (ASHA, 2007b, Shriberg, Lohmeieir, Strand, & Jakielski, 2012). This consensus has been supported by behavioral studies (ASHA 2007a; 2007b;), classification paradigms (Shriberg et al., 2010), and computation modeling studies (Terband & Maassen, 2019). The impairment then manifests itself as a disorder in articulation difficulty, sequencing sounds and syllables, inconsistent production or repeated sounds and syllables, and distortion at the suprasegmental level, known as dysprosody (ASHA, 2007a, 2007b). Evidence suggests that children with CAS can only improve their speech motor skills with a variety of oral-motor based intervention protocols. To date, findings of research indicate that motor-based interventions can produce gains in speech production abilities in children with CAS (Maass, Gildersleeve-Neumann, Jakielski, & Stoeckel, 2014). Successive approximation or multisensory approaches to motor planning are key to speech production progress (Tierney et al., 2015). The young child with only CAS typically has acquired language and understands language but is unable to verbally produce sounds and words to verbally communicate (CASNA, 2018).

The data revealed that most of the SLP's voiced concerns regarding the lack of standardized, evidence-based assessment tools available to accurately assess CAS. Two of the SLP's shared that they typically utilize a form of dynamic assessment to accurately and effectively assess a young child with CAS, given their experience and knowledge base in observing and analyzing their verbal output repertoire as a screening tool. Research literature supports the experiences and perceptions of these SLP's. There are currently nominal comprehensive, standardized assessment tools available for CAS.

There also exist checklists to rule out CAS. One is a 10-point checklist that guides the SLP in making presence or absence decisions for a range of speech, oral-motor, and linguistic behaviors. This checklist does not include explicit definitions of the features or methods for determining how much or how often a single behavior must be observed (Carr, 1995; Davis & Velleman 2000; Rvachewn, Hodge, & Ohberg, 2005; Thoonen et al., 1997). The other checklist is the Checklist for Autism Spectrum Disorder (CASD) is a 30-item checklist of autism symptoms that includes a section of apraxia. This tool was developed and meant to determine to accurately distinguish between ASD and CAS. There is one research study that was inconclusive regarding the efficacy of this tool to accurately differentiate ASD from CAS. This study revealed that the CASD checklist demonstrates high comorbidity between ASD and CAS of speech. Given the high comorbid nature of these entities, it is important to monitor all children diagnosed with CAS for signs of ASD and all children diagnosed with ASD for signs of CAS (Tierney, et al., 2015).

Research supports the dynamic assessment methods these two SLP's utilize to rule out CAS. Typically, the most common assessment the SLP's administer to rule out CAS is through a dynamic assessment, which seeks to identify the skills that the individual young child possesses, as well as their learning potential. The dynamic assessment procedure emphasizes the learning process and accounts for the amount and nature of the examiner's investment (ASHA, 2017). By using a dynamic type of assessment, the SLP can provide slowed rate, gestural or tactile cues to better judge the speech production and to determine how much cueing is necessary to facilitate the performance. Many of the behaviors and signs associated with CAS are also found in children with more broadly defined SSD's. The current gold standard for diagnosis continues to be an expert opinion (Maass, Butalla, & Farenella, 2012).

The data also revealed that all SLP's, two OT's, and four SPED's would recommend an AAC device for a young minimally verbal child with only CAS. The SLP's shared that many children with only CAS demonstrate increased frustration when they are unable to verbally communicate their wants and needs. Although they may be able to non-verbally gesture and point to what they need, these children begin to manifest behavioral outbursts given their inability to verbally express themselves. Research literature reveals that AAC devices can be implemented as a communicative tool to facilitate the development of communication and speech for the young minimally verbal child with only CAS (Bornman, Alant, & Meiring, 2009).

Four of the OT's shared the presence of limbic apraxia when working with a young child with CAS. They shared that, upon assessing the young child, they typically observe moderate difficulty in motor planning and motor sequencing their upper and lower extremities to perform gross motor activities and fine motor activities. Research literature supports the experiences and perception of these OT's. In a study by Newmeyer, (2007), the findings of his study revealed that children with severe SSD and CAS often present with fine motor-functioning below the average range for their age, along with the presence of abnormal oral-motor imitation skills. Another study conducted by Dewy (1993 & 2007) reported that limbic apraxia as a general underlying impairment in the planning and sequencing of gross and fine motor movements, particularly in the presence of abnormal imitation of oral-motor movements. It was also suggested by OT professionals that instigating sign language to aid the young child with CAS communicative skills is counterproductive, given their limbic upper extremity limitations (Missiuna et al., 2002).

