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The Education, Clinical Practices, and Collaboration Routines of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders in Children

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THE EDUCATION, CLINICAL PRACTICES, AND COLLABORATION ROUTINES OF AUDIOLOGISTS AND SPEECH-LANGUAGE PATHOLOGISTS IN AUDITORY PROCESSING DISORDERS IN CHILDREN

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ABSTRACT

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A survey of audiologists and speech-language pathologists (SLP) was conducted to explore the education, clinical practices, and collaboration routines of audiologists and speech-language pathologists in auditory processing disorders (APD) in children. The main objective was to identify factors that contribute to successful collaboration between professionals, as well as to identify potential barriers to successful collaboration in hopes of supporting professionals in providing a smooth continuum of care for children with APD. A link to complete the survey was distributed to both audiologists and speech-language pathologists via email, social media, and on professional community forums. Data from 248 completed surveys were analyzed. Overall, the findings revealed vast differences in the education, clinical practices, and collaboration routines both between and among the two professional groups. Several factors that contribute to successful collaboration, including but not limited to, the competency, availability, and preparedness of other professionals, were identified. In addition, several factors that prevent successful collaboration, including but not limited to, time, the availability of other professionals, and lack of education and training were identified. The clinical implications of these factors, both positive and negative, are discussed in detail in an effort to support professionals in their future collaborative efforts for children with APD.

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STATEMENT OF THE PROBLEM

Auditory processing disorders (APD) are characterized by a reduced ability to perceptually process auditory information at the level of the central auditory nervous system (CANS; American Speech-Language-Hearing Association. [ASHA], 2005). Individuals with APD may experience difficulty with any combination of the following auditory processing tasks: sound localization and lateralization; auditory discrimination; auditory pattern recognition; temporal aspects of audition, including temporal integration, temporal discrimination (e.g., temporal gap detection), temporal ordering, and temporal masking; auditory performance in competing acoustic signals (including dichotic listening); and auditory performance with degraded acoustic signals (ASHA, 2005). For children, difficulty with such tasks often leads to challenges in language development and academic learning in the school setting. While it is within the scope of practice of an audiologist to diagnose and provide intervention for children with APD, research shows the majority of audiologists tend to be the primary professional to diagnose APD while speech-language pathologists tend to be the primary professional to provide intervention (Emanuel, Ficca, & Korczak, 2011). Accurate diagnosis and appropriate intervention techniques are dependent upon the education and training of audiologists and speech-language pathologists. Equally important is the ability of each professional to successfully collaborate about a child's specific auditory processing deficit(s), needs in

the classroom, and progress with intervention strategies. For this cross-discipline approach to result in a smooth transition of care from diagnosis to intervention, audiologists and speech-language pathologists must be competent in evidence-based APD practices and have effective collaboration skills.

Purpose

Given the complex nature of APD, there is a need for careful planning of diagnostic and intervention protocols that are tailored to the needs of each child. This responsibility falls on the two primary professionals responsible for the care of children suspected of having or diagnosed with APD, audiologists and speech-language pathologists. The current study was conducted, in part, to further explore the education and clinical practices of audiologists and speech-language pathologists in auditory processing disorders through survey data. This study followed up on both the Chermak et al. (2007) and Emanuel et al. (2011) studies to examine similarities and differences in the preparation and practices of audiologists as all audiology graduate programs have since shifted to doctoral degree programs. In addition, it provided preliminary information regarding the preparation and practices of speech-language pathologists working with children with APD since there are currently no existing data on this subject. This study examined current trends in collaboration routines between audiologists and speech-language pathologists, including the effectiveness of and/or barriers to collaboration with each other, in an effort to better understand the continuum of care children with APD are likely to receive. Information gathered from the survey will hopefully bridge the two professions and offer helpful strategies for providing a seamless transition from diagnosis to intervention for children suspected of having or diagnosed with APD. The following

research questions were answered by surveying audiologists and speech-language pathologists:

Q1 What preparation do audiologists and speech-language pathologists (SLP) receive to work with children who are suspected of having or are diagnosed with an auditory processing disorder based on their education and training?

H1 The majority of audiologists complete a graduate-level course that primarily focuses on the diagnosis of auditory processing disorders. The majority of speech-language pathologists receive little to no training specifically related to auditory processing disorders during their graduate level coursework but gain some experience during internships and their clinical fellowship year (CFY).

Q2 What trends exist in the current clinical practices of audiologists and speech-language pathologists (SLP) related to auditory processing disorders?

H2 Audiologists view themselves as the primary professional responsible for diagnosing APD and view speech-language pathologists as the primary professional responsible for providing intervention for APD. Speech-language pathologists view audiologists as the primary professional responsible for diagnosing APD and view themselves as the primary professional responsible for providing intervention for APD. Both audiologists and speech-language pathologists use a multidisciplinary approach when caring for children suspected of having or diagnosed with APD.

Q3 How do audiologists and speech-language pathologists (SLP) collaborate to provide a continuum of care to children suspected of having or who have been diagnosed with an auditory processing disorder?

Glossary of Terms

American Academy of Audiology (AAA) – The world's largest organization of, by, and for audiologists dedicated to providing quality hearing care services through professional development, education, research, and increased public awareness of hearing and balance disorders

Auditory brainstem response (ABR) – Auditory evoked potential that gives information about the cochlea (inner ear) and central auditory pathway.

Auditory processing disorder (APD) – A disruption along the CANS pathway that prevents effective and efficient transmission of auditory signals.

American Speech-Language-Hearing Association (ASHA) – National professional, scientific, and credentialing association for audiologists, speech-language pathologists, speech, language, and hearing scientists, audiology and speech-language pathology support personnel, and students.

Auditory closure – The ability of a normal listener to use redundancy to fill-in missing or distorted portions of an auditory signal and recognize the entire message.

Binaural integration – The ability to fuse/bring together different auditory stimuli that are presented simultaneously to each ear.

Binaural interaction – The ability to detect an auditory signal in the presence of noise.

Binaural separation – The ability to ignore different auditory stimuli that are presented simultaneously to each ear.

Dichotic listening – Listening to auditory stimuli presented to both ears simultaneously with the stimulus presented to each ear being different.

Expressive language – The ability to put thoughts into words and sentences.

Individuals with Disabilities Education Act (IDEA) – A federal law that ensures appropriate educational services to children (birth-21) with disabilities.

Individualized Education Plan (IEP) – A legal document that ensures children identified with a disability who cannot benefit from general education alone receive specialized instruction and obtain reasonable learning goals.

Middle latency response (MLR) – An auditory evoked response used to assess auditory cortical function.

Receptive language – The ability to understand language.

Section 504 Plan – A civil rights law that prohibits discrimination against individuals with disabilities by ensuring children with a disability have equal access to an education through the use of classroom accommodations and modifications.

Speech-sound discrimination – The ability to distinguish between individual sounds used in speech.

Temporal processing – The ability to perceive time-related aspects of an auditory stimuli.

CHAPTER II

REVIEW OF THE LITERATURE

Auditory Processing

The processing of an auditory signal depends on the integrity of the entire auditory system- from detecting the signal in the peripheral auditory system, to encoding and processing the signal in the central auditory nervous system (CANS). An individual's ability to recognize, decode, and interpret auditory stimuli is heavily reliant on higher-level neurocognitive and behavioral factors (Bellis, 2011). The American Speech-Language-Hearing Association's Task Force on (Central) Auditory Processing (1996) defined auditory processing as:

> The auditory system mechanisms and processes responsible for the following behavioral phenomena: (1) sound localization and lateralization, (2) auditory discrimination, (3) auditory pattern recognition, (4) temporal aspects of audition including temporal resolution, temporal masking, temporal integration, temporal ordering, (5) auditory performance decrements with competing acoustic signals, and (6) auditory performance decrements with degraded acoustic signals. (ASHA, 1996).

These mechanisms and processes are important for understanding auditory information in a variety of listening conditions and environments. Bellis (2011) described several important processes including dichotic listening, temporal processing, binaural interaction, and speech sound discrimination. Dichotic listening is listening in conditions where different stimuli are presented to each ear simultaneously such as listening to a speech signal in noise. Temporal processing is the way in which the CANS deals with

time-related aspects of the acoustic signal which is important for the perception of melody in music and prosody in speech. Binaural interaction can be thought of as how the ipsilateral and contralateral auditory pathways work together to localize and lateralize signals. Speech-sound discrimination is simply discrimination of phonemes that rely on specific coding such as vowels.

Auditory Processing Disorders

A disruption along the CANS pathway that prevents effective and efficient transmission of auditory signals is known as an auditory processing disorder (APD). Auditory Processing Disorders are not due to an inability to detect an acoustic stimulus, but rather, are an inability to perceptually process an auditory stimulus (AAA, 2010; ASHA, 2005). Auditory processing disorders impact an individual's ability to understand and interpret a spoken message (Musiek & Chermak, 2014; Northern, Downs, & Hayes, 2014). The disorder can manifest in various ways and to various degrees of severity, but is typically associated with a deficiency at least one of the aforementioned auditory processing skills (ASHA, 1996). There is evidence in the existing literature to establish APD as a true clinical disorder and differentiate APD from higher order language, cognitive, and related factors (AAA, 2010; ASHA, 2005; Geffner, Ross-Swain, & Stach, 2013). While APD is not the cause nor the result of other disorders, it is not uncommon for APD to be present with other comorbid disorders (i.e. language impartment, ADHD, learning disability, etc.).

Symptoms and Behavioral Manifestations

A disruption along the CANS pathway can lead to a variety of auditory processing difficulties including sound localization and lateralization, auditory

discrimination, auditory pattern recognition, temporal aspects of audition, and auditory performance with degraded signals (ASHA, 2005). These deficits tend to manifest in various ways including: inconsistent or inappropriate responses to auditory stimuli; inability to follow auditory instructions; difficulty localizing sound; difficulty discriminating, remembering, and manipulating phonemes in tasks such as reading, spelling, and phonics; poor perception and use of pitch, intonation, and other suprasegmental features of speech that affect meaning; difficulty understanding speech in noisy backgrounds/reverberant environments or against competing sounds; impaired ability to recall or repeat simple musical patterns; difficulty with tasks involving auditory memory; poor listening skills due to decreased attention and increased distractibility and restlessness; need for frequent repetition; slow processing skills; delayed responses (AAA, 2010; ASHA, 2005; Keith, 2000; Northern et al., 2014). Difficulties with these tasks become particularly apparent as children mature and the language and learning demands required of them become increasingly challenging. Children may experience increased difficulty with language, reading, spelling, writing, vocabulary, and comprehension, which can result in low academic performance (AAA, 2010; ASHA 2005; Bellis, 2011). To further complicate the matter, school-age children may start to recognize certain tasks are difficult and become frustrated when these tasks are required of them. It is not uncommon for children with APD to exhibit secondary characteristics such as behavioral problems and withdrawal tendencies, including shyness and poor self-concept from multiple failures as they become more aware of their struggles (AAA, 2010; ASHA 2005; Bellis, 2011). This list of APD symptoms and behavioral manifestations is not exhaustive, nor will all children with APD demonstrate each of the

aforementioned symptoms. Since APD can involve any combination of auditory processes which are mediated at various levels of the CANS, individuals are affected in different ways. It is equally important to note not all children who exhibit these symptoms have APD because difficulties with such tasks may stem from comorbid disorders that exist in the presence or absence of APD (AAA, 2010; ASHA, 2005).

Causes

While the exact cause of APD remains unknown, researchers have suggested several possible etiologies of APD which are neurobiological in nature and involve the CANS (Chermak, Bellis, & Musiek, 2007; Musiek & Chermak, 2014). Causes of APD can be classified as either developmental or acquired. Developmental APD is attributed to neuroanatomical or neuromaturational factors such as abnormal or slow development of the neural pathways of the CANS (Musiek & Chermak, 2014). Perhaps one of the most accepted explanations of developmental APD is the contribution of recurrent otitis media. Otitis media is associated with fluctuating hearing thresholds and temporary hearing loss. Repeated episodes of otitis media during critical periods of development limits the amount of auditory stimulation a child receives and compromises the development of the central auditory pathway (Bamiou, Musiek, & Luxon, 2001; Northern et al., 2014; Whitton & Polley, 2012; Zumach, Gerrits, Chenault, & Anteunis, 2009). Acquired APD results from damage or trauma to the CANS including, but not limited to, neurological lesions, degenerative vascular disorders that affect structures in the CANS, auditory deprivation, and traumatic brain injury (Bamiou et al., 2001; Moore, 2007; Musiek & Chermak, 2014; Whitton & Polley, 2012).

Prevalence in Children

The general consensus is approximately 3-5% of school-age children have some degree of an APD (Chermak & Musiek, 1997; Geffner et al., 2013; Northern et al., 2014). However, researchers have noted the prevalence in school-age children to be as high as 20% (Geffner et al., 2013; Katz, 2005). It is difficult to differentially diagnose APD from other disorders, making the true prevalence hard to determine. That said, it is estimated 3-7% of school-age children exhibit some form of a learning disability (Hurley & Singer, 1989; Lewis, 1986). Researchers suggest the prevalence of co-existing APD is as high as 43% in children also identified as having a learning disorder (Iliadou, Bamiou, Kaprinis, Kaprinis, & Kandylis, 2009). Boys are twice as likely as girls to be diagnosed with APD, although more evidence is needed to fully support this claim (Northern et al., 2014; Roeser & Downs, 2004).

Auditory Processing Disorder Diagnostic and Intervention Guidelines

The American Speech-Language-Hearing Association (ASHA) is a national professional, scientific, and credentialing association for both audiologists and speech-language pathologists (SLP). In 2005, a panel of audiologists with expertise in the area of APD formed the ASHA Working Group on Auditory Processing Disorders with the goal of determining the current status of existing literature and establishing implications for clinical practice. This technical report provides a definition of APD, describes the nature of APD, provides evidence-based guidelines for testing for APD, evidence-based guidelines for intervening for APD, and tips for communicating the results.

The American Academy of Audiology (AAA) is the world's largest professional organization for audiologists. AAA compiled a task force of audiologists to develop

clinical practice guidelines for APD titled, “Guidelines for the Diagnosis, Treatment and Management of Children and Adults with Central Auditory Processing Disorder” in 2010. Like ASHA’s technical report, this document also provides evidence-based recommendations for the diagnosis, treatment, and management of children and adults with APD.

Both of these practice guidelines define APD as a true clinical disorder. While subtle differences in procedures and semantics exist between the two documents, the majority of information presented is in agreement with one another. Both organizations emphasize the importance of individualized assessment and deficit-focused intervention. The guidelines serve as a resource for clinicians involved in auditory processing disorders to help guide their clinical decision making.

Primary Professionals Involved in the Diagnosis and Intervention of Auditory Processing Disorders

An auditory processing disorder is an auditory deficit. Therefore, administration of tests specific to auditory processing skills, as well as, the diagnosis of APD falls within the scope of practice of an audiologist (AAA, 2010; ASHA, 2002; ASHA, 2004b). Not only do audiologists receive some level of education and training for assessing APD, they also have access to necessary testing equipment and the knowhow to use it. Although information the multidisciplinary team (e.g. speech-language pathologists, psychologist, physician, teachers, parent) provides about a child’s skills is important to consider, audiologists are the only professionals able to make the diagnosis and specify deficient auditory processes. Audiologists are also able to make recommendations for management (ASHA, 2004b).

Controversy over the definition of APD has made it difficult to determine who the primary professional responsible for providing intervention in the school setting is. The ASHA Preferred Practice Patterns for the Profession of Audiology (2006) suggests management be conducted by both intradisciplinary teams (i.e. professionals from one discipline that includes team members with different levels of training and skills) and interdisciplinary teams (i.e. professionals from more than one discipline). The ASHA Preferred Practice Patterns (2004a) states the speech-language pathologist's role is to provide intervention services either individually or as part of a multidisciplinary team. The document specifically suggests involvement of the speech-language pathologist when APD exists in the presence of other cognitive, communication and/or language impairments. Conversely, the role of the speech-language pathologist was never specifically addressed in ASHA's Technical Report on (Central) Auditory Processing Disorders (ASHA, 2005; Richard, 2011). Yet, the delineation between auditory processing skills and language skills is difficult to determine, and auditory training interventions tend to be language-based in nature. For that reason, speech-language pathologists are likely to be the primary professional to provide intervention. In the ASHA Schools Survey conducted in 2014, 45.5% of speech-language pathologist respondents reported regularly serving clients with APD (ASHA, 2014).

Researchers and clinicians need to come to a general consensus about proper care for individuals with APD. The first step in creating a successful APD service delivery program involves the education of all professionals and caregivers involved in the child's care (Bellis, 2011). Emanuel et al. (2011) conducted a survey of audiologists to determine common diagnosis and management protocols in the area of auditory processing

disorders. A total of 195 audiologists completed the survey. Respondents represented a variety of clinical settings including schools, private practices, hospitals, and university clinics and worked with both children and adults. Respondents were asked which professional(s) are qualified to diagnosis APD. Ninety-seven percent of respondents answered "audiologists," while six percent of respondents reported a multidisciplinary team should make the diagnosis. When asked which professional(s) are responsible for recommending an APD treatment plan and management strategies, 81% of respondents answered "audiologist," while 40% of respondents answered "speech-language pathologist," and 36% of respondents answered "multidisciplinary team" (respondents were able to select more than one answer). Last, when asked which professional(s) are responsible for the provision of the treatment plan and management strategies, 74% of respondents answered "speech-language pathologist," while 52% of respondents chose "educational professional," and 40% of respondents answered "audiologist." Results of this survey clearly demonstrate a strong preference to use an approach in which audiologists diagnose children with APD and speech-language pathologists provide treatment for children with APD. Since both audiologists and speech-language pathologists are involved in the care of children with APD in different capacities, it is plausible to think a continuum of care may be difficult to achieve. The availability of both professionals, along with their education, clinical experience, professional beliefs, and collaborative skills are factors likely to contribute to efficacy of care. Audiologists and speech-language pathologists need to find a way to work collaboratively and use each other's expertise (Richard, 2011).