The data revealed that three OT's share immediate intervention to engage the young child with CAS with gross motor activities. All three OT's mentioned that many of the children, particularly the children with CAS, begin verbalizing a few sounds, word approximations, or simple true words when the child was engaged in gross motor activities. Research studies support these experiences and perceptions from these OT's and indicate that motor performance can affect the young child's verbal output. Pulvermuller et al., (2005), demonstrated that the left hemisphere's cortical systems for language and action are interlined and that activation of motor areas can influence the processing of words semantically related to arm and leg actions. The results of his study provided evidence that a functional link exists between two systems and there is an interaction in the processing of meaningful information about language and motor action (Pulvermuller et al., 2005). Early information about these young children with speech-language and motor impairment could lead to early occupational therapy services and other interventions to address motor and speech deficits (Rechenikov, & Maita, 2009).

For Practice for ASD

The data revealed that all the SLP's would begin intervention with a minimally verbal young child with ASD and CAS with a communication system that would be implemented immediately. The urban SLP's shared that the elementary schools will provide the young minimally verbal child with iPads. They typically utilize the LAMP application, as it is a very comprehensive language application that can address all the communicative needs of each individual child with ASD and CAS. The urban SLP's shared that their elementary schools typically do not have the budget to provide for iPads, so they create low cost communication boards with PECS pictures. Regardless of the type of communication board implemented, all the minimally verbal child would begin intervention with a communication system. AAC intervention is supported by past and current evidence-based literature (Draeger, Light & MacNaughton, 2010; Mustonsen, Locke, Reichle, Solbrach & Lindgren, 1991). Digitized speech output is recommended in intervention to enhance verbal output and practice of motor patterns when accessing accurate picture icons to make the child's needs and wants known. The use of iPads and Dynovox compact digitalized communication devices are highly recommended and reported to be successful (Potts & Satterfield, 2015).

The common language application that is utilized by all of the rural SLP's was the LAMP language application. Their experiences and perceptions are supported by research literature. The LAMP language application has been extensively studied which allows children who are minimally verbal or nonverbal a way to spontaneously express themselves throughout all setting within their school and home environments. The language and vocabulary provide verbal and vocal output and allows the young child opportunities to engage in motor planning, as the child functionally accesses their needs and wants (Potts & Satterfield, 2015). LAMP training is highly recommended for all professionals that works with the young child's AAC device to comprehensively understand and problem solve the varied communicative needs the young child encounters when attempting to functionally communicate (Prizant & Rubin, 1999). Research studies also support the use of PECS interchange pictures that are reported to be utilized by the rural SLP's when working with the communication systems of the minimally verbal young child.

Research studies support the efficacy of the use of PECS picture interchange systems that allows the young child to effectively communicate his/her needs and wants by carrying over the functional pictures to different areas of the young child's classroom and school settings (Frost & Bondy, 2002). PECS pictures are utilized by the child approaching another person and giving them the appropriate picture of a desired item in exchange for that item (Frost & Bondy, 2002).

Continued implementation of interventions and practices are revealed through the data that the SLP's, OT's, and SPED's prioritized social language goals as a primary intervention goal along with the young child's AAC communicative goals. They shared their experiences and perceptions that stem from their observations of the young child not being able to communicate through nonverbal cues, gestures, eye contact, and facial expression. Two of the SLP's shared their experiences implementing the SCERTS program that is comprehensive in nature, addressing all the areas of deficit that a young child with ASD may be encountering. The two SLP's shared the utilization of visual materials, daily routines, social scenarios in the AAC device, social scripts, and opportunities for social interaction with peers. Extensive research studies have been conducted in analyzing the efficacy of the SCERTS program. SCERTS is derived from two decades of empirical and clinical work and is consistent with recommended tenets of evidence-based practices exposed by researcher and clinical scholars in ASD and related disabilities (NRC, 2001; Prizant & Rubin, 1999). More specifically, the developmental social-pragmatic focus on the model has been the hallmark of research work for many years (Prizant & Wetherby, 1985; 1987, Wetherby et al., 1997; Wetherby & Prutting, 1984). The model is also built upon addressing relationships among communication socio-emotional development and emotional regulation (Prizant and Meyer, 1993; Prizant & Rubin, 1999; Prizant & Wetherby, 1987), is consistent with the works of Rogers and Lewis (1989) and Greenspan and

Wieder (1998, 2000), addressing socio-emotional factors, and De Gangi (2000), addressing arousal modulation and emotional regulation.

As continued intervention and practices for young children with ASD were shared by all participants, the data revealed that all the OT's, COTA, and three SLP's shared the importance of implementing sensory integrative intervention, particularly for a young minimally verbal child with ASD, but they would also implement it with a young minimally verbal child with CAS if needed. One COTA shared that her intervention and practices consistently involves sensorial activities that become more challenging and complex. The idea is that through repetition, the young child's nervous system will respond in a more organized fashion to sensations and movement.

Although the American Academy of Pediatrics cautions that research on SI intervention's effectiveness is limited and inconclusive, there are many OT's that validate the efficacy of SI intervention through therapeutic effective experiences. Sensory integration is a theory that was developed more than 20 years ago by Jean Ayers, an OT with advance training in neuroscience and educational psychology (Bundy, & Murray, 2002). Ayres (1995) defines SI as "the neurological process that organizes sensation from one's own body and from the environment and makes it possible to use the body effectively within the environment." (p.11) The theory is used to explain the relationship between the brain and behavior. The five main senses are (a) touch-tactile, (b) sound-auditory, (c) sight-visual (d) taste-gustatory (e) smell-olfactory. In addition, there are two other powerful senses: (a) vestibular movement and balance that provides information about where the head and body are in space, and in relation to the earth's surface, and (b) proprioception, joint/muscle sense, which provides information about where body parts are and what they are doing. Research studies generally find SI interventions inconclusive

(Pfeiffer et al., 2011: Schaaf & Nightlinger, 2007). Recent optimistic research studies reveal that the field of OT offers tremendous promise (Schaaf & Nightlinger, 2007; Pfeiffer et al., 2011). Research studies are underway to elucidate the underlying mechanisms of the impairment, to distinguish the phenotype characteristics of the sensory integrative disorders from other developmental disorders and to evaluate the effectiveness of OT services in remediating the dysfunction. New research with stronger empirical standards is forthcoming (Schaaf & Miller, 2007).

For Practice for CAS

The data on intervention and practices implemented on minimally verbal children with CAS revealed that all SLP's shared that oral-motor based interventions would be the primary type of interventions performed, addressing the utilization of comprehensive tactile based programs like the Kaufman Praxis Program comprehensive praxis program, the PROMPT comprehensive program and/or the DTTC comprehensive program would be implemented. The tactile cues would include a multi-sensory modality of prompting vowel and consonant phonemes in isolation by specific bilabial, tip-alveolar and velar productions through a multi-sensory modality of elicitation. The frequency of intervention would be the maximum of two sessions a week in the school setting with carry-over to the home setting to continue intervention with oral-motor based daily exercises and tactile prompting. Research studies support these SLP experiences and perceptions. Evidence suggests that children with CAS can only improve their speech motor skills with a variety of oral-motor based intervention protocols. To date, findings of research indicates that motor-based interventions can produce gains in speech production abilities with children with CAS (Maass, Gildersleeve-Neumann, Jakielski & Stoeckel, 2014).

Successive approximation of multisensory approaches to motor planning are key to speech production progress.

Two OT’s stated that limbic apraxia intervention and practices would be the primary intervention to implement for a young minimally verbal child with CAS but not necessarily for the young child with ASD unless the child requires this intervention which includes gross motor and fine motor activities that would involve crossing mid-line upon revealing the data. The OT’s shared that limbic apraxia interventions would include gross motor activities such as: kicking a ball, climbing a rock wall or a slide ladder, monkey bars, swings, and daily living tasks. Fine motor activities would include puzzles, pegs, legos, coloring, writing and daily living tasks, such as putting socks and shoes on, tying shoes etc. Research studies support these intervention strategies on CAS and proposes that treatment programs driven by a principled account of how the motor system learns to produce skilled actions that will prove the most efficient and effective framework for treating motor-based speech disorders (Maass et al., 2008). In turn, well controlled and theoretically motivated studies of treatment efficacy promise to stimulate further development of theoretical accounts and contribute to better understanding of CAS (Maass et al., 2008).