Education of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders

Audiologists

AAA considers the diagnosis and intervention of APD to be a specialty area within audiology (AAA, 2010). That does not necessarily mean however, additional education and clinical experience beyond what is offered in a traditional graduate program is mandatory. This means, most audiologists are dependent upon the knowledge and skills gained during their graduate program or continuing education to work with children with suspected or confirmed APD. The Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association most recently developed Standards for the Certificate of Clinical Competence in Audiology in 2012 which defines the standards for clinical certification for audiologists. Standard IV-C8 states, "Evaluating auditory-related processing disorders" is a mandatory skill. It is the only standard which specifically references auditory processing disorders. Bellis (2011) attributes the lack of education audiologists receive regarding APD to two main factors: (1) a lack of consensus regarding best practices in APD service delivery and (2) few educational programs incorporate in-depth discussion of APD to allow for independent clinical application. Chermak, Silva, Nye, Hasbrouck, and Musiek (2007) developed an online questionnaire to describe audiologists' education, professional preparation and clinical practices in the area of APD. This study evolved as a result of deficiencies in the graduate-level academic and clinical preparation of future professionals in the area of APD that was revealed in an earlier study conducted by Chermak, Trynham, Seikel, and Musiek (1998). Therefore, the second study served as an update to the first and provided valuable information as the

graduate level requirements changed from a Master's degree to a Doctoral degree during this time period. One hundred eighty-three audiologists responded to the Chermak et al. (1998) survey and 90 audiologists responded to the Chermak et al. (2007) survey. A comparison of the two studies shows a growing number of audiologists received instruction specific to APD (20% of audiologists reported APD training in 1998; 69% of audiologists reported APD training in 2007). It is likely the increase in APD training reflects the expansion of audiology programs from a Master's degree to a Doctoral degree between these two dates. For instance, 10% of respondents in Chermak et al. (1998) were educated at the doctoral level (Au.D.), whereas 34% of respondents in Chermak et al. (2007) were educated at the doctoral level (Au.D.). Emanuel et al. (2011) does not report on the percent of audiologists who received training specific to APD during their graduate program. However, it is plausible to think this number would be even larger due to the shift to doctoral programs in the field circa 2007. Fifty-one percent of audiologists surveyed in Emanuel et al. (2011) held an Au.D. In addition to classroom coursework, Chermak et al. (2007) reported audiologists averaged 12 hours of clinical experience with APD as part of their graduate preparation. This statistic was not addressed in the subsequent Emanuel et al. (2011) study.

Speech-Language Pathologists

Since speech-language pathologists are the professionals most likely responsible for providing intervention to students diagnosed with APD in the educational setting, it is reasonable to expect they are knowledgeable about the disorder and have received proper training. Bellis (2011) argued that speech-language pathologists should be familiar with underlying auditory processes that may be affected, sub-profiles of APD, and purposes

and goals of management techniques. Theoretically, if a speech-language pathologist is in charge of providing intervention services, they should also know how to interpret diagnostic audiologic test results, understand the functional impact APD may have on the child's academic performance and communication skills, understand environmental modifications and compensatory strategies recommended by the audiologist in the evaluation report, and be familiar with the existing literature therapy approaches for APD. Yet, anecdotal data and quick internet exploration suggest, the majority of textbooks on speech-language development and developmental communication disorders do not discuss APD at length. Further complicating this issue is the fact that researchers in the area of APD have conflicting opinions concerning the efficacy of auditory training interventions for children with APD. Furthermore, the Council for Clinical Certification in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association most recently developed Standards for the Certificate of Clinical Competence in Speech Language Pathology in 2014 (revised in 2016) which defines the standards for clinical certification for speech-language pathologists. Standard IV-C states, "Hearing, including the impact on speech and language" is a mandatory skill. However, it is the only standard which incorporates hearing/hearing impairment. There is no specific mention of auditory processing disorders in this document. To date, there are no studies that examine the education and training speech-language pathologists receive in the area of APD.

Recommended Clinical Practices for Diagnosing and Treating Auditory Processing Disorders

Both the AAA (2010) and ASHA (2005) guidelines include detailed information regarding recommended components and considerations for diagnosing and treating

APD. It is not the intent of this paper to discuss diagnostic and intervention criteria in-depth. Rather, what follows provides a brief overview of components and considerations to help illustrate the complexity of the nature of APD, and therefore, the complexity of the diagnostic and intervention procedures.

Diagnosing Auditory Processing Disorders

Due to the complex nature of APD, no definitive assessment protocol exists. To date, many researchers have studied the validity and reliability of various behavioral and electrophysiological tests in an attempt to develop a "gold standard" protocol for the diagnosis of APD (Amos & Humes, 1998; Jerger et al., 2002). The general consensus among researchers is to use a battery of tests known to evaluate different regions of the central auditory nervous system (CANS) and help in identification of functional auditory deficits to diagnosis APD (AAA, 2010). Emanuel et al. (2011) completed a survey on APD diagnosis and management practices of educational audiologists. Results of their survey indicated 97% of respondents (n = 187) utilize a test battery to assess APD. Careful consideration should be made when determining what specific tests are included in the test battery. The test battery should be comprehensive, measure a variety of auditory mechanisms and processes, and assess multiple levels within the CANS. It should be tailored to the individual's strengths and struggles. In the Emanuel et al. (2011) survey, 80% of respondents (n=124) who used a test battery to assess APD reported they "always" or "often" use a "minimum battery for all patients with additions based on individual case history and age." A list of commonly used audiologic tests for APD can be found in Appendix C and a list of commonly used language tests for APD can be found in Appendix D.

ASHA and AAA have developed guidelines to assist audiologists in choosing an appropriate test battery that will identify deficits in the brain's ability to process auditory information and describe the impact these disruptions have on communication through the administration of both behavioral and electrophysiological tests (AAA, 2010; ASHA, 2005). A diagnosis of APD requires performance of at least two standard deviations below the mean on two or more auditory processing tests in the test battery or at least three standard deviations below the mean on one auditory processing test (ASHA 2005; Chermak & Musiek, 1997). A brief overview of components that may be included as part of a test battery is provided below. Additionally, an example test battery that could be used for an auditory processing evaluation is provided in Appendix E.

Case history and parent/teacher questionnaires. The use of a case history to gather information regarding the functional impact of the suspected disorder can be helpful in differentiating APD from other disorders and assisting the diagnosing professional in choosing appropriate behavioral and electrophysiological assessments. Using a case history is suggested in both the AAA (2010) and ASHA (2005) guidelines. Emanuel et al. (2011) found 95% of respondents routinely collect a case history as a part of their pretesting procedures. Additionally, the majority of respondents indicated they request a questionnaire about the child's performance be completed by either the teacher or parent (75% and 65% respectively). It was unclear from this survey whether audiologists are using the questionnaire as part of their screening or diagnosis protocol, although the question was included in the "pretesting" section of the survey. AAA (2010) and ASHA (2005) discuss the use of a questionnaire only in the context of screening and pretesting. The high number of respondents from the Emanuel et al. (2011) survey who

reported using a questionnaire suggests it adds valuable information regarding the need for a comprehensive APD evaluation and/or characteristics of the child suspected of having the disorder.

Observation. Keith (1999) stated an observation completed by an audiologist can also contribute valuable information. The observation should be completed in the child's natural environment (i.e. classroom) rather than a contrived clinical setting to gain the most pertinent information regarding the child's auditory strengths and deficits (AAA, 2010). An audiologist will be able to determine whether the child is demonstrating age-appropriate auditory behaviors, cross-check observations with parent and other professionals' reports, and use the information gathered to guide their test battery selection.

Behavioral tests. The sensitivity and specificity of numerous behavioral tests to accurately identify children with APD has been documented in existing research (Jerger & Musiek, 2000). Behavioral tests that assess central auditory function are often categorized into four main groups: (1) monaural low-redundancy speech tests, (2) dichotic speech tests, (3) temporal patterning tests, and (4) binaural interaction tests. Both AAA (2010) and ASHA (2005) recommend administering at least one test to assess each central auditory function. Results of the Emanuel et al. (2011) survey found dichotic speech tests to be the most commonly administered test, while binaural interaction tests were the least commonly administered.

Electroacoustic and electrophysiological tests. Both AAA (2010) and ASHA (2005) suggest electrophysiological tests should be incorporated into the test battery when the results of the behavioral testing do not indicate a clear pattern of findings, the

behavioral tests are inconclusive, a neurological disorder is suspected, or behavioral tests are not available in the child's native language. Examples of electroacoustic/ electrophysiological tests include Auditory Brainstem Response (ABR), Middle Latency Response (MLR), cortical event-related potentials (CERP), and steady-state evoked potentials (ASHA, 2005). The ability to include such tests may depend on the audiologist's workplace setting and availability of necessary equipment. Less than 30% of educational audiologists who responded in the Emanuel et al. (2011) survey reported incorporating electrophysiological tests as part of their test battery.

Other considerations. There are several others factors to consider when assessing for APD. For example, it is recommended that a comprehensive audiologic exam be administered to rule out a peripheral hearing loss since difficulties with auditory processing are distinct from difficulties detecting auditory stimuli. Additionally, both AAA (2010) and ASHA (2005) recommended testing for APD not be completed with children under the age of seven. The requirements of behavioral tests may not be developmentally appropriate for children younger than seven because the auditory system needs time to mature. If APD is suspected in a child before the age of seven, individualized intervention based on the child's specific needs should be provided in the absence of an official diagnosis (AAA, 2010). Thoughtful consideration should also be given to the testing conditions. ASHA (2005) suggests APD testing may need to be divided up into multiple sessions so as to maintain the child's attention, motivation, and energy level and prevent fatigue.

Differential diagnosis of APD is important since the definition explicitly states deficits in auditory processing are not due to higher order language or cognitive factors

(ASHA, 2005). For this reason, information regarding a child's performance across various developmental domains needs to be considered. It is recommended a multidisciplinary team approach be used to collect the information necessary to obtain a comprehensive description of the child's strengths and challenges. This team may include a speech-language pathologist to describe the child's receptive and expressive language skills, a psychologist to determine the child's cognitive skills, a physician to rule out the presence of a medical pathology, a general education teacher and a special education teacher to provide information about the child's listening and learning behaviors in the classroom, and/or the child's parents to provide information about listening and learning behaviors at home (AAA, 2010; ASHA, 2005; Bellis, 2011).

Intervention for Auditory Processing Disorders

It is important children receive intensive intervention as soon as a diagnosis of APD is made so as to take advantage of the plasticity of the CANS (AAA, 2010; ASHA, 2005). Successful treatment outcomes are dependent on auditory stimulation that induces cortical reorganization and results in behavioral changes and learning (Merzenich & Jenkins, 1995). Early intervention lessens the likelihood secondary problems such as behavioral, social, emotional, communication and learning difficulties emerge (ASHA, 2005). Intervention goals should be derived from an individual's diagnostic results and should be age-appropriate to ensure the child remains engaged and motivated throughout treatment (Bellis, 2011). Incorporating intervention goals into settings beyond the typical therapy room (e.g. classroom, home, community) will allow for generalization of auditory processing skills to other environments (AAA, 2010; ASHA, 2005; Bellis, 2011). Intervention approaches for APD in the educational setting fall into three main

categories: (1) environmental modifications, (2) compensatory strategies, and (3) direct remediation techniques (ASHA, 2005; Bellis, 2011; Keith, 1999). Aspects of all three approaches should be incorporated into an intervention plan in order to achieve successful outcomes. A brief overview of each of these intervention components follows.

Environmental modifications. The primary goal of environmental modifications is to create a highly redundant learning and listening environment in hopes of providing children better access to auditory information with their current skills (Bellis, 2011). Environmental modifications are advantageous because they allow children to expend as little energy as possible to obtain important auditory information in the classroom. It is important to note, not all children will benefit from the same environmental modifications. Therefore, careful selection and progress monitoring are required. Emanuel et al. (2011) found the most commonly recommended environmental modifications for the classroom to be preferential seating (recommended by 95% of respondents), gaining the child's attention before speaking (recommended by 91% of respondents), repeating and rephrasing verbal information (recommended by 89% of respondents), and the use of frequency modulated (FM) systems (personal FM systems recommended by 85% of respondents; sound-field FM systems recommended by 72% of respondents). The FM system is the only environmental modification mentioned here that requires additional equipment and thus, extra cost. For that reason, it is especially important to consider the efficacy of FM systems for children with APD in the classroom.

A systematic review of the literature regarding the use of FM systems for children with APD was completed by Lemos et al. (2009). Based on their analysis of 19 studies, the researchers concluded no strong scientific evidence exists to support the use of

personal FM systems for APD. Yet, results from the Emanuel et al. (2011) study revealed a large majority of audiologists continue to recommend the use of an FM system for these children. It is important to carefully determine whether a child will benefit from FM use based on their specific auditory deficits (i.e. Is understanding speech in noise a specific auditory deficit for the child?) and monitor their progress, or lack thereof, with an FM system on a regular basis. It should be noted many environmental modifications exist and children often benefit from combining multiple of environmental modifications in the classroom.

Compensatory strategies. The goal of compensatory strategies is to teach children to take responsibility for their learning and listening and minimize the impact of APD (ASHA, 2005; Bellis, 2011). Compensatory strategies can involve metalinguistic strategies and/or metacognitive strategies, including memory and attention (Bellis & Anzalone, 2008). These strategies are directly discussed, modeled, and practiced with the child so the child feels competent and comfortable implementing them when in a difficult listening situation. Emanuel et al. (2011) found the most commonly recommended compensatory strategies to be active listening skills (recommended by 82% of respondents), meta-memory skill training (recommended by 73% of respondents), and context derived vocabulary building (recommended by 52% of respondents). Other examples of compensatory strategies include whole body listening, problem solving, self-reflection, and mnemonic devices (Bellis, 2011).

Direct remediation. Direct remediation techniques are also referred to as deficit-specific auditory training therapy. The goal of direct remediation is to target specific areas of auditory deficits as indicated by the results of the test battery. Therapy should be

frequent, challenging, and intense because changes in plasticity of the brain are reliant upon stimulation (Bellis, 2011). Examples of direct remediation techniques include tasks of intensity, frequency, duration, phoneme awareness and discrimination, temporal ordering or sequencing, localization/lateralization, and listening in noise (Bellis, 2011; Chermak & Musiek, 2002). Controversy surrounds the efficacy of incorporating deficit-specific auditory training goals into therapy demonstrating a need for more research into the effectiveness of this management approach. Both AAA's Clinical Practice Guidelines (2010) and ASHA's Technical Report on (Central) Auditory Processing Disorders (2005) cite several research studies which discuss a neurophysiologic basis for auditory processing deficits and support the use of auditory training in the treatment of children with APD (Bellis, 2011; Chermak et al., 2007; Moore, Halliday, & Amitay, 2009). However, a systematic review on auditory and language interventions for children with APD completed by Fey et al. (2011) found no compelling evidence to suggest intensive, short-term auditory interventions improve auditory functioning in school-age children with APD. Other research suggests language interventions are just as effective as auditory interventions for improving auditory skills (Gillam et al., 2008). Due to the reported variable efficacy of direct remediation, intervention should be individualized and progress should be monitored on a regular basis to ensure a child is receiving benefit from the selected intervention technique(s). Results of the Emanuel et al. (2011) survey imply the inclusion of auditory training techniques into the intervention protocol continues to exist. Results from the survey indicated the most popular direct remediation techniques to be Earobics (recommended by 70% of respondents) and auditory closure activities (recommended by 70% of respondents), followed by phoneme training

activities (recommended by 60% of respondents), and temporal training (recommended by 51% of respondents).

With advancements in technology, computer-based auditory training programs have emerged. Two programs in particular, Earobics (Cognitive Concepts, 1998) and Fast ForWord (Scientific Learning Corporation, 1998), receive a lot of attention in the literature. The allure of these programs to children is clear as they are engaging and interactive. However, the support for using these programs with children with APD is limited. Fey et al. (2011) completed a systematic review which included these two therapy techniques (among others) focused on auditory training. They found weak evidence to support the inclusion of auditory training intervention through the use of either Earobics or Fast ForWord, suggesting the appealing features of such computer-based therapy programs do not offer additional benefit over more traditional auditory training techniques.

Collaboration Between Audiologists and Speech-Language Pathologists

Collaboration is defined as:

> A process for communication and decision making that enables the separate and shared knowledge and skills of different care providers to synergistically influence the care provided through changed attitudes and behaviors, all the while emphasizing patient-centered goals and values. (Newton, Wood, & Nasmith, 2012).

Efficient collaboration is necessary for providing patients high quality and efficacious services. As true for any healthcare delivery, the patients' needs and well-being should be of upmost importance and the driving force for diagnostic and (re)habilitative approaches. In regards to the current study, the best interest of children

suspected of having or diagnosed with APD should be at the forefront of the quality of care they receive in order to meet their developmental and educational needs.

Given the suggestion that audiologists are the primary professional to diagnose APD and speech-language pathologists are the primary professional to treat APD, it is important to consider the collaboration that occurs between these two professionals for the care of a child who is suspected of having or diagnosed with an APD. In an ideal situation, audiologists and speech-language pathologists would work closely together to provide services for these children. This includes collaborating on the necessary documentation to qualify these children for services at school, establishing intervention goals, generating accommodations and modifications for the classroom, communicating the child's needs with classroom teachers, monitoring progress, and modifying intervention plans as needed. There are several factors needed to achieve successful collaboration which include: each professional must have basic underlying knowledge of APD, including knowledge of both diagnostic and intervention components; each professional having access to the other professional (i.e. audiologists must have access to speech-language pathologists and vice versa); each professional must be able to communicate effectively. The former of these three factors is addressed by examining the education and clinical practices of each professional.

The idea of having access to other professionals can be addressed by looking at reports of collaboration professionals in the existing literature. However, there are few studies that examine the collaboration between audiologists and speech-language pathologists specifically. Those that do tend to analyze collaboration for the care of children who are deaf or hard of hearing. One such study by Richburg and Knickelbein

(2011) was conducted with the goal of determining whether school-based speech-language pathologists had access to audiologists, and if so determining whether the speech-language pathologists felt as those they benefited from services provided by the audiologist. The researchers identified several reasons that could contribute to a lack of collaboration including a severe shortage of school-based audiologists, variations between states' interpretation of federal laws, lack of time in already too full schedules, and lack of understanding and knowledge about what constitutes the other professional's scope of practice and job responsibilities (Richburg & Knickelbein, 2011). Results of their survey of school-based speech-language pathologists (n=209) revealed only 61.5% of speech-language pathologists had access to an audiologist in either all or some of their schools. That means 32.3% did not have access to an audiologist (6.3% were uncertain). It should be noted not all speech-language pathologists who responded worked with children who were deaf of hard of hearing and therefore, did not have a need to collaborate with an audiologist. Nonetheless, one-third of respondents did not have an audiologist available to them. Out of the speech-language pathologists who did not have access to an audiologist, more than half of the respondents (57.6%) reported having additional responsibilities in their job description due to lack of access. Of the speech-language pathologists who did have access to an audiologist, the vast majority (89.7%) reported feeling as though the audiologist provided beneficial assistance. While this percentage is high, ideally, every speech-language pathologist who works with children who are deaf or hard of hearing or have an APD should benefit from the help and collaboration of an audiologist to best meet the needs of children. Similarly, every audiologist responsible for evaluating children with hearing loss or APD should have

access to and receive benefit from the speech-language pathologist who works with the child on a more regular basis.

While the results of this study highlight some important issues regarding collaboration, the design is limited in that only school-based speech-language pathologists were surveyed. Collaboration, or lack thereof, between audiologists and speech-language pathologists could be further confounded by the variety of workplace settings (i.e. schools, private practices, hospitals, universities, etc.) these professionals are employed in. The audiologist and speech-language pathologist working with a child may not be employed in the same setting and therefore limit the access professionals have to each other even more. Additionally, this study only surveyed speech-language pathologists regarding their access to audiologists. There are no existing studies that survey audiologists and the access they have to speech-language pathologists. Knowing this information is equally important for identifying potential barriers to effective collaboration, as collaboration requires equal partnership between professional groups.

Equally important to the aforementioned factors regarding collaboration is being able to communicate effectively with other professionals. This includes each professional being able to relay their specialized knowledge of APD to other professionals and parents in a clear and understandable manner. For audiologists, this means sharing the purpose of tests included in the APD test battery, the child's results on each test, and a functional interpretation of the results (i.e. how auditory processing deficits may manifest in the classroom and other environments). Speech-language pathologists will have to effectively describe how particular intervention techniques will address such deficits, as well as, explain the progress that can be expected for the child's individualized goals. While

establishing a good rapport with one another is one step towards effective communication, it is often not enough. Audiologist and speech-language pathologists that work together also need to come to a consensus on what each professional's roles will be for the care of a child with APD, the frequency of collaboration, and the method of communication (i.e. over the phone, in person, etc.) to name a few. Maintaining open lines of communication will help ensure the child's needs are being met.

Potential Barriers to Successful Identification and Intervention of Children with Auditory Processing Disorder

Several potential barriers may exist that impact the quality of care children suspected of having or diagnosed with APD receive and have been discussed up to this point. To summarize, these barriers may include, a lack of education and clinical experience audiologists and speech-language pathologists receive in the area of APD, discrepancy among professionals regarding diagnostic considerations for APD and efficacious intervention approaches for APD, and ineffective collaboration between professionals involved in the care of children with APD. Audiologists and speech-language pathologists cannot be expected to provide an adequate continuum of care for children with APD if they don't receive ample opportunity to develop the foundational knowledge and skills required to do so. Both the ASHA Code of Ethics (2016) and the AAA Code of Ethics (2011) state individuals may provide services only in areas in which they are qualified for and competent in based on their education and experience. If adequate opportunities for education and experience (which includes collaborative experience) are not granted in graduate programs, both AAA (2010) and ASHA (2005) strongly recommend individuals seek out and participate in continuing education

opportunities so they are prepared when a child suspected of having or diagnosed with APD emerges on their caseload. Both professions are involved in the care of such students, so both need adequate education and clinical experience and effective collaboration skills in order for diagnostic results and intervention plans to be effectively communicated and executed.

CHAPTER III

METHODOLOGY

Study Design

This study utilized a survey with a mixed methods design to collect data. Questions were both quantitative and qualitative in nature. This study was approved by the University of Northern Colorado Institutional Review Board (IRB) under the category of "exempt." A copy of the IRB approval letter can be found in Appendix A.

Survey Description

A survey titled, "A Survey of the Education, Clinical Practices, and Collaboration Routines of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders in Children" was developed by the lead investigator and was distributed to both audiologists and speech-language pathologists. The survey included a total of 75 questions classified into six different categories. These six categories included demographic information (completed by all respondents), education of audiologists, clinical practices of audiologists, education of speech-language pathologists, clinical practices of speech-language pathologists, and collaboration between professionals (completed by all respondents). Since the survey used both skip logic (e.g. sent participants to a future question in the survey based on their answer to a previous question) and branch logic (e.g. sent participants down different paths in the survey based on their answer to a previous question), participants were not required to answer all 75

questions nor were they required to answer questions from all six categories. A variety of question types were utilized including multiple choice (56 questions), rank order (1 question), matrix tables (8 questions), and text entry (10 questions). Text entry questions allowed for more in-depth and individualized explanations from respondents. Providing additional comments was not required in order for the respondents to finish the survey. Estimated time to complete the survey was between 10 and 15 minutes. Some questions included in the survey were similar to questions included in the Chermak et al. (2007) and Emanuel et al. (2011) surveys of audiologists' education and clinical practices with regards to APD. The survey and raw data can be found in Appendix B.

Participants

Audiologists and speech-language pathologists were asked to participate in this study. Inclusion criteria required the participants to have self-reported prior experience working with at least one child suspected of having or diagnosed with APD. For purposes of this study, "child" was defined at any individual under the age of 21. Participants were required to read an informed consent letter and agree to voluntary participation in the study before they were able to access the survey.

Procedures

A small pilot study (n=1) was conducted to test the survey prior to distributing it to the intended audience. Audiology and Speech-Language Sciences faculty at the University of Northern Colorado were asked to participate. Feedback regarding the flow, length, and ease of access of the survey, as well as general formatting and word choice, was collected to identify any potential issues and contribute to the validity of the survey.

Changes to the survey were made as suggested by the feedback provided. Results from the pilot study were not included in data analysis.

Survey Distribution

The survey was created using Qualtrics, an online survey software. Qualtrics allows participants to respond through the website using a desktop, laptop, tablet, or mobile device. In an effort to maximize the number of responses received, a link to complete the survey was distributed in the following ways: directly emailing 715 members of AAA who listed auditory processing as a specialty area in their member profile; posting on ASHA's Facebook page; posting on the Colorado Speech-Language-Hearing Association's (CSHA) Facebook page; posting a message in ASHA's Special Interest Groups 1 (Language Learning and Education), 9 (Hearing and Hearing Disorders in Childhood), and 16 (School-Based Issues); posting a message on ASHA's Research and ASHA's Audiology community forums. Due to the means of distribution, it cannot be determined how many professionals actually received an initiation to complete the survey.

Due to the methods of survey distribution, it is likely audiologists and speech-language pathologists who do not work directly with children diagnosed with or suspected of having APD received an invitation to complete the survey. For that reason, one of the initial questions included in the survey addressed this concern and prevented those individuals who do not meet the inclusion criteria from completing the survey. Additionally, it is likely audiologists and speech-language pathologists received more than one invitation to participate in the survey. Participants were asked to complete the survey only one time in the informed consent letter. Participants were informed that their

participation was voluntary and their privacy would be kept confidential in the reporting of results.

Frequency of Contact

An initial invitation to participate in the study was distributed in the aforementioned ways. No matter the means of distribution, the link to the survey was accompanied by the title of the survey, contact information for the principal investigator, a brief description of the study, and an estimate of the time commitment required to complete the survey. An initial invitation to participate was sent on April 20, 2016. As suggested in Dillman's Tailored Design Method (Dillman, 2014), a first and final reminder was sent one week after the initial invitation (April 27, 2016). The reminder thanked those who had already completed the survey and requested participation from those who had not. The survey was accessible to potential participants for approximately four weeks after the final reminder.

Data Handling and Reporting

Qualtrics assigned a random "Response ID" to each completed survey. No personal information was asked of the participants that could reveal their identity. An electronic summary of response data will be stored in Qualtrics for three years. Qualtrics is a password-protected website, therefore, only the lead investigator and research advisor have access to the data. The lead investigator may decide to present the findings to others or publish results in scientific journals or at scientific conferences. The Institutional Review Board at the University of Northern Colorado or appropriate federal agencies like the Office for Human Research Protections may review this study's records.

Data Analysis

Survey responses were analyzed using descriptive statistics. A summary of the data most relevant to the research questions is provided in Chapter IV. The frequency of a response (number of times a response was chosen) was included when appropriate. Results from all questions included in the survey can be found in Appendix B. Sample responses felt to be representative of all the responses to open-ended questions are displayed in tables throughout Chapter IV as well.

CHAPTER IV

RESULTS

A total of 272 responses were received. Data from 24 surveys were not analyzed: four respondents declined giving informed consent; one respondent denied being either an audiologist or speech-language pathologist; seven respondents reported having no experience working with at least one child suspected of having or being diagnosed with APD; six respondents did not complete the section pertaining to demographic information; six respondents failed to complete the entire survey. Therefore, data from 248 completed surveys were analyzed. Emails were sent directly to 715 members of AAA who listed "Auditory Processing" as a specialty area on their member profile. Two hundred eleven surveys were completed by respondents who reported being either an audiologist or both an audiologist and speech-language pathologist based on this email invitation. The response rate for participants solicited through email was 30%. The overall response rate could not be determined due to the various forms of distribution and recruitment (i.e. posting on social media websites and ASHA community pages). Since the survey used branch and skip logic which directed respondents to different questions based on previous responses, the number of respondents per question varies slightly. For this reason, percentages for each question will be accompanied by the number of respondents in the presentation of results that follows.

A summary of the most pertinent findings is presented here. Raw data for all questions can be found in Appendix B. The results are presented in a manner that aligns with this study's research questions.

Demographic Information

Eleven respondents were both audiologists and speech-language pathologists. Respondents who were dually certified were categorized as either an audiologist or speech-language pathologist based on which profession they reported spending more time practicing in. Six respondents reported spending more time practicing as an audiologist bringing the final number of audiologist respondents to 194. Five respondents reported spending more time practicing as a speech-language pathologist bringing the final number of speech-language pathologist respondents to 54.

Responses were obtained from across the United States. Data from 46 out of 50 states were obtained (states not represented included Alaska, Delaware, Iowa, and Montana). Respondents represented a variety of workplace settings including private practices, colleges/universities, hospital/medical facilities, K-12 schools, and manufacturing centers. The frequency of workplace settings among respondents is depicted in Figure 1. Respondents reported practicing in their respective fields for anywhere from zero to 15+ years. The majority of respondents reported practicing for more than 15 years (n = 164, 62.6%).

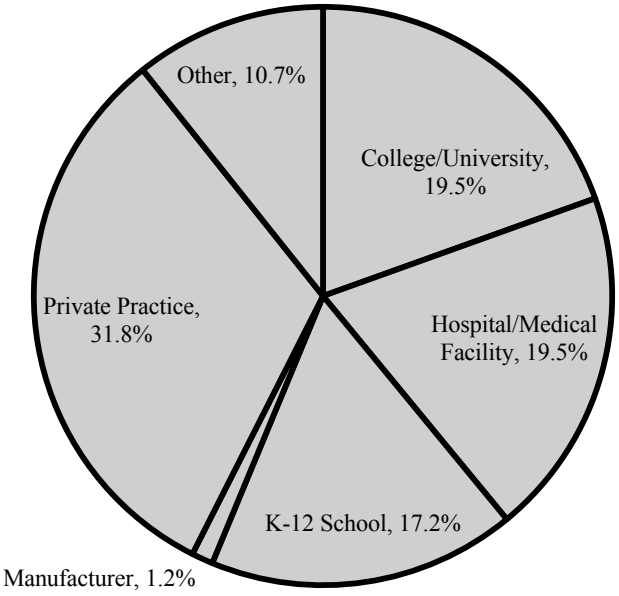

Figure 1. Workplace setting of respondents

Education of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders

Education of Audiologists in Auditory Processing Disorders

The questions asked in this section of the survey were answered only by respondents who identified themselves as audiologists (n = 194). The purpose of this section of the survey was to examine the amount, type, and source of education audiologists received with regards to APD. The majority of respondents reported taking a full course dedicated to APD during their graduate program(s) (n = 111, 57.2%). Conversely, 6.7% of respondents (n = 13) reported not learning about APD in any course(s) during their graduate program(s). Instruction focused primarily on APD assessment for 49.0% of respondents (n = 95), while 31.4% of respondents (n =61) learned about assessment and intervention for APD equally. Approximately half of the

respondents (n = 103, 53.1%) had the opportunity to complete an APD diagnostic evaluation during their graduate program(s). A similar number had the opportunity to observe an APD evaluation. Fewer respondents had the opportunity to provide intervention for a child with APD during their graduate program(s) (n = 45, 23.7%).

Respondents were asked which experience(s) contributed most to their current knowledge of APD. Multiple answers could be selected from a predetermined list and respondents could also type their own answer into a text box. These data are shown in Figure 2. Examination of Figure 2 reveals the most commonly selected answer was "on the job experience" (n = 137, 72.1%), closely followed by "continuing education training/courses" (n = 127, 66.8%). The most common added responses pertained to self-study and reading research. An overwhelming number of respondents reported completing continuing education in the area of APD since earning their highest degree (n = 176, 92.6%).

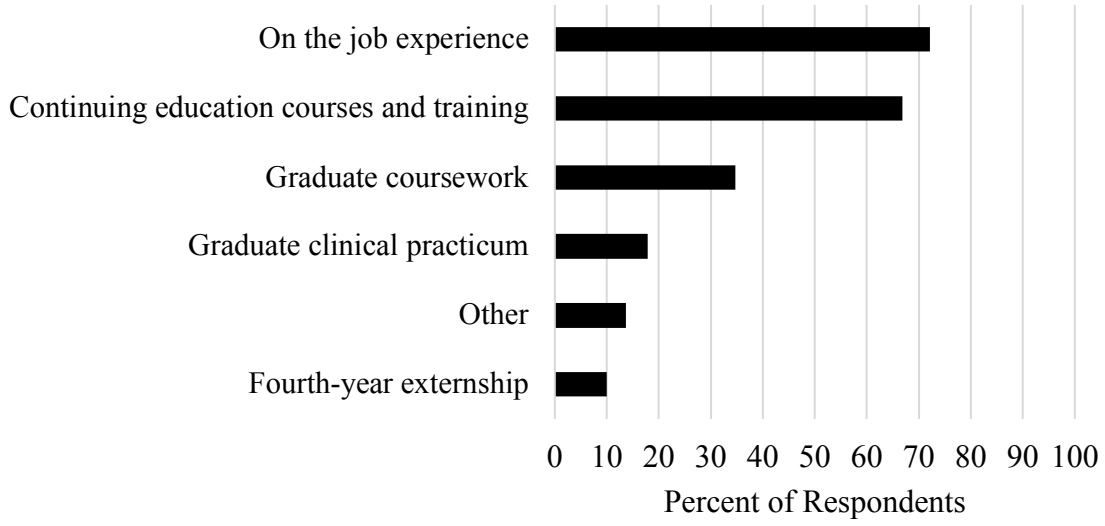

Figure 2. Experiences that contributed to audiologists' knowledge of auditory processing disorders
Note. This figure displays responses from audiologists only. Respondents were able to select all answers that applied.

This section of the survey also included questions aimed at determining the respondents' level of comfort providing specific services related to APD based on their education and training. The majority of respondents reported feeling "comfortable" to "extremely comfortable" diagnosing APD (n = 169, 89.0%), communicating assessments results to other professionals (n = 170, 89.5%), making intervention recommendations for APD (n = 160, 84.2%), and implementing environmental modifications and compensatory strategies for APD (n = 158, 83.2%). However, there was a noticeable difference in the number of respondents who felt "comfortable" to "extremely comfortable" when it comes to implementing direct remediation strategies for APD intervention (n = 88, 46.3%). Data pertaining to the respondents' level of comfort with specific tasks related to APD are shown in Table 1.

Table 1

Audiologists' Level of Comfort with Auditory Processing Disorders (APD)

	Extremely Uncomfortable and Uncomfortable		Undecided		Extremely Comfortable and Comfortable		Total
Task	n	%	n	%	n	%	n
Diagnosing APD	16	8.4	5	2.6	169	89.0	190
Communicating APD assessment results with other professionals	14	7.4	6	3.2	170	89.5	190
Making recommendations for APD intervention based on assessment results	19	10.0	11	5.8	160	84.2	190
Implementing environmental modifications and compensatory strategies for APD intervention	16	8.4	16	8.4	158	83.2	190
Implementing direct remediation for APD intervention	55	29.0	47	24.7	88	46.3	190

Respondents were asked to share any additional thoughts or comments related to their educational preparation and training that has influenced their level of comfort working with children suspected of having or diagnosed with APD. Table 2 provides sample responses given by 12 audiologists. These sample responses are considered to be representative of the most common themes that emerged from the responses.

Table 2

Influence of Audiologists' Educational Preparation for Auditory Processing Disorders (APD)

Quotes from Individual Participants
All audiologists need me to continually educate themselves on new advances in the field.
Although I took a course on APD, it was very cursory and was inadequate to prepare for actual clinical work. Most of the study came from continuing education and self-study.
I didn't really understand what APD really was until I began seeing patients and did the testing. Reading about APD and discussing it in class was pretty abstract.
Graduate program provided limited clinical experience. Most of my knowledge was acquired post-graduate through continued educational programs and hands on experience in the clinical setting.
I have had extensive continuing education and mentoring for APD assessment and have seen children for this assessment for many years. None of my knowledge came from graduate courses.
The most important knowledge comes from working with psychologists, SLPs, and other professionals to learn about the multiple assessment and other disorders that relate to APD.
Most of my information with respect to auditory processing intervention was gained by interacting with other professionals (SLPs, OTs, psychologists).
I would have liked more coursework in my graduate program dedicated to APD.
All APD education, diagnostic assessment, and intervention is influenced by the quality of research available, which is currently the biggest problem limiting APD care.
Diagnosing APD in children as we know it now was not being done in graduate school 37 years ago. I gained much of my knowledge by both purchasing textbooks on the subject and attending continuing education classes by some of our nation's top audiology experts on the subjects.
I continue reading and networking in my field and my collaborative relationships with other professionals are helpful.
During my Master's program in audiology (1988), the coursework consisted of test protocols and test interpretation. My doctoral course (circa 2009) was not much different.

Note. These are 12 examples from the 101 audiologist respondents in total who supplied comments.