For Research-Team Based Collaborative Efforts

All fifteen participants shared the need to engage in continuous communication and collaborative efforts with all professionals involved in working with the young minimally verbal child with ASD and CAS and only CAS. Research supports these experiences, thoughts, and perceptions regarding professional team collaboration from all fifteen participants (Ritzman, Sanger, & Coufal, 2006). Research studies indicate that collaborative efforts alter and enhance goals and outcomes to produce comprehensive solutions for the young minimally verbal young child with ASD and CAS and only CAS. These comprehensive solutions would not be possible if produced independently by individual team members (Ritzman. Sanger, & Coufal, 2006). The major outcome of collaborative consultation efforts is to provide comprehensive and effective programs for children with special needs with the most appropriate context (Idol, Paoloucci-Whitcombe, & Nevin, 1986). Administrators can promote the success of the collaborative model and significantly contribute to the SLP's and OT's success in attaining collaborative goals for the young child (Elskin, 1997; Ritzman, Sanger & Coufal, 2006). Research studies report that the experience that all active team members receive from comprehensive multi-disciplinary services impact their perceptions and professional dispositions of working with children and families with special needs (Elskin, 1997; Ritzman, Sanger, & Coufal, 2006).

Four SLP's shared the need for advocacy in implementing a successful speech and language programs in order for collaborative efforts to be effective among SPED's ECSPED's, Gen Ed's, and OT's (Prelock & Bland, 1995), particularly when transitioning AAC devices from one school setting to the next. There needs to be more intra and interdisciplinary dialogue about roles of SLP's, SPED's, and ECSPED's. Additionally, Ritzman, (2006), points out that other variables, such as enthusiasm, student engagement, and motivational strategies will continue to be important factors impacting successful academic outcomes. AAC service requires skills in successful collaboration when working with an AAC team in order to transition the AAC device from one school setting to the next (ASHA, 1989; Collier & Blackenstine-Adler, 1989; Locke & Mirenda, 1992; Soto, 1999). Team members providing AAC services require skills in successful collaboration when working with AAC teams (ASHA, 1989, Soto, 1999).

Most of the OT's reported their frustrations in integrating SI programs into the classroom settings, and the need to collaboratively involve classroom teachers and other team members as partners into these integrations. Research studies indicate the team members may be better able to identify the nature of the underlying neurobehavioral dysfunction and its possible contributions to delayed communication skills. In accomplishing this goal, these team members can identify intervention strategies that are most effective in enhancing language, learning and academic success for individual young special need children (Mauer, 1999). As a treatment approach, SI intervention was never intended to be provided apart from special education services or speech and language services. Regrettably, school-based research studies indicate that the structural and administrative barriers limit opportunities for educators and OT's to establish and maintain effective partnerships that are viewed as crucial to supporting meaningful outcomes for young minimally verbal children (Bose & Hinojoso, 2008). The literature cites limited funding, large caseloads, and shortages of OT's as factors supporting the adoption of consultation only as a service delivery approach (Reid et al., 2006). Lack of a clear understanding concerning the roles and responsibilities of stakeholders involved in school-based OT has been identified as a significant challenge to collaboration (Barnes, & Turner, 2001).

The SPED's and ECSPED agreed and shared that, as the young minimally verbal child transitions into the classroom settings, the appropriate accommodations and adaptations are established to fit the young child's needs, with the SLP and OT support systems in place. They all agreed that a child with ASD may respond differently to different social and sensory input. Research studies support the experiences and perceptions of the SPED's and ECSPED. Research states that it is imperative that the necessary accommodations and adaptations with additional supplements from the other professionals working with the child be established (Ashburner, Ziviani, & Rodger, 2008). The child with ASD manifests substantial difficulty processing verbal instruction in noisy environments and often focus on sensory-seeking or sensory-avoiding behaviors. These behaviors will ultimately create academic underachievement (Ashburner, Ziviani, & Rodger, 2008).