Education of Speech-Language Pathologists in Auditory Processing Disorders

The questions asked in this section of the survey were answered only by respondents who identified themselves as speech-language pathologists (n = 54). The purpose of this section of the survey was to examine the amount, type, and source of education speech-language pathologists received with regards to APD. Unlike audiologist respondents, very few speech-language pathologist respondents reported taking a full course dedicated to APD during their graduate program(s) (n = 4, 7.6%). Yet, many respondents indicated they took at least one course in which some APD content was addressed (n = 35, 66.0%). Fourteen respondents (26.4%) reported they did not learn about APD in any of their graduate level courses. Of those who acknowledged receiving at least some education related to APD, 31.2% of respondents (n = 19) reported that instruction focused on assessment and intervention for APD equally. A mere 3.7% of respondents (n =2) reported instruction focused primarily on intervention. Less than half of the respondents (n = 12, 22.2%) had the opportunity to complete an APD diagnostic evaluation during their graduate program(s). A similar number had the opportunity to observe an APD evaluation. A slightly higher number of respondents had the opportunity to provide intervention for a child with APD during their graduate program(s) (n = 14, 26.9%).

Respondents were asked which experience(s) contributed most to their current knowledge of APD. Multiple answers could be selected from a predetermined list and respondents could also type their own answer into a text box. These data are shown in Figure 3. Comparable to the responses from audiologists, the most commonly selected

answer by speech-language pathologists was “on the job experience” (n = 36, 69.2%), followed by “continuing education training/courses” (n = 32, 61.5%). A large number of respondents reported completing continuing education in the area of APD since earning their highest degree (n = 41, 78.9%).

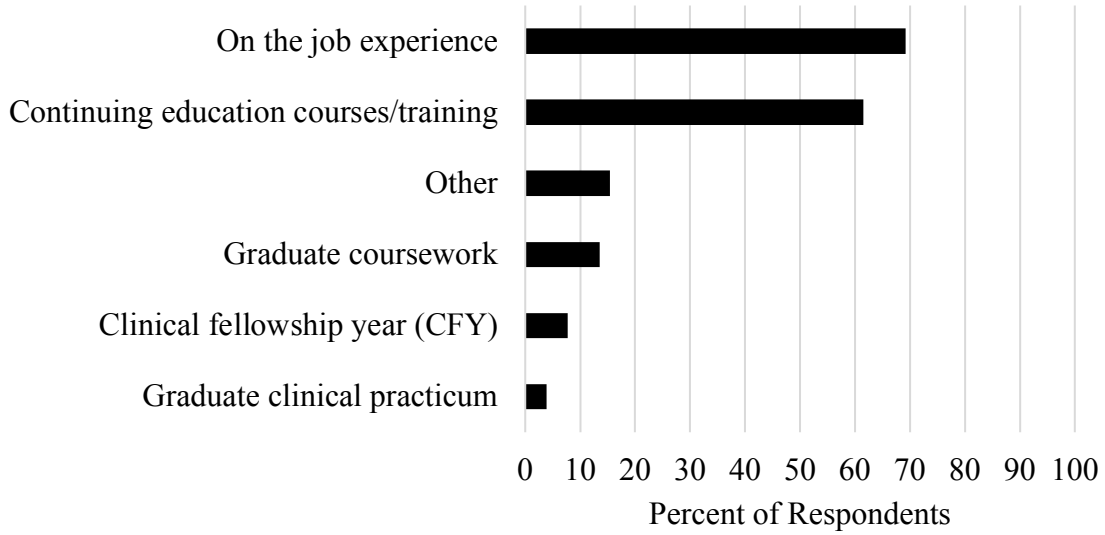

Figure 3. Experiences that contributed to speech-language pathologists’ knowledge of auditory processing disorders
Note. This figure displays responses from SLPs only. Respondents were able to select all answers that applied.

This section of the survey included questions aimed at determining respondents’ level of comfort providing specific services related to APD based on their education and training. The majority of respondents reported feeling “comfortable” to “extremely comfortable” interpreting assessment results (n = 38, 73.1%), interpreting recommendations for APD intervention (n = 42, 80.8%), implementing environmental modifications and compensatory strategies for APD (n = 40, 76.9%), and implementing direct remediation for APD intervention (n = 34, 65.4%). However, there was a slight difference in the number of respondents who felt “comfortable” to “extremely

comfortable" when it comes to making recommendations for APD intervention based on assessment results (n = 30, 57.7%). Data pertaining to the respondents' level of comfort with certain tasks related to APD are shown in Table 3.

Table 3

Speech-Language Pathologists' Level of Comfort with Auditory Processing Disorders (APD)

	Extremely Uncomfortable and Uncomfortable		Undecided		Extremely Comfortable and Comfortable		Total
Task	n	%	n	%	n	%	n
Interpreting APD assessment results	6	11.5	8	15.4	38	73.1	52
Interpreting recommendations for APD intervention made by other professionals	4	7.7	6	11.5	42	80.8	52
Making recommendations for APD intervention based on assessment results	6	11.5	16	30.8	30	57.7	52
Implementing environmental modifications and compensatory strategies for APD intervention	6	11.5	6	11.5	40	77.0	52
Implementing direct remediation for APD intervention	8	15.4	10	19.2	34	65.4	52

Respondents were asked to share any additional thoughts or comments related to their educational preparation and training that has influenced their level of comfort working with children suspected of having or diagnosed with APD. Table 4 provides sample responses given by five speech-language pathologists. These sample responses are considered to be representative of the most common themes that emerged from the responses.

Table 4

Influence of Speech-Language Pathologists' Educational Preparation for Auditory Processing Disorders (APD)

Quotes from Individual Participants
Graduate coursework was just surface talk. It is my self-education through continuing education, reading books and articles, and my collaboration with our educational audiologist and the audiologist that does the APD evaluations that has increased my comfort level.
I feel that I have had to learn about APD on the job and am constantly trying to get and stay ahead of the curve.
I feel like I received a lot of information about how the brain process[es] speech sounds but did not receive much information about how to conduct an assessment for a child suspected of having an auditory processing disorder or guidance on what best practice is for treatment decisions.
Because I went to graduate school in the dark ages, when analog hearing aids were the rage, nothing was said or done about APD.
APD was not covered in classes.

Note. These are 5 examples from the 31 SLP respondents in total who supplied comments.

Comparison of the Education of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders

Several questions were asked of both audiologists and speech-language pathologists so that responses could be compared across professions. Table 5 displays

data collected from each professional group regarding the academic coursework related to APD completed during graduate program(s). Slightly more than half of the audiologists surveyed reported taking a full course dedicated to APD (n = 111, 57.2%), while very few of the speech-language pathologists surveyed answered in a similar manner (n = 4, 7.6%). To examine the type of information about APD audiologists and speech-language pathologists reported receiving during their graduate program(s), respondents were asked, "Which statement best describes your academic coursework related to auditory processing disorders (APD) during your graduate program(s)?" Table 6 displays the responses from both audiologists and speech-language pathologists. Slightly less than half of the audiologists surveyed reported information presented about APD focused primarily on assessment (n = 95, 49.0%). Even fewer audiologists reported information presented about APD focused equally on assessment and intervention (n = 61, 31.4%).

Table 5

Amount of Graduate Coursework Related to Auditory Processing Disorders (APD)

	Audiologists		SLPs	
Response	n	%	n	%
I took a full course dedicated to APD during graduate program	111	57.2	4	7.6
I took a course in which some APD content was addressed	70	36.1	35	66.0
I did not learn about APD in any courses during graduate program	13	6.7	14	26.4

Note. This table displays responses from both audiologists and SLPs.

Table 6

Focus of Graduate Coursework Related to Auditory Processing Disorders (APD)

	Audiologists		SLPs	
Response	n	%	n	%
Information presented about APD focused primarily on assessment.	95	49.0	3	5.6
Information presented about APD focused primarily on intervention.	2	1.0	2	3.7
Information presented about APD focused equally on assessment and intervention.	61	31.4	19	35.2
Limited information was presented about APD.	36	18.6	30	55.6

Note. This table displays responses from both audiologists and SLPs.

Clinical Practices of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders

Clinical Practices of Audiologists in Auditory Processing Disorders

The questions asked in this section of the survey were answered only by respondents who identified themselves as audiologists (n = 194). The purpose of this section of the survey was to examine current clinical practices of audiologists with regards to diagnosing and providing intervention for APD. The majority of respondents reported that less than 25% of their caseload is dedicated to the evaluation of children suspected of having APD (n = 142, 76.9%). An even greater number of respondents reported that less than 25% of their caseload is dedicated to providing intervention for children diagnosed with APD (n = 177, 95.2%).

Diagnosing auditory processing disorders. Respondents were asked to select all professionals that are qualified to make a diagnosis of APD from a predetermined list. The vast majority of respondents selected "audiologists" (n = 177, 96.2%). Other professionals chosen included "multidisciplinary team" (n = 49, 26.6%) and "speech-language pathologist" (n = 28, 15.2%). As a follow-up question, respondents were asked how frequently they use a multidisciplinary team approach to differentially diagnose APD. The responses varied. The most chosen response was "often" (n = 59, 32.1%), followed by "always" (n = 51, 27.2%). Sixteen respondents (8.7%) reported they "never" use a multidisciplinary approach to diagnosis APD.

Given a list of potential factors, respondents were asked to select any and all choices that prevented them from evaluating APD. In order from most selected to least selected, respondents indicated the following factors: "reimbursement issues" (n = 56, 56.0%); "too much time required to test" (n = 29, 29.0%); "availability of resources (i.e. test materials)" (n = 16, 16.0%); "workplace policies and/or procedures" (n = 15, 15.0%); "lack of training" (n = 9, 9.0%). In addition, respondents were able to type in individual comments regarding other factors that prevented them from evaluating APD. Table 7 provides sample responses from three audiologists with additional obstacles.

Table 7

Factors that Prevent Audiologists from Evaluating for Auditory Processing Disorders (APD)

Quotes from Individual Participants
Find little help out of diagnosis.
Concomitant diagnosis of referred students.
Lack of referrals.

Note. These are 3 examples from the 28 audiologist respondents who chose "Other (please describe)."

Recommending intervention strategies for auditory processing disorders. Respondents were also asked to select all professionals that are responsible for recommending intervention strategies. The majority of respondents selected "audiologists" (n = 166, 90.2%). Other professionals chosen included "speech-language pathologists" (n = 114, 61.7%) and "multidisciplinary team" (n = 88, 47.8%).

Implementing intervention strategies for auditory processing disorders. Respondents were asked whether they use a multidisciplinary team approach to provide intervention for APD. Responses once again varied. The most selected response was "often" (n = 61, 34.3%), followed by "always" (n = 45, 25.3%). Sixteen respondents (9.0%) reported they "never" use a multidisciplinary team approach to provide intervention for a child with APD.

In order to gain further insight into the current clinical practices of audiologists, respondents were asked which professional(s) were responsible for implementing specific intervention strategies. More than half of the audiologists reported being responsible for implementing the following interventions: auditory training/direct remediation (n = 130, 70.7%); FM system (n = 180, 97.8%); other environmental strategies (n = 157, 85.3%);

other compensatory strategies (not metalinguistic or metacognitive strategies; n = 136, 73.9%). More than half of the audiologists indicated speech-language pathologists are responsible for implementing the following interventions: auditory training/direct remediation (n = 163, 88.6%); other environmental strategies (not FM systems; n = 132, 71.7%); metacognitive strategies (n = 161, 87.5%); metalinguistic strategies (n = 179, 97.3%); other compensatory strategies (not metalinguistic or metacognitive strategies; n = 162, 88.0%). More than half of the audiologists reported professionals other than the audiologist and speech-language pathologist are responsible for implementing the following interventions: other environmental strategies (not FM systems; n = 103, 56.0%); metacognitive strategies (n = 119, 64.7%); other compensatory strategies (not metalinguistic or metacognitive strategies; n = 133, 72.3%).

Respondents were also asked what factors prevented them providing intervention for children diagnosed with APD. Respondents could select as many choices as desired from a list of possible factors. In order of most selected to least selected, respondents chose the following factors: “reimbursement issues” (n = 79, 51.6%); “lack of training” (n = 54, 35.3%); “availability of resources (i.e. therapy materials)” (n = 44, 28.8%); “workplace policies and/or procedures” (n = 38, 24.8%); “questionable efficacy of treatment options” (n = 35, 22.9%). In addition, respondents were able to type in individual comments regarding other factors that prevented them from providing intervention for APD. Table 8 provides sample responses from five audiologists who offered additional obstacles.

Table 8

Factors that Prevent Audiologists from Providing Intervention for Auditory Processing Disorders (APD)

Quotes from Individual Participants
The controversy related to APD including uninformed opinions.
Lack of proven efficacy of treatment.
We have SLPs on staff to do intervention.
Lack of interest.
Cost/benefit ratio for families and amount of time they need to dedicate.

Note. These are 5 examples from the 36 audiologist respondents who chose "Other (please describe)."

Clinical Practices of Speech-Language Pathologists in Auditory Processing Disorders

The questions asked in this section of the survey were answered only by respondents who identified themselves as speech-language pathologists (n = 54). The purpose of this section of the survey was to examine current clinical practices of speech-language pathologists with regards to providing intervention for APD. The majority of respondents reported that less than 25% of their caseload is dedicated to the evaluation of children suspected of having APD (n = 42, 82.4%).

Diagnosing auditory processing disorders. Respondents were asked to select all professionals that are qualified to make a diagnosis of APD from a predetermined list. The vast majority of respondents selected "audiologists" (n = 48, 94.1%). Other professionals chosen included "multidisciplinary team" (n = 13, 25.5%) and "speech-language pathologists" (n = 7, 13.7%).

Recommending intervention strategies for auditory processing disorders. Respondents were asked to select all professionals that are responsible for recommending intervention strategies. The majority of respondents selected "audiologists" (n = 45, 88.2%). Other professionals chosen included "speech-language pathologists" (n = 41, 80.4%) and "multidisciplinary team" (n = 21, 41.2%).

Implementing intervention strategies for auditory processing disorders. Respondents were asked whether they use a multidisciplinary team approach to provide intervention for APD. Responses varied. The most chosen response was "always" (n = 19, 40.4%), followed by "sometimes" (n = 11, 23.4%). Three respondents (6.4%) reported they "never" use a multidisciplinary team approach to provide intervention for a child with APD.

In order to gain further insight into the current clinical practices of speech-language pathologists, respondents were asked which professional(s) were responsible for implementing specific intervention strategies. More than half of the speech-language pathologists reported being responsible for implementing the following interventions: auditory training/direct remediation (n = 43, 91.5%); FM systems (n = 30, 63.8%); other environmental strategies (not FM systems; n = 43, 91.5%); metacognitive strategies (n = 47, 100.0%); metalinguistic strategies (n = 47, 100.0%); other compensatory strategies (not metalinguistic or metacognitive strategies; n = 47, 100.0%). More than half of the speech-language pathologists indicated audiologists are responsible for implementing the following interventions: auditory training/direct remediation (n = 28, 59.6%); FM systems (n = 42, 89.4%); other environmental strategies (FM systems; n = 35, 74.5%); other compensatory strategies (not metalinguistic or metacognitive strategies; n =27,

57.5%). More than half of the speech-language pathologists reported professionals other than the audiologist and speech-language pathologist are responsible for implementing the following interventions: other environmental strategies (not FM systems; n = 25, 53.2%); other compensatory strategies (not metalinguistic or metacognitive strategies; n = 31, 66.0%).

Given a list of potential factors, respondents were asked to select any and all choices that prevented them from providing intervention for children diagnosed with APD. In order from most selected to least selected, respondents indicated the following factors: "questionable efficacy of treatment options" (n = 19, 57.6%); "availability of resources (i.e. therapy materials)" (n = 15, 45.5%); "lack of training" (n = 12, 36.4%); "reimbursement issues" (n = 5, 15.2%); "workplace policies and/or procedures" (n = 4, 12.1%).

Respondents were asked to share any additional thoughts or comments related to their clinical practices and/or experiences working with children with APD. Table 9 provides sample responses given by four speech-language pathologists.

Table 9

Additional Comments from Audiologists' Regarding Clinical Practices for Auditory Processing Disorders (APD)

Quotes from Individual Participants
APD is something I think is often misdiagnosed, as well as underdiagnosed.
Most of the children on my caseload with APD have other diagnoses as well which makes it difficult to sort out evidence-based strategies when other factors (ADHD, Autism, Specific Learning Disability, Dyslexia) are at play.
APD is not recognized in our public school system therefore, if language scores support weaknesses, the child is diagnosed with a language disorder.
I think it is important that more information regarding the efficacy of treatment options be more widely publicized.

Note. These are 4 examples from the 14 SLP respondents in total who supplied comments.

Comparison of the Clinical Practices of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders

Figure 4 displays the percent of audiologists and speech-language pathologists who selected which professionals are qualified to make a diagnosis of APD. Respondents were able to select multiple answers. Both audiologists and speech-language pathologists selected "audiologists" most frequently, followed by "multidisciplinary team." These results show a shift in clinical practices when compared to results of the Emanuel et al. (2011) study in which audiologist respondents selected "audiologist" most frequently, followed by "speech-language pathologist."

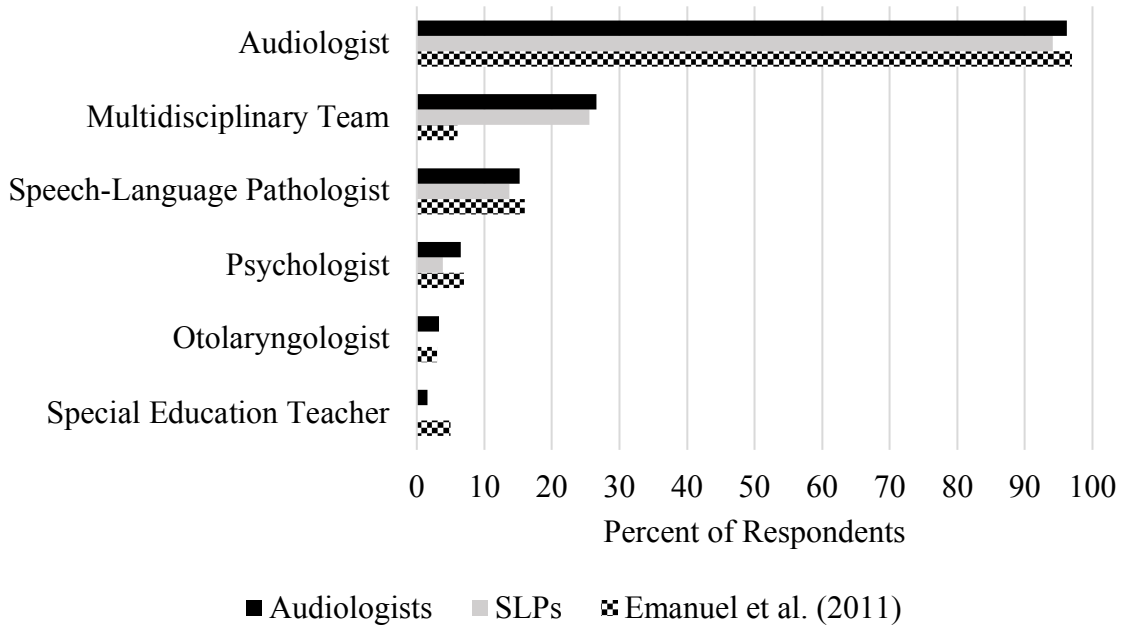

Figure 4. Professionals qualified to diagnosis auditory processing disorders
Note. This figure displays responses from audiologists and SLPs. Respondents were able to select all answers that applied. Data from Emanuel et al. (2011) are also displayed.

Figure 5 shows the percent of audiologists and speech-language pathologists who selected which professionals are responsible for recommending intervention strategies for children with APD. Respondents were able to select all answers that applied. Both audiologists and speech-language pathologists selected "audiologists" most frequently, followed by "speech-language pathologists," followed by "multidisciplinary team."

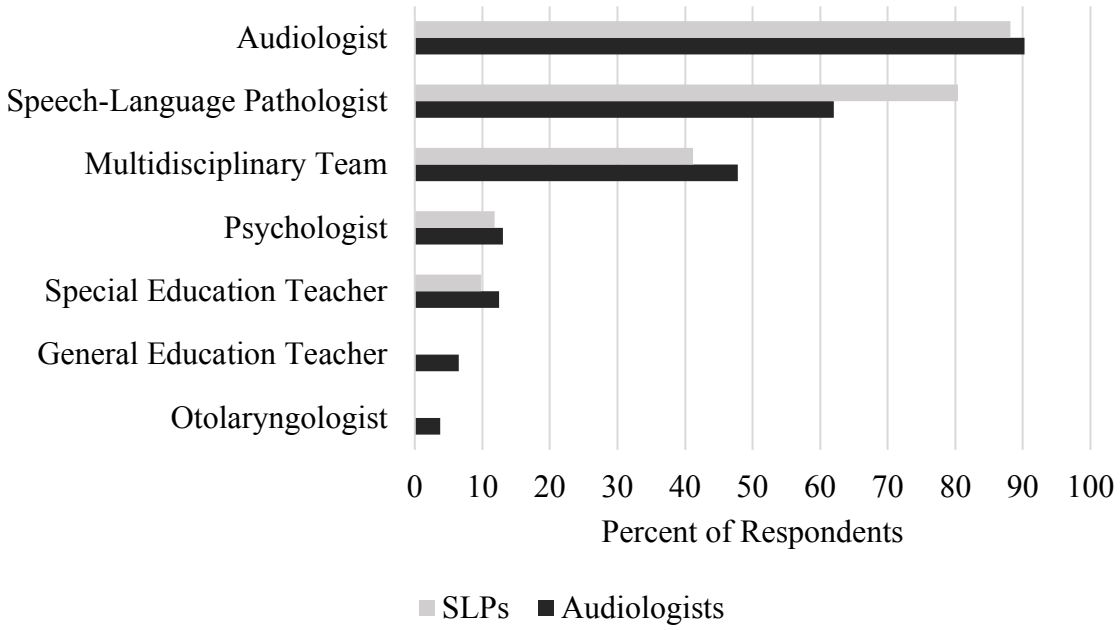

Figure 5. Professionals responsible for recommending intervention for auditory processing disorders
Note. This figure displays responses from audiologists and SLPs. Respondents were able to select all answers that applied.

Due to the fact that a large percentage of audiologists and speech-language pathologists feel multidisciplinary teams are qualified to diagnosis and recommend intervention for APD, it is worth examining which professionals comprise multidisciplinary teams. Figure 6 displays the data obtained in response to this question.

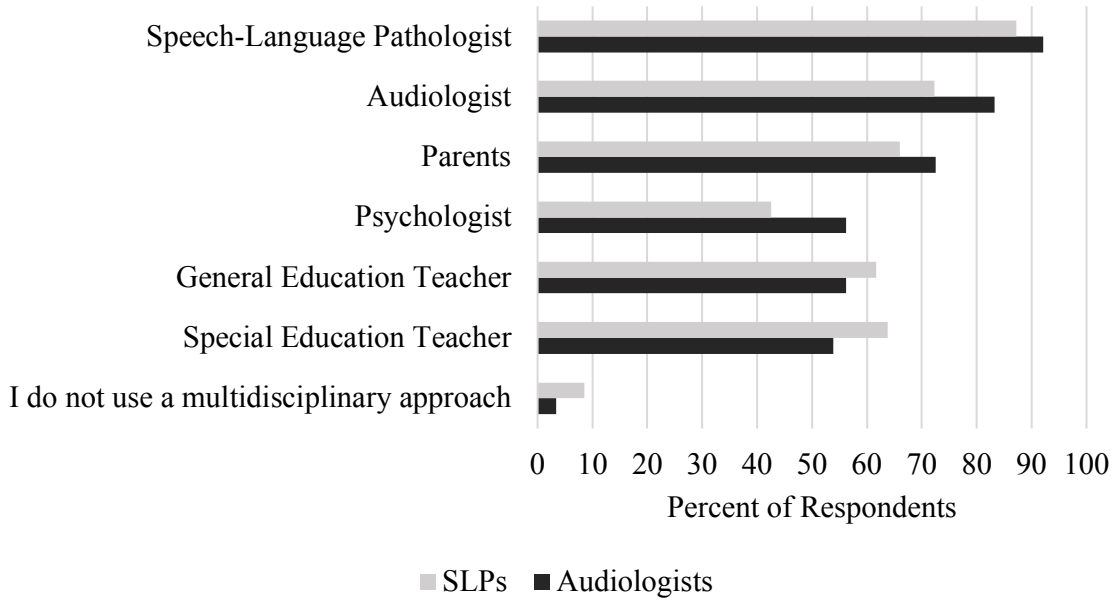

Figure 6. Members of the multidisciplinary team for auditory processing disorders
Note. This figure displays responses from audiologists and SLPs. Respondents were able to select all answers that applied.

Factors that audiologist respondents identified as preventing them from evaluating APD are shown in Figure 7. Factors selected by audiologists and speech-language pathologists which prevent them from providing intervention for APD are displayed in Figure 8.

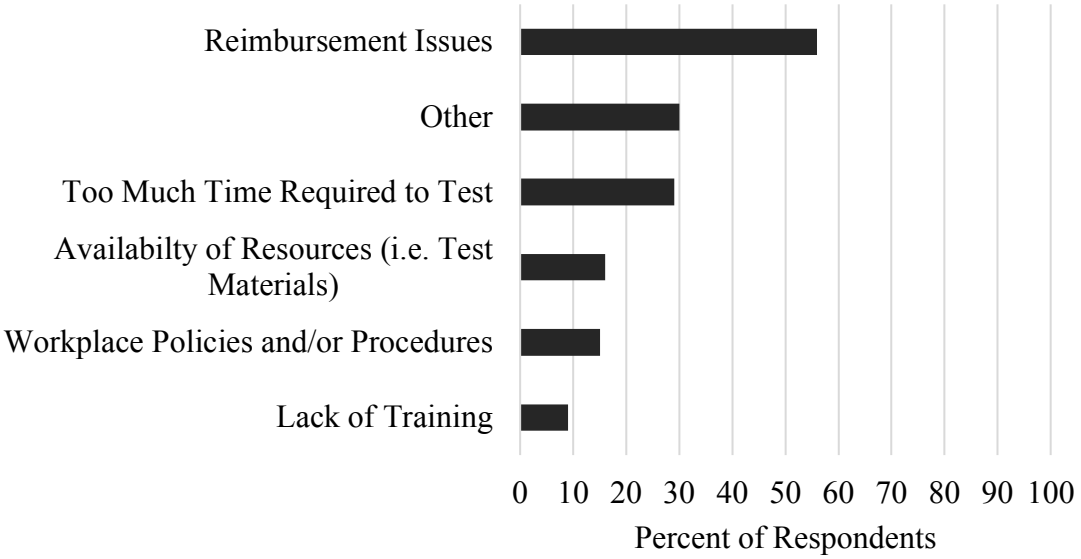

Figure 7. Factors that prevent the evaluation of auditory processing disorders
Note. This figure displays responses from audiologists only. Respondents were able to select all answers that applied.

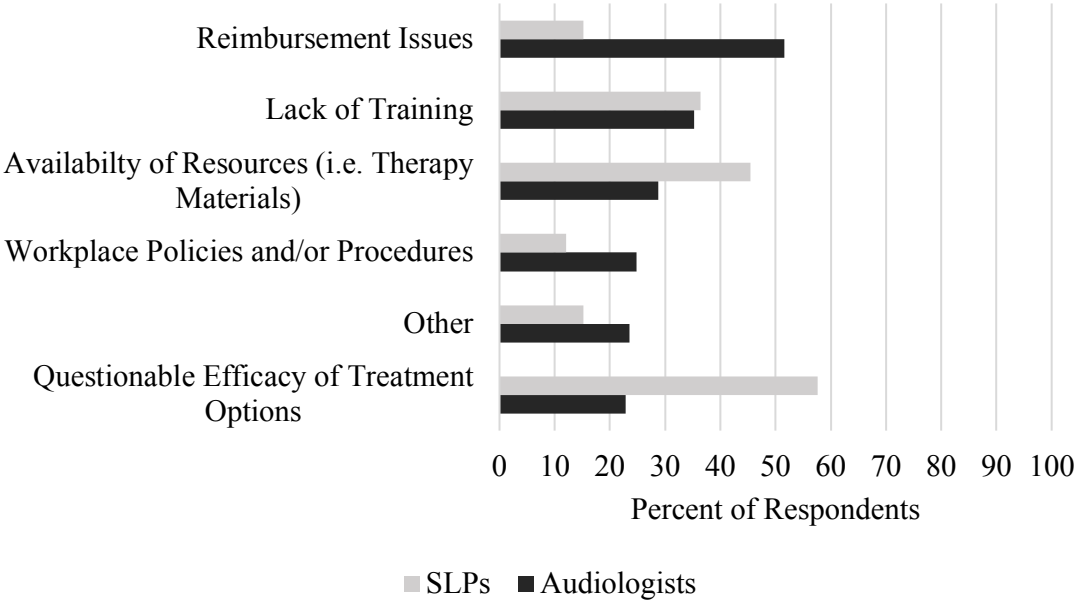

Figure 8. Factors that prevent intervening for auditory processing disorders
Note. This figure displays responses from audiologists and SLPs. Respondents were able to select all answers that applied.

Collaboration Between Audiologists and Speech-Language Pathologists

Some questions asked in this section of the survey were answered only by audiologists, while other questions were answered only by speech-language pathologists. There were also several questions directed to participants from both professions. The purpose of this section of the survey was to gain an understanding of the current collaboration routines of audiologists and speech-language pathologists and to identify factors which contribute to and barriers which prevent successful collaboration.

Frequency of Collaboration Between Audiologists and Speech-Language Pathologists

When asked, "How often do you collaborate with the audiologist/speech-language pathologist about the care of a child with an auditory processing disorder (APD)?" the majority of respondents reported collaborating "as needed" rather than on a regular basis. Approximately 40% of respondents (n = 87), representing both audiologists and speech-language pathologists, reported collaborating the same amount for children with APD as for other children on their caseload. Approximately 30% of respondents (n = 66) tend to collaborate more often about a child with APD. Respondents were asked how often they collaborate with each other on specific tasks. Audiologists reported varied results for how often they make a diagnosis of APD in collaboration with the speech-language pathologist. The majority of respondents answered "sometimes" (n = 48, 29.6%) with 32.7% of respondents (n = 53) reporting more frequently than "sometimes" and 37.6% of respondents (n = 61) reporting less frequently than "sometimes." A much smaller percentage of respondents, which included both audiologists and speech-language pathologists, indicated they "always" write goals in collaboration with the other

professional (n = 22, 9.9%) and "always" provide intervention for APD in collaboration with the other professional (n = 16, 7.2%). When asked how effective collaboration with the other professional has been in the past, the majority of respondents reported either "undecided" or "effective" (n = 165, 79.9% combined).

Forty percent of audiologist and speech-language pathologist respondents (n = 87) reported collaborating the same amount for children with APD as for other children on their caseload. Thirty percent of respondents (n = 66) tend to collaborate more often about a child with APD than other children on their caseload.

Thirty-two percent of audiologists (n = 53) reported they "always" or "often" make a diagnosis of APD in collaboration with a speech-language pathologist. Twenty-seven percent of audiologist and speech-language pathologist respondents (n = 60) reported they "always" or "often" write goals in collaboration with one another and 19.4% of audiologists and speech-language pathologists respondents (n = 43) reported they "always" or "often" provide intervention in collaboration with one another.

Collaboration with professionals other than an audiologist or speech-language pathologist is equally as important. Slightly greater than half of the respondents reported collaborating with other professionals on a regular basis to discuss the care of a child with APD. These "other professionals" included parents (n = 87, 75.0%), special education teachers (n = 83, 71.6%), general education teachers (n = 78, 67.2%), and psychologists (n = 64, 55.2%). Several respondents chose to list additional professional(s) with whom they collaborate with on a regular basis regarding APD. Answers included occupational therapists, school administrators, and pediatricians.

Methods of Collaboration

Audiologist and speech-language pathologist respondents were asked to rank their preferred means of communication with one another. Email and conversations over the phone were the most preferred methods (n = 86, 39.6% and n = 52, 24.0%, respectively). Some respondents reported use of standardized and/or self-developed tools to guide collaboration (n = 60, 29.4%), however, many respondents reported not using any tools (n = 95, 46.6%).

Topics of Collaboration

Audiologists were asked what type of information they share with speech-language pathologists. Respondents were able to select all choices that were applicable. In order from most shared to least shared were the following: performance results from all tests that were administered (n = 144, 88.9%); detailed explanation of clinical impressions (n = 134, 82.7%); a description of all diagnostic tests administered (n = 128, 79.0%); brief summary of clinical impressions (n = 54, 33.3%); performance results (scores) from some tests that were administered (n = 46, 28.4%). Likewise, speech-language pathologists were asked to select which information was shared with them by the audiologist. They reported the same type of information is shared with them with similar frequency as to what the audiologists reported.

Conversely, speech-language pathologists were asked what type of information they share with audiologists. Respondents were able to select all applicable choices. In order from most shared to least shared were the following: an informal summary of progress (n = 28, 68.3%); a formal progress report (n = 26, 63.4%); therapy session data (n = 15, 36.6%); and lesson plans (n = 9, 22.0%).

Factors that Contribute to Successful Collaboration

The respondents were asked what factors they felt contributed to successful collaboration. They were able to select multiple answers. Results of this question are displayed in Figure 9. The most common factors selected included competency of other professional(s) (n = 161, 78.9%), availability of other professional(s) (n = 141, 69.1%), and preparedness of other professional(s) (n = 114, 58.9%). Factors that more than 50% of respondents felt contribute to successful collaboration are all related to quality of the interaction between professionals. Examples include the education and training and the interpersonal skills of the other professional. If respondents had additional factors that they felt contribute to successful collaboration, they were asked to share. The willingness of other professionals to collaborate was the most commonly added response.

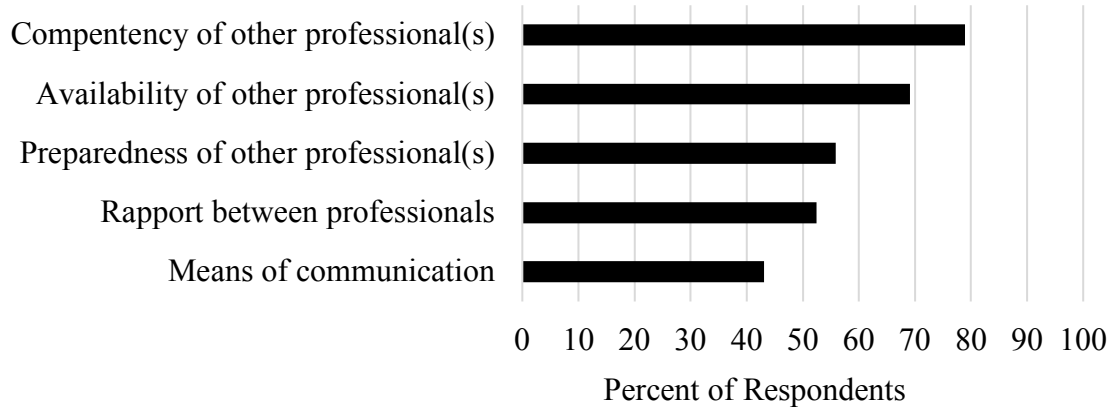

Figure 9. Factors that contribute to successful collaboration
Note. This figure displays responses from audiologists and SLPs. Respondents were able to select all answers that applied.

Audiologist and speech-language pathologist respondents were asked, “Are there any strategies/techniques you would like to share that have worked well when

collaborating with other professionals for the care of a child with APD?" A text box allowed respondents to share as much or as little as they wished. Table 10 provides a sampling of responses given by the eight respondents who supplied comments.

Table 10

Additional Strategies that Contribute to Successful Collaboration

Quotes from Individual Participants
Tracking page- each child has a notebook that other professionals can place information and data in and that is brought to my office. There I can also put my comments, observations, testing updates. It is then returned to the school for other professionals to review.
Educate, communicate, explain roles clearly but do not get into a "turf battle."
Clearly explain the strategies in writing and in person. Provide demonstration and specific examples.
Setting an exact time in your schedule and their schedule to chat.
Sometimes it works well to empower the parents as a go between.
Get the parents involved. The more they push everyone in the child's circle of care, the better.
Respecting the knowledge of the child other professionals have gained through working with the student.
Spend time discussing the nature of the results and how they impact the child in the classroom, environmentally, etc. and the rationale behind recommendations is important.

Note. These are 8 examples from the 51 audiologist and SLP respondents in total who supplied comments.