For Practice-Team Based Collaborative Efforts

All the SPED's and ECSPED reported that the TA's are primarily responsible for implementing the interventions in the SPED or Gen Ed classroom settings for a minimally verbal young child with ASD and CAS or only CAS. All the SPED's and ECSPED reported that they try and keep all the TA's informed and trained for all the different types of interventions that need to be applied for each individual child. They also stressed how challenging this role is when there is a tight budget, too many children to serve, and not enough SPED's and TA's. Research studies support the SPED's experiences and perceptions by stating that the role of the SPED and ECSPED teacher as a leader of ongoing and daily professional development for TA's is one that is critical to the field, as special need children require and deserve instruction from highly qualified teachers and highly qualified TA's (Stockall, 2014).

Preparing SPED and ECSPED teachers to be confident, instructionally competent and cognitively capable is a challenging and complex task (Feng & Sass, 2013). It is necessary that a team of professionals be adequately trained and work together with these young minimally verbal children and their families to improve upon the efficacy of the child's communicative skills (ASHA, 1989; Locke & Mirenda; 1992; Soto, 1999). All the SPED and ECSPED teachers reported that for a young child with ASD, the SPED's and ECSPED's would use diverse types of interventions beginning with token boards, schedule boards, transition boards, first-then boards, and visual communication boards or AAC devices that would optimally be transitioned to other school settings. Research studies stress that continued intervention and training is critical in order for these collaborative goals to succeed to optimally help the young minimally verbal child. Preprofessional training may not occur or may vary and, more relevant, specific information is needed regarding comprehensive training in the area of collaboration as it is related to many issues including usage and transition of AAC's. (ASHA, 1989; De Bartoli, 2011; Collier & Blackestine-Adler, 1998; Locke & Mirenda, 1992; Soto, 1999).

Regarding ASD training, many SPED and ECSPED teachers of children with ASD have received training in evidence-based practices in their professional development, such as how to utilize visual supports, schedules, prompting, functional behavior assessments, social skills training, task-analysis, antecedent-based intervention, differential reinforcement of alternative and social and narratives based intervention, that were either taught through direct instruction or discussed with them. These strategies are essential components of classroom management skills (Alberto, & Troutman 2013; Cooper et al., 2007; Wong et al., 2013). Although the studies report that many SPED's, ECSPED's, and TA's have perhaps received this type of instruction in some form, they do not feel they are well prepared on these skills (Freeman et al, 2014). It is expected that these practices related to classroom management skills are addressed in service professional development. Professional preparation programs have a responsibility for preparing SPED's ECSPED's Gen ED's, SLP's and OT's for collaboration with a focus on strategies to minimize potential barriers and support outcomes for the minimally verbal child with ASD and CAS and only CAS.

Limitations

Limitations of this current qualitative study include: the limited number of participants and observation opportunities were not included along with the semi-structured interviews. Observation opportunities would have allowed the researcher to document more nuances and subtleties that may not have been spoken but observed. The window of time was limited to interview the participants during the summer months. Elementary schools were also closed for the summer months. All demographic areas were represented: urban, rural, and suburban. However, there were only a few participants per area. This may not have represented all perspectives in the study. Although many SPLA's, and COTA's are working in rural elementary school area, the researcher was only able to interview one SLPA and one COTA from rural settings. A bigger sampling may provide more information regarding this population of professionals. No TA's were interviewed, although five licensed SPED and one ECSPED teachers were interviewed that supervise TA's.

Final Thoughts

Upon concluding the interviews with these dedicated participants, they were asked if they had any questions for me. The SLP's in particular were curious as to why the researcher was asking these specific questions and what recent research studies are out there regarding CAS. They wanted the latest research articles shared with them so they can become more informed and share the information to their colleagues in their next in-service or Q&A meeting. Their inquiries were quite revealing. Research was shared with them after the interviews were conducted. The research study that spurred this study revealed that a young minimally verbal child with ASD and CAS does not demonstrate verbal output gains as would a young minimally verbal child with only CAS (Tager-Flusberg, 2013).