Audiologist and speech-language pathologist respondents were then asked, "Are there any other thoughts or comments you would like to share regarding your experiences collaborating with other professionals for the care of a child with APD?" Again, respondents were able to provide as much or as little information as they wished into a

text box. Table 11 provides a sampling of responses given by the five respondents who supplied comments.

Table 11

Additional Comments Regarding Collaborative Experiences

Quotes from Individual Participants
Collaboration and how to get started should be taught in AuD programs with many opportunities to practice this very important skill.
I think the information I present is usually well-received. However, without having APD as a standalone, recognized disability, it is difficult to always provide the interventions that may be necessary for a particular student.
I feel one of the biggest barriers for everyone is time. There just simply isn't enough time to collaborate effectively and implement recommendations to their full potential.
We need to drop the APD terminology and treat specific deficiencies. The term "APD" is too east for parents and SLPs to use incorrectly.
Issues of scope of practice can interfere with respect and collaboration.

Note. These are 5 examples from the 43 audiologist and SLP respondents in total who supplied comments.

Barriers to Successful Collaboration

The respondents were asked what potential barriers exist that impact their ability to collaborate. They were able to select multiple answers. Results of this question are displayed in Figure 10. The most common barriers selected included time (n = 134, 65.7%), availability of other professional(s) (n = 115, 56.4%), and lack of education and training (n = 103, 50.5%). Barriers that more than 50% of respondents felt prevent successful collaboration are primarily related to logistics. Examples included time and the availability of the other professional(s). Respondents were asked to share any additional barriers that they felt prevent successful collaboration. The distance between

professionals and lack of follow-through of professionals were the most commonly added response.

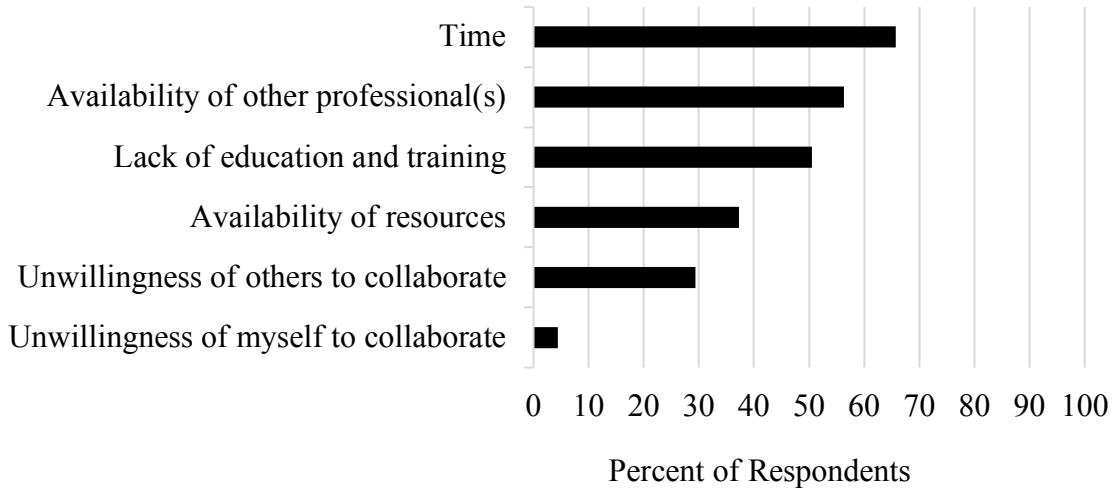

Figure 10. Barriers to effective collaboration
Note. This figure displays responses from audiologists and SLPs. Respondents were able to select all answers that applied.

Respondents were asked what tools/resources would be most helpful when collaborating with other professionals in hopes of determining ways to overcome barriers that prevent successful collaboration. The most common tools/resources selected included more education and training during graduate programs (n = 64, 31.4%), more opportunities for continuing education (n = 64, 31.4%), and clearly defined roles for all professionals (n = 53, 26.0%). Respondents were able to type in additional tools/resources that would be helpful. The most recurring response pertained to having a clearer definition of APD and more universal acceptance of APD as a true disorder among professionals.

CHAPTER V

DISCUSSION

The present study was conducted to describe the education, clinical practices, and collaboration routines of audiologists and speech-language pathologists when working with children suspected of having or diagnosed with APD. A survey was distributed to both audiologists and speech-language pathologists to gather information on the aforementioned topics. Overall, the findings revealed vast differences in the education, clinical practices, and collaboration routines both between and among the two professional groups. Variations in the knowledge and experiences of professionals likely translates to the type and quality of services children with APD receive and are therefore, important to discuss. Responses to survey questions are discussed in a manner that aligns with this study's research questions.

Education of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders

Several questions in the survey used for the present study inquired about the education and training audiologists and speech-language pathologists receive in the area of APD. The results suggest that graduate programs for both audiologists and speech-language pathologists vary greatly in terms of the emphasis placed on incorporating APD into the curriculum. Given the complex nature of APD, it is reasonable to think that anything less than an entire course dedicated to APD would not allow for the in-depth

study of the CANS, typical auditory processing skills, evaluation procedures, interpretation of results, and management techniques necessary to understand APD and its implications.

Respondents were asked about their academic coursework related to APD during their graduate program (Table 5). Fifty seven percent of audiologists (n = 111) indicated that they were enrolled in at least one full course dedicated to APD. These results are promising when compared to responses obtained by Chermak et al. (1998) in which 20%) of audiologists (n = 35) indicated they took at least one course explicitly dedicated to APD. Also worth noting is that approximately seven percent of audiologists (n = 13) reported not learning about APD in any courses during their graduate program. This finding is assuring when compared to the findings of Chermak et al. (1998) in which 80% of respondents reported they had not taken any coursework dedicated solely to APD. This comparison shows a positive change in the education of audiologist receive with regards to APD over the last 20 years. This change can be partially attributed to the transition of audiology graduate programs from a Master's degree to a Doctoral degree. It can also be partially attributed to the fact that research on APD has expanded and evolved over the past several years. Existing literature has led to new discoveries and new interest in APD over time. Nonetheless, if audiologists and speech-language pathologists are the primary professionals involved in the care of children with APD, the number of respondents who did not learn about APD in any courses during their graduate program(s) should be minimal and continue to decrease over time.

Eight percent of speech-language pathologists (n = 4) indicated that they were enrolled in at least one full course dedicated to APD during their graduate program

(Table 5). Historic data do not exist to compare possible changes in the percent of speech-language pathologists who took an entire course dedicated to APD over time. A small percent of speech-language pathologists responded that they took an entire course dedicated to APD. One possible explanation for this small percent is that the education and training speech-language pathologists receive related to intervention for APD in graduate programs is embedded within the broader context of language intervention. The data obtained are in agreement with this statement as 66% of speech-language pathologist respondents indicated they took a course in which some APD content was addressed. However, APD is not a language disorder and must be differentiated from a true language disorder during the diagnostic process. Unique intervention approaches must be employed when a child present with true auditory processing difficulties.

Another interesting finding from this section of the survey is the type of information about APD that audiologists and speech-language pathologists reported receiving during their graduate program(s). Just under half of the audiologist respondents (n = 95, 49%) indicated information presented on APD during their graduate program focused primarily on assessment of APD (Table 6). According to the AAA (2010) and ASHA (2005) guidelines for APD, audiologists are the primary professional to diagnose APD and it is within their scope of practice to provide intervention for APD as well. For this reason, these numbers are expected to be much higher. Similarly, it is within the scope of practice of speech-language pathologists to provide intervention for APD and speech-language pathologists are often thought to be the primary professional involved in intervention (ASHA, 2005). Yet, only 3.7% of the speech-language pathologists (n = 2) surveyed reported information presented on APD during their graduate program focused

primarily on intervention. Again, these numbers are much lower than anticipated and are cause for concern.

It is not the purpose of the current study to blame graduate programs for not providing sufficient training in the area of APD, but rather, to call attention to the fact that APD often receives less attention than other areas within audiologists' and speech-language pathologists' scopes of practice. Self-study and continuing education are necessary for professionals who are likely to encounter children suspected of having or diagnosed with APD in their practice. Both self-study and continuing education were reoccurring themes that emerged throughout the corresponding section of the survey indicating many professionals are aware of the need to fill in any gaps they may have pertaining to APD diagnosis and intervention by staying up-to-date on research and literature.

Clinical Practices of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders

Several questions in the survey used for the present study pertained to the current clinical practices of audiologists and speech-language pathologists in the area of APD. In order to provide an adequate and appropriate continuum of care to children with APD, the roles and responsibilities of all professionals involved must be established and agreed upon.

As seen in Figure 4, the results of the current survey indicate that the majority of audiologists and speech-language pathologists (n = 177; 96%) are in agreement with guidelines published by AAA (2010) and ASHA (2005) which suggest audiologists are the primary professional to diagnosis APD. These findings are consistent with results of the Emanuel et al. (2011) survey in which 97% of respondents (n = 190) indicated

audiologists were qualified to make a diagnosis of APD. There were a fair number of respondents who selected professionals other than audiologists and multidisciplinary teams as being qualified to diagnosis APD (i.e. speech-language pathologists, psychologists, otolaryngologists, special education teachers). It is unclear whether respondents chose these other professionals due to the contribution they make to the body of evidence gathered during the evaluation process, or whether they truly believe these other professionals can diagnose APD.

Audiologists and speech-language pathologists were also asked which professional(s) are responsible for recommending intervention after a child is diagnosed with APD (Figure 5). First, a considerably large percent of speech-language pathologists indicated that they are responsible for recommending intervention strategies for children with APD. This finding is interesting considering only 57.7% of speech-language pathologists (n = 30) reported feeling "comfortable" or "extremely comfortable" making recommendations for APD intervention based on assessment results in a previous question. Forty-three percent of speech-language pathologists (n = 22) reported feeling "extremely uncomfortable," "uncomfortable," or "undecided" to the same question. Second, a small number of audiologist respondents selected general-education teachers and otolaryngologists as being responsible for recommending intervention strategies for children with APD. No speech-language pathologist respondents selected either of these two professionals.

Also, similar to the guidelines published by AAA (2010) and ASHA (2005), both audiologist and speech-language pathologist respondents answered that speech-language pathologists are the primary professional to provide intervention for children with APD,

including direct remediation through auditory training, metacognitive strategies, metalinguistic strategies, and compensatory strategies. However, respondents indicated providing intervention through the use of an FM system and counseling on environmental strategies is primarily the responsibility of audiologists. These findings indicate that providing intervention for APD appears to be thought of as a shared role spanning both professions, making collaboration across professions that much more important.

This study places emphasis on the importance of audiologists and speech-language pathologists for the care of children with APD. However, due to the complex nature of APD, the inclusion of other professional groups in the continuum of care for children with APD is extremely important. It is clear from the data in Figure 6 that audiologists and speech-language pathologists tend to seek the knowledge and expertise of each other for support. The data also suggest the parents of children with APD are frequently included as part of the multidisciplinary team. The frequent inclusion of parents is a positive finding not only because the needs and beliefs of parents are important to consider during any intervention program, but also because parents may have to take on the role of liaison between professionals if their child was diagnosed in one setting (e.g. private practice) but receives services in another setting (e.g. K-12 schools).

The data obtained from this question also reveal that a slightly higher percentage of speech-language pathologists tend to include general-education teachers and special-education teachers as a part of the multidisciplinary team. It is possible this finding is attributed to differences in workplace settings of the respondents. For instance, speech-language pathologists who work in K-12 schools often spend more time at a specific

school than audiologists, as audiologists more often travel between several schools. Therefore, it is plausible to think that speech-language pathologists have more direct access to other professionals which may influence who is considered on their multidisciplinary team.

Another important finding that came out of the section of the survey pertaining to current clinical practices related to APD was the identification of factors that prevent professionals from evaluating and providing intervention for APD. According to the data, reimbursement issues are the biggest factor with just over half of both audiologist and speech-language pathologist respondents selecting "reimbursement issues" as a deterrent to evaluating for APD (Figures 7 and 8). "Reimbursement issues" was selected most frequently by audiologists, followed by "lack of training." Factors selected most frequently by speech-language pathologists were "questionable efficacy of treatment options," followed by "availability of resources (i.e. therapy materials)." These findings highlight a need for future research to focus on evidence-based approaches for remediating specific deficits associated with auditory processing.

A broader look at the results presented in Figures 7 and 8 shows lack of a clear pattern in the selection by respondents. The data suggest audiologists and speech-language pathologists face a wide range of obstacles related to providing care for children with APD. Additionally, each professional group faces their own unique set of obstacles and challenges. This likely further complicates the quality and continuum of care children with APD receive. Perhaps contributing to the lack of clear, established practice patterns of both audiologists and speech-language pathologists in the care of children with APD is the amount of time dedicated to APD in their typical clinical routine. Data obtained in

response to the question, "What percentage of your caseload is dedicated to the evaluation of children suspected of having an auditory processing disorder (APD)?" revealed APD constitutes a small percentage of both audiologists' and speech-language pathologists' caseloads. The majority of audiologists (n = 142, 76.9%) dedicate less than 25% of their caseload to the evaluation of children suspected of having APD. Ninety-five percent of audiologists (n = 177) dedicate less than 25% of their caseload to providing intervention for children diagnosed with APD. Likewise, 82.4% of speech-language pathologists (n = 42) dedicate less than 25% of their caseload to providing intervention for children with APD. Small caseloads dedicated to APD could also contribute to the varying levels of comfort respondents reported when working with children with APD in a different survey question.

Collaboration Between Audiologists and Speech-Language Pathologists

The final section of the survey used for the present study examined the collaboration routines between audiologists and speech-language pathologists for the care of children with APD. Overall, the findings from this section of the survey reveal vast differences in the collaboration routines of professionals. First, professionals reported that the amount of time spent collaborating with other professionals about a child with APD on their caseload is substantially higher than the average child on their caseload. Forty percent of respondents (n = 87) indicated they spend more time collaborating about a child with APD than for other children on their caseload, while another forty percent of respondents (n = 87) reported they collaborate the same amount of time for a child with APD as they do for other children. Reasons that professionals feel the need to collaborate more about children with APD could be attributed to the complexity of the disorder,

limited background knowledge and resources about the disorder, and/or the cross-discipline nature of APD. Future research regarding the collaboration of professionals should investigate the reasons behind increased collaboration for children with APD.

Even though the tendency seems to be for professionals to collaborate as much, if not more than, for children with APD, it appears as though very few audiologists and speech-language pathologists work together to provide a continuum of care for children with APD on a consistent basis. The majority of respondents indicated they collaborate with the audiologist/speech-language pathologist on an "as needed" basis with individual responses ranging from "weekly" (n = 10, 4.5%) to "once a year" (n = 55, 24.8%) to "rarely" (n = 28, 12.9%). These findings are alarming considering the cross-disciplinary nature of APD including the disorder's central origin and the various ways in which the disorder manifests.

Just as it is important to know how often professionals are collaborating for children with APD, it is equally important to understand what their collaboration looks like. There were no clear patterns of findings concerning preferred means of communication with other professionals, whether or not a primary contact for the classroom teacher is established when a child is identified with APD, nor the type of information shared with one another regarding the child's evaluation results or intervention progress. These findings suggest one of two things, either professionals have a wide variety of preferences and approaches when it comes to APD, or professionals don't have established procedures and protocols in place when it comes to working with children with APD.

Lastly, this section of the survey examined factors that contribute to successful collaboration as well as barriers to successful collaboration. More than half of the respondents indicated that competency of other professionals, availability of other professionals, preparedness of other professionals and rapport between professionals were factors that contribute to successful collaboration (Figure 9). These factors all highlight the importance of professionals having access to each other, having confidence in each other's skills, and believing that they will receive benefit from working with one another. On the other hand, the ways in which collaboration is accomplished, such as means of communication and use of standardized or self-developed tools were selected by fewer respondents suggesting these factors are less important. It is no surprise that barriers to effective collaboration selected by more than half of the respondents include time, availability of other professionals, and lack of education/training (Figure 10). These barriers also related back to professionals having access to each other and having confidence in each other's skills.

These findings are fairly consistent with results described by Richburg and Knickelbein (2011) in that the availability and willingness of professionals to collaborate is perhaps the biggest barrier that needs to be overcome. Richburg and Knickelbein (2011) found that 61.5% of the school-based speech-language pathologists (n = 126) surveyed stated they have access to an audiologist, while an additional 6.3% of respondents (n = 13) were uncertain whether they had access to an audiologist. Out of those respondents who had access to an audiologist, 89.7% of respondents (n = 113) felt they received benefit from working with the audiologist. These results are encouraging because they suggest that so long as access to other professionals is attained, positive and

appropriate collaborative care for children can occur. The study by Richburg and Knickelbein (2011) uncovered issues with access to professionals within the educational setting. It is plausible to assume that access to other professionals only becomes more complicated and difficult when considering children with APD can be evaluated by and receive intervention from professionals in a variety of workplace settings.

Clinical Implications

The factors identified that contribute to successful collaboration are important to recognize and should be shared among professionals in hopes of increasing the efficacy of future collaborative efforts. However, it is the barriers identified that prevent successful collaboration which must be the focus of future research on cross-discipline collaboration. These barriers need to be reduced and/or eliminated in order for children with APD to receive a smooth continuum of care and demonstrate positive growth. There are many parts to establishing an effective model of collaboration. First, all appropriate professionals need to be involved on the team. Second, professionals need to possess the ability to release control while still offering their knowledge and experience. Professionals need to be able to teach/coach others without feeling like they are giving their "secrets." Third, as previously discussed, professionals need to value each other's input and have an open mind for continual learning. Last, professionals need to understand their shared responsibility of the outcomes for the child. The following list addresses the barriers to successful collaboration identified in this survey and offers possible solutions to these barriers. The suggested solutions take into account the various comments of respondents on open-ended questions throughout the survey.

Time

Audiologists and speech-language pathologists need to make the most of what little time is available. This can be achieved by:

1. Developing a plan for communication between professionals (i.e. Will collaboration take place in-person, via email, via phone?)
2. Setting a timeline for communication (i.e. Will collaboration take place on a regular basis or on an as needed basis?)
3. Creating an agenda for each meeting to keep the meeting on track and assure time for all necessary topics of discussion
4. Creating tools (or using existing tools) to guide collaboration (i.e. checklists, online document multiple people can view and edit, "tracking notebook" that travels with the child and allows professionals to make comments in)
5. Establishing the roles and responsibilities of each professional involved in the care of a child with APD as soon as the child is identified

Availability and Willingness of Professionals

Audiologists and speech-language pathologists need to be intrinsically motivated and willing to collaborate with one another in order to best meet the needs of the child. This can be difficult to teach as it is often an inherent quality. Perhaps, topics of discussion such as the importance of collaboration and how to collaborate could be incorporated into the graduate-level curriculum or as part of continuing education course offerings. Universities that have both programs for audiology and speech-language pathology could offer a joint course in hopes of giving future professionals additional practice working with one another and learning to appreciate the knowledge and

perspectives other professionals have to offer. Additionally, a lack of understanding and knowledge about the roles and responsibilities of other professionals may contribute to decreased to motivation and willingness to initiate contact and collaboration with other professionals. Graduate level curriculum and continuing education courses that highlight each professional group's scope of practice and the education/training they receive could be beneficial (Dettmer, Thurston, & Dyck, 2005; Richburg & Knickelbein, 2011).

Lack of Education

As caseloads expand and include a greater range of auditory impairments, including APD, the knowledge and skills of audiologists and speech-language pathologists needs to expand as well (Richburg & Knickelbein, 2011). Audiologists and speech-language pathologists need more opportunities to observe and participate in APD evaluations and intervention during their graduate programs. Perhaps, the inclusion and/or elaboration of auditory processing disorders into the Standards for the Certificate of Clinical Competence in Audiology and the Standards for the Certificate of Clinical Competence in Speech Language Pathology would compel more graduate programs to incorporate assessment of and intervention for APD into their respective curriculums. Additionally, more opportunities for continuing education courses focused on APD should be offered. It may also be helpful to change the terminology and approach professionals take to diagnosing and managing APD. Currently, APD is used as a "catch-all" phrase, but perhaps APD should be referred to by the specific deficiencies a child exhibits. Using more specific language to describe APD is likely to lead to a more common understanding of the child's strengths and needs.

Availability of Resources

In a profession where resources are scarce, audiologists and speech-language pathologists need to find a way to share materials about APD. Whether this means, for example, speech-language pathologists share self-developed materials with other speech-language pathologists in their school district or audiologists distribute self-developed tools online, resources need to be readily available for all.

Distance

Unfortunately, distance between professionals is unavoidable. However, technology affords a variety of "non-traditional" opportunities to collaboration. For example, sharing evaluation results, describing test results, developing goals, discussing appropriate accommodations in the classroom, and progress reporting can be easily accomplished through email or video conferencing.

Defining Auditory Processing Disorder

Several comments shared by respondents pertained to the lack of a clear definition of APD, the lack of belief in APD as a true clinical entity, skepticism regarding the validity of the diagnosis, and efficacy of treatment options. Although AAA, ASHA, and many states have guidelines which regard APD as a "true clinical disorder" and document the "strong link between well-defined lesions of the central auditory nervous system (CANS) and deficits on behavioral and electrophysiological central auditory measures," some professionals in the field do not agree (AAA, 2010). Additional research is needed to further describe APD, delineate it from other disorders, and offer an evidence-based test battery that is able to confirm/rule out the presence of APD. Likewise, additional research is needed to develop evidence-based intervention strategies

that are proven effective and can be used remediate specific auditory processing deficiencies.

Limitations

The extent to which the findings of the present study can be generalized to the education, clinical practices, and collaboration routines of all audiologists and speech-language pathologists is limited. First, there are known limitations associated with all survey research. The findings must be interpreted with caution due to the possibility of unreliable data caused by variations in the interpretation of questions and/or answers by respondents. Also, bias can be created in the data if respondents do not feel comfortable providing answers that present themselves in an unfavorable manner. Any bias for this reason was hopefully minimized as the respondents were assured their answers would be confidential. Surveys are limited by a lack of flexibility and validity because respondents were required to select answers from a predetermined list of options and were unable to clarify their selections at times. Several questions in the survey were open-ended and allowed for additional comments, however, any comments made by the respondents could not be traced to their original response.

Second, the present study is limited by the means in which participants were recruited, as well as the small sample size. The survey was distributed to audiologists who listed “auditory processing” as an area of specialty. Therefore, the audiologists who received the survey likely have more experience diagnosing and/or intervening for APD than the average audiologist. The survey was distributed to a broader population of speech-language pathologists via discussion boards and social media. It is plausible to think the speech-language pathologists who participated have some degree of vested

interest in APD and felt compelled to participate after reading the title of the survey. Due to these reasons and the corresponding low response rate, the survey results may not be representative of the entire population of audiologists and speech-language pathologists who currently work with or have worked with children with APD.

Third, there was a large discrepancy between the number of audiologists and the number of speech-language pathologists who responded to the survey. There were significantly fewer speech-language pathologists who participated. Although the percentage of audiologist respondents and the percentage of speech-language pathologist respondents are compared across certain survey questions, these comparisons must be interpreted with caution as the sample size from which they are derived are different.

Fourth, the respondents represented a variety of workplace settings. The degree to which workplace setting influenced responses is unknown. It is likely that the factors preventing diagnostic and intervention services is influenced by workplace policies and procedures. In addition, it likely that factors contributing to and limiting successful collaboration between professionals are dependent on the nature of the facility at which a professional is employed.

Finally, the majority of audiologists and speech-language pathologists who responded to the survey indicated that less than 25% of their caseloads were dedicated to the evaluation and/or intervention of APD. If these numbers translate to inexperience with APD, the validity of survey results could be questioned due to hesitant or uncertain answers provided by the respondents.

Future Research Considerations

The current study serves as a preliminary examination of the education, clinical practices, and collaboration routines of audiologists and speech-language pathologists in the area of APD. The survey results from the present study allow for insight into the perspectives of both professionals. However, future research needs to be completed to develop evidence-based solutions for creating a smooth continuum of services from diagnosis to intervention for children with APD. Studies utilizing either a case-study or focus-group design will allow researchers to gain a deeper understanding of the factors that contribute to and the barriers that prevent successful collaboration, as well as ways in which to overcome those barriers.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

DATE:	April 20, 2016
TO:	Erika Murphy
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[875285-1] The Education, Clinical Practices, and Collaboration Routines of Audiologists and Speech-Language Pathologists in Auditory Processing Disorders in Children
SUBMISSION TYPE:	New Project
ACTION:	APPROVAL/VERIFICATION OF EXEMPT STATUS - **CORRECTED LETTER**
DECISION DATE:	March 15, 2016
EXPIRATION DATE:	March 15, 2020

Thank you for your submission of New Project materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

APPENDIX B

SURVEY QUESTIONS AND RESPONSES

Q1 - The purpose of this survey is to describe the education, clinical practices, and collaboration routines of audiologists and speech-language pathologists in auditory processing disorders (APD) in children. The survey should take 10-15 minutes to complete. Qualtrics, the software used to complete this survey, does not collect your name nor your affiliation. Therefore, the answers you provide will be anonymous and confidential. We reserve the right to use qualitative comments you provide to illustrate data. I foresee no risks to participants beyond those that are normally encountered answering online surveys. You do not stand to benefit directly from your participation in this research study. However, the fields of audiology and speech-language pathology stand to benefit from the data collected, especially information collected pertaining to collaboration routines of professionals in the care of children with APD. Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Please complete the survey only once. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

Thank you for taking time to participate in this survey for the University of Northern Colorado.

Answer	%	Count
Yes, I would like to participate.	98.53%	268
No, I do not wish to participate.	1.47%	4
Total	100%	272

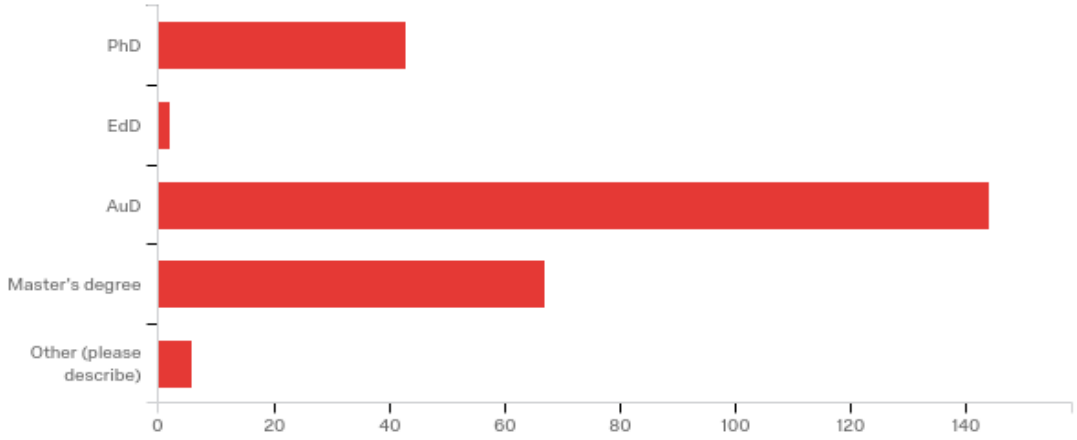
Q2 - What option best describes your profession?

Answer	%	Count
Audiologist	75.47%	200
Speech-Language Pathologist	20.00%	53
Both	4.15%	11
Neither	0.38%	1
Total	100%	265

Q3 - Which profession do you spend the most time practicing in?

Answer	%	Count
Audiologist	54.55%	6
Speech-Language Pathologist	45.45%	5
Total	100%	11

Q4 - What is the highest degree you currently hold?



Answer	%	Count
PhD	16.41%	43
EdD	0.76%	2
AuD	54.96%	144
Master's degree	25.57%	67
Other (please describe)	2.29%	6
Total	100%	262

Q5 – What year did you earn your highest degree?

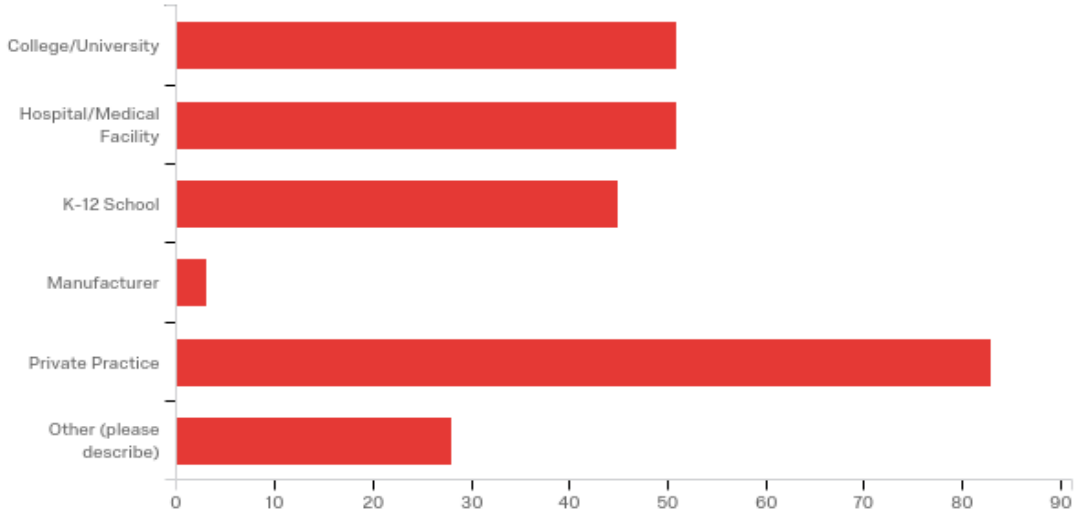
2006	2005	2005	201	2012
2002	2000	2009	2012	M.A.
1980	1989	2005	2006	2004
2--2	95	2008	2000	1986
2008	2006	1995	2002	1980
2002	2006	2007	2012	1970
1999	1987	2001	2006	2009
2013	2007	2010	2014	2004
1997	2005	1986	1978	1993
2004	1997	2002	1993	2007
2010	2008	1985	2004	2005
1984	1996	1999	2002	2010
2002	Chapman University	2007	1979	1982
2011	1980	2012	2009	2002
2002	2007	2004	2014	2009
1991	2002	2006	2014	1985
2013	1992	2005	2010	2010
2009	1997	1981	2010	2007
2000	1980	1970	1969	1991
2012	1985	2002	2009	2003
2012	1977	1976	2012	2009
Idaho State University	2013	2002	2013	2007
2004	1990	1988	2010	2010
1985	1977	1997	2009	2014
2015	2011	2003	2005	2010
	1987	2011	2005	2006
		2000	2014	2006

2001	2003	2013	2002	1989
2005	2001	2004	2014	2009
2013	1987	2011	2005	2010
1973	2009	2006	2004	2006
2010	2010	2005	2000	1995
2004	2013	2015	2004	1970
2008	2005	2003	2011	2008
1984	2006	2008	1999	1999
2001	2003	2010	1988	1981
1981	2016	3009	2004	1985
2012	2005	2010	2008	2007
2011	2001	2003	2004	1979
2014	2004	1992	2011	2007
2009	2007	1986	2003	2002
2010	1978	2013	2007	2012
2010	2013	2007	1997	2005
2009	2005	2013	2006	2004
2010	2014	2006	2007	2010
2002	2009	2014	2012	2012
2004	2012	2009	1979	2004
1980	1998	67	1995	2002
2012	2000	1978	2011	2007
2007	1999	U. of Southern CA	2004	2000
2011	2000	2009	2005	
2000	2014	2003	1988	
2003	2014	2003	2005	
2004	2001		2007	

Q6 - How many years have you been practicing in your profession?

Answer	%	Count
0-5 years	14.12%	37
6-10 years	12.21%	32
11-15 years	11.07%	29
15+ years	62.60%	164
Total	100%	262

Q7 - What setting best describes your current place of employment?



Answer	%	Count
College/University	19.54%	51
Hospital/Medical Facility	19.54%	51
K-12 School	17.24%	45
Manufacturer	1.15%	3
Private Practice	31.80%	83
Other (please describe)	10.73%	28
Total	100%	261

Q8 - Do you have experience working with AT LEAST one child suspected of having or diagnosed with an auditory processing disorder (APD)? For purposes of this survey, "child" is defined at any individual under the age of 21.

Answer	%	Count
Yes	97.32%	254
No	2.68%	7
Total	100%	261

Q9 - What state(s) are you currently licensed to practice in?

Answer	%	Count
Alabama	1.20%	3
Alaska	0.00%	0
Arizona	1.20%	3
Arkansas	0.40%	1
California	8.76%	22
Colorado	2.39%	6
Connecticut	3.19%	8
Delaware	0.00%	0
Florida	5.58%	14
Georgia	2.39%	6
Hawaii	0.40%	1
Idaho	1.99%	5
Illinois	1.20%	3
Indiana	0.40%	1
Iowa	0.00%	0
Kansas	1.59%	4
Kentucky	1.20%	3
Louisiana	1.20%	3
Maine	0.80%	2
Maryland	3.59%	9
Massachusetts	2.79%	7
Michigan	3.98%	10
Minnesota	3.19%	8
Mississippi	0.40%	1
Missouri	3.19%	8

Montana	0.00%	0
Nebraska	1.20%	3
Nevada	0.80%	2
New Jersey	7.97%	20
New Mexico	1.99%	5
New York	10.36%	26
North Carolina	5.18%	13
North Dakota	0.40%	1
Ohio	2.39%	6
Oklahoma	0.80%	2
Oregon	1.20%	3
Pennsylvania	6.77%	17
Rhode Island	0.40%	1
South Carolina	0.80%	2
South Dakota	1.20%	3
Tennessee	1.99%	5
Texas	5.98%	15
Utah	1.59%	4
Vermont	0.80%	2
Virginia	1.99%	5
Washington	1.20%	3
West Virginia	0.80%	2
Wisconsin	1.20%	3
Wyoming	1.20%	3

Q10 - Which statement best describes your academic coursework related to auditory processing disorders (APD) during your graduate program(s)?

Answer	%	Count
I took a full course dedicated to APD.	57.22%	111
I took a course in which some APD content was addressed.	36.08%	70
I did not learn about APD in any of my courses.	6.70%	13
Total	100%	194

Q11 - Which statement best describes your academic coursework related to auditory processing disorders (APD) during your graduate program(s)?

Answer	%	Count
Information presented about APD focused primarily on assessment.	48.97%	95
Information presented about APD focused primarily on intervention.	1.03%	2
Information presented about APD focused equally on assessment and intervention.	31.44%	61
Limited information was presented about APD.	18.56%	36
Total	100%	194

Q12 - Did you have the opportunity to COMPLETE a diagnostic evaluation for a child suspected of having an auditory processing disorder (APD) during your graduate program(s)?

Answer	%	Count
Yes	53.09%	103
No	46.91%	91
Total	100%	194

Q13 - Did you have the opportunity to OBSERVE a diagnostic evaluation for a child suspected of having an auditory processing disorder (APD) during your graduate program(s)?

Answer	%	Count
Yes	56.19%	109
No	43.81%	85
Total	100%	194

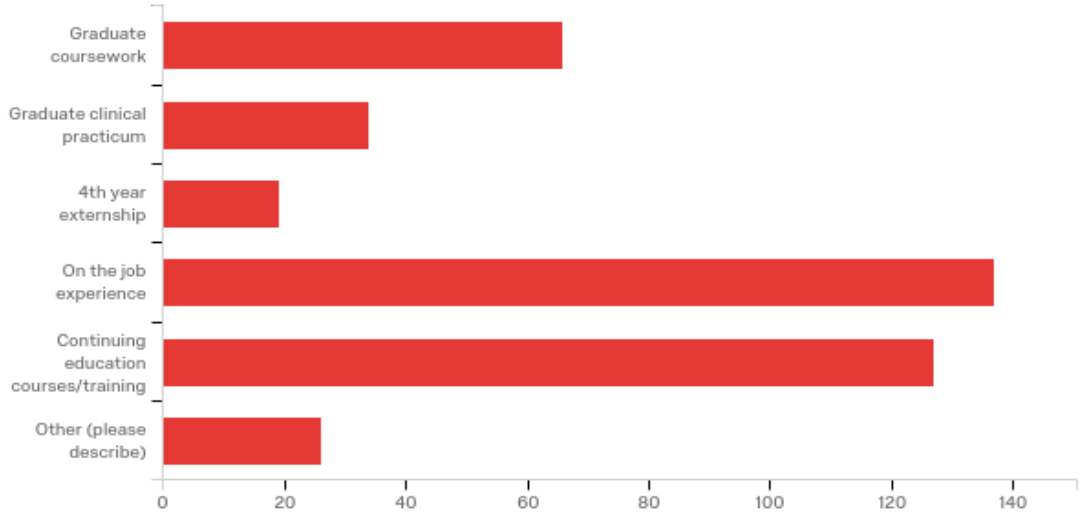
Q14 - Did you have the opportunity to provide intervention for a child diagnosed with an auditory processing disorder (APD) during your graduate program(s)?