Further research is clearly needed since there are currently no recent studies conducted regarding minimally verbal young children with ASD and CAS. Reliable clinical measures can help the SLP profession understand which minimally verbal child might respond to speech treatment and which child is unlikely to. This information would help the SLP make clinical decisions about treatment much earlier that can be done now and can give the SLP an opportunity to create and refine treatments that can help the child who can achieve useful speech (Chanausky, 2018). Professionals in the field need to specifically discover how many children with ASD also meet the criteria for CAS and what CAS looks like in these children who are severely affected.

Every child has the right to have a voice. A young child's fervent and unquestionable individual right is considered to be the child's ability to learn how to communicate. As educators and therapists look at communication skills though this perspective, our mindsets as professionals working with these young children must change stressing upon the importance to prioritize the child's communication skills as a primary goal. By building the child's communication skills, we will help empower the child to have his/her basic wants and needs met, to ask questions, to share information and to interact with others socially. Communication, therefore, is so prized that every child regardless of their ability, is justified to receive comprehensive intervention to build his/her communication skills throughout the young child's life. Team members who have young children who are struggling with their communication skills, therefore, should view the child's communication goals as primary.

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Appendix A

Interview Guide

Interview Questions for SLP's and SLPA:

1. When intervening with a young child who has ASD and has the speech diagnosis of CAS or s CAS, what type of motor-based intervention(s) would you provide this child?
    - Describe the intervention tool(s) you would use and the successes and challenges with this intervention experience?
2. When intervening with a minimally young child who may have another disorder but not ASD and has the speech diagnosis of CAS or s CAS, what motor-based intervention would you provide this child?
    - Describe the intervention differences, the efficacy of the motor-based intervention(s) and, the successes and challenges associated with the intervention experience(s).
3. Upon re-evaluation, what young child would demonstrate verbal output gains, a young minimally verbal child with ASD and CAS or a young minimally verbal child with only CAS?
    - Describe and explain the reasons why.
4. When working with these two sets of young minimally verbal children, describe the school-based collaborative, multidisciplinary efforts that are

implemented to help the young minimally verbal child.

Additional question administered to only SLP's and SLPA:

5. Are you aware of the latest research studies regarding speech guidelines and development of diagnostic markers for CAS?

<u>Interview Questions for OT's and COTA:</u>

1. When working with a young minimally verbal child with ASD and the speech diagnosis of CAS, what type of motor-based intervention(s) would you provide this child?
   - Describe the intervention tool(s) you would use and the challenges and successes with the intervention experience(s).
2. When working with a young minimally verbal child with CAS and s CAS, what type of motor-based intervention(s) would you provide for this child?
   - Describe the intervention tool(s) you would use and the challenges and successes with the intervention experience(s).
3. Upon re-evaluation, what young child would demonstrate improved verbal output gains, the young minimally verbal child with ASD and CAS or the young minimally verbal child with only CAS?
   - Describe and explain the reasons why.
4. When working with these two sets of young children describe the school-based collaborative efforts between all the professionals involved in working with the young minimally verbal child with ASD and CAS and the young child with only CAS.

<u>Interview Questions for SPED and ECSPED:</u>

1. When working with a young minimally verbal child with ASD and has the speech

diagnosis of CAS, what type of motor-based intervention(s) would you provide this child?

  - Describe the intervention tool(s) you would use and the challenges and successes with the intervention experience(s).

2. When working with a young minimally verbal child with CAS and s CAS, what type of motor-based intervention(s) would you provide this child?
    - Describe the intervention tool(s) you would use and the challenges and successes with the intervention experience(s)?
3. Upon re-evaluation, what young child would demonstrate improved verbal output gains, the young minimally verbal child with ASD and CAS or the young minimally verbal child with only CAS.
    - Describe and explain the reasons why.
4. When working with these two sets of young children describe the school-based collaborative efforts between all the professionals involved in working with the young minimally verbal child with ASD and CAS and CAS only.

VITA

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Candidate for the Degree of

Doctor of Philosophy

Thesis: IT'S A COLLABORATIVE TEAM EFFORT: COMMUNICATION SKILLS AND INTERVENTION PROGRAMS FOR THE YOUNG MINIMALLY VERBAL CHILD WITH ASD AND CAS AND ONLY CAS

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