Answer	%	Count
Yes	23.68%	45
No	76.32%	145
Total	100%	190

Q15 - Have you completed any continuing education courses/trainings on auditory processing disorders (APD) since earning your highest degree?

Answer	%	Count
Yes	92.63%	176
No	7.37%	14
Total	100%	190

Q16 - Which experience(s) contributed the most to your knowledge about auditory processing disorders (APD)? Select all that apply.



Answer	%	Count
Graduate coursework	34.74%	66
Graduate clinical practicum	17.89%	34
4th year externship	10.00%	19
On the job experience	72.11%	137
Continuing education courses/training	66.84%	127
Other (please describe)	13.68%	26
Total	100%	190

Q17 - On a scale from 1 (Extremely Uncomfortable) to 5 (Extremely Comfortable), how comfortable do you feel with the following tasks related to auditory processing disorders (APD)?

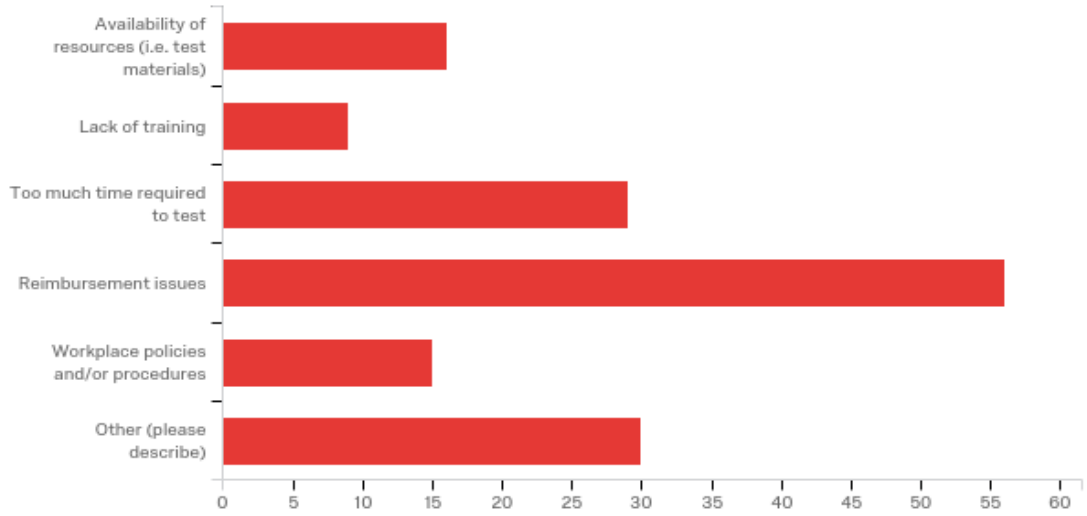
Question	Extremely Uncomfortable		Uncomfortable		Undecided		Comfortable		Extremely Comfortable		Total
Diagnosing APD	2.11%	4	6.32%	12	2.63%	5	43.16%	82	45.79%	87	190
Communicating APD assessment results with other professionals	2.11%	4	5.26%	10	3.16%	6	44.21%	84	45.26%	86	190
Making recommendations for APD intervention based on assessment results	2.63%	5	7.37%	14	5.79%	11	46.84%	89	37.37%	71	190
Implementing environmental modifications and compensatory strategies for APD intervention	1.58%	3	6.84%	13	8.42%	16	45.26%	86	37.89%	72	190
Implementing direct remediation for APD intervention	7.37%	14	21.58%	41	24.74%	47	29.47%	56	16.84%	32	190

Q18 - Are there any thoughts or comments you would like to share regarding how your educational preparation has influenced your level of comfort working with children suspected of having or diagnosed with an auditory processing disorder (APD)?

Q19 - What percentage of your caseload is dedicated to the evaluation of children suspected of having an auditory processing disorder (APD)?

Answer	%	Count
Less than 25%	76.88%	143
25-50%	13.98%	26
51-75%	3.76%	7
Greater than 75%	5.38%	10
Total	100%	186

Q20 - Do any of the following factors prevent you from evaluating auditory processing disorders (APD)? Select all that apply.

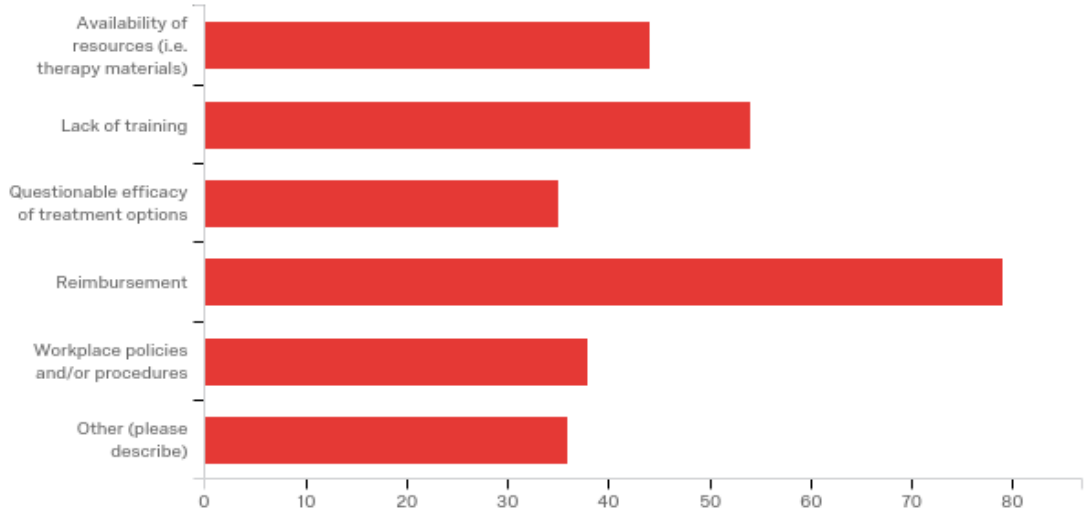


Answer	%	Count
Availability of resources (i.e. test materials)	16.00%	16
Lack of training	9.00%	9
Too much time required to test	29.00%	29
Reimbursement issues	56.00%	56
Workplace policies and/or procedures	15.00%	15
Other (please describe)	30.00%	30
Total	100%	100

Q21 - What percentage of your caseload is dedicated to providing intervention for children diagnosed with an auditory processing disorder (APD)?

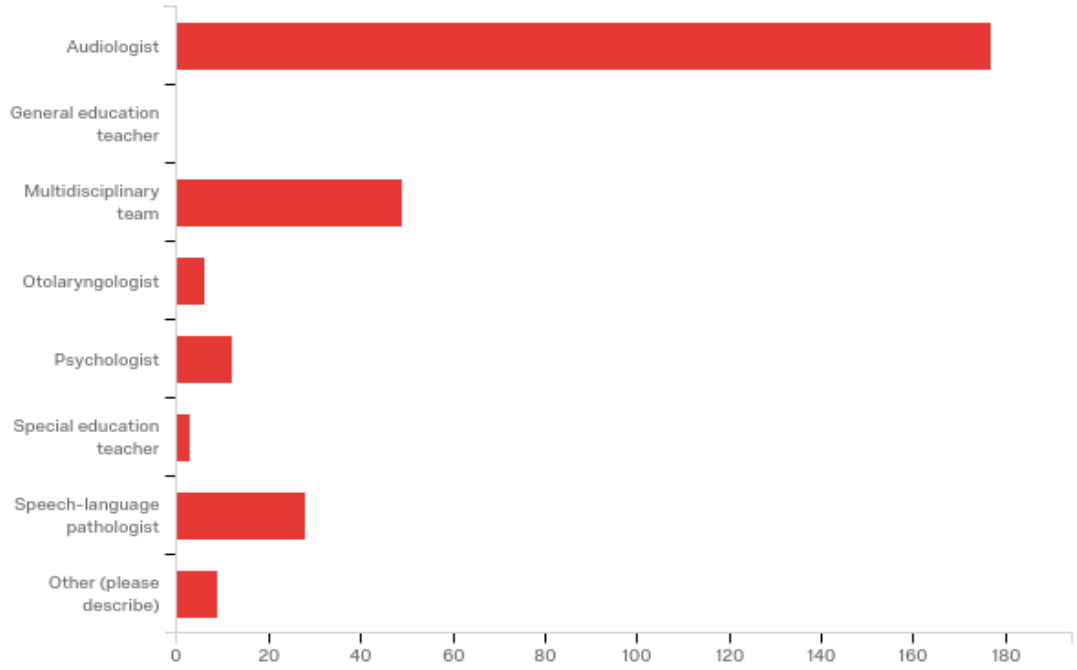
Answer	%	Count
Less than 25%	95.16%	177
25-50%	2.15%	4
51-75%	1.08%	2
Greater than 75%	1.61%	3
Total	100%	186

Q22 - Do any of the following factors prevent you from providing intervention for auditory processing disorders (APD)? Select all that apply.



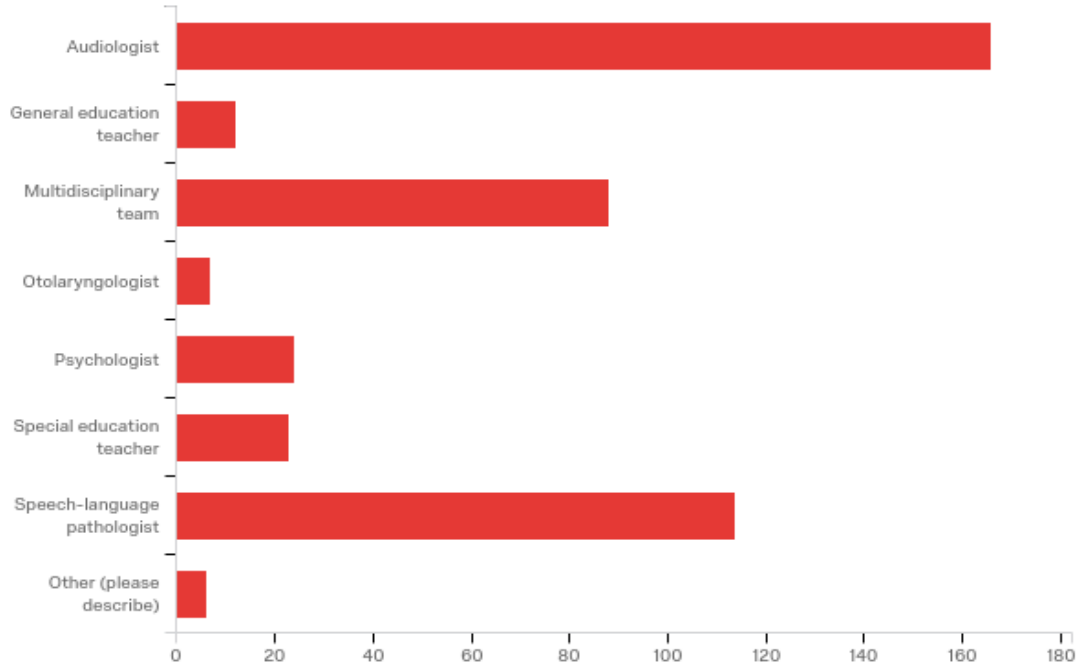
Answer	%	Count
Availability of resources (i.e. therapy materials)	28.76%	44
Lack of training	35.29%	54
Questionable efficacy of treatment options	22.88%	35
Reimbursement	51.63%	79
Workplace policies and/or procedures	24.84%	38
Other (please describe)	23.53%	36
Total	100%	153

Q23 - Who is qualified to make a diagnosis of auditory processing disorder (APD)? Select all that apply.



Answer	%	Count
Audiologist	96.20%	177
General education teacher	0.00%	0
Multidisciplinary team	26.63%	49
Otolaryngologist	3.26%	6
Psychologist	6.52%	12
Special education teacher	1.63%	3
Speech-language pathologist	15.22%	28
Other (please describe)	4.89%	9
Total	100%	184

Q24 - Who is responsible for recommending intervention strategies for a child with an auditory processing disorder (APD)? Select all that apply.



Answer	%	Count
Audiologist	90.22%	166
General education teacher	6.52%	12
Multidisciplinary team	47.83%	88
Otolaryngologist	3.80%	7
Psychologist	13.04%	24
Special education teacher	12.50%	23
Speech-language pathologist	61.96%	114
Other (please describe)	3.26%	6
Total	100%	184

Q25 - Who is responsible for implementing each of the following intervention strategies? Select all that apply.

Question	Audiologist		Speech-Language Pathologist		Other Professional		Total
Auditory training/Direct remediation	70.65%	130	88.59%	163	17.39%	32	184
FM System	97.83%	180	20.65%	38	13.04%	24	184
Other environmental strategies	85.33%	157	71.74%	132	55.98%	103	184
Metacognitive strategies	35.33%	65	87.50%	161	64.67%	119	184
Metalinguistic strategies	22.83%	42	97.28%	179	39.13%	72	184
Other compensatory strategies	73.91%	136	88.04%	162	72.28%	133	184

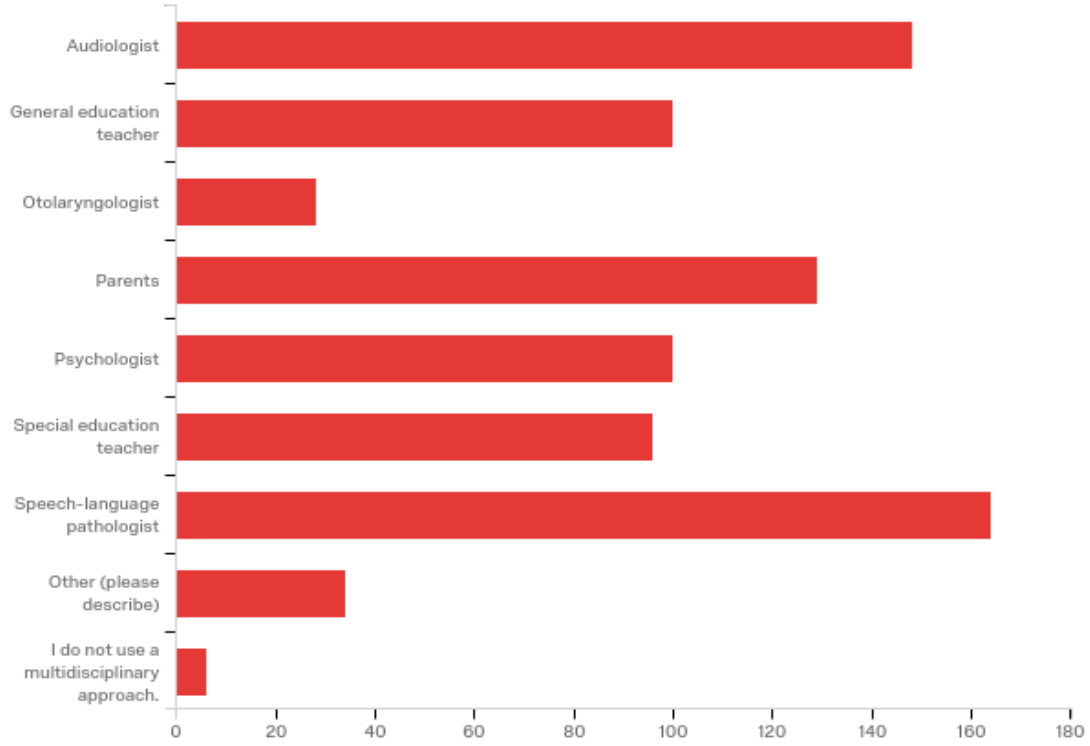
Q26 - Do you use a multidisciplinary approach to differentially diagnose auditory processing disorders (APD)?

Answer	%	Count
Never	8.70%	16
Rarely	9.24%	17
Sometimes	22.28%	41
Often	32.07%	59
Always	27.72%	51
Total	100%	184

Q27 - Do you use a multidisciplinary approach to provide intervention for a child with an auditory processing disorder (APD)?

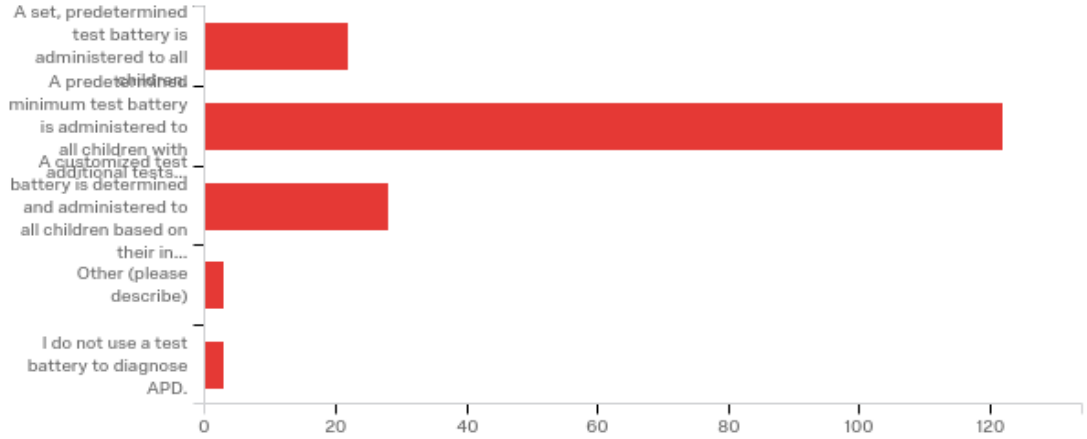
Answer	%	Count
Never	8.99%	16
Rarely	8.99%	16
Sometimes	22.47%	40
Often	34.27%	61
Always	25.28%	45
Total	100%	178

Q28 - Who is typically included as part of your multidisciplinary team for a child with an auditory processing disorder (APD)? Select all that apply.



Answer	%	Count
Audiologist	83.15%	148
General education teacher	56.18%	100
Otolaryngologist	15.73%	28
Parents	72.47%	129
Psychologist	56.18%	100
Special education teacher	53.93%	96
Speech-language pathologist	92.13%	164
Other (please describe)	19.10%	34
I do not use a multidisciplinary approach.	3.37%	6
Total	100%	178

Q29 - Which option best describes your approach for choosing a test battery to evaluate children suspected of having an auditory processing disorder (APD)?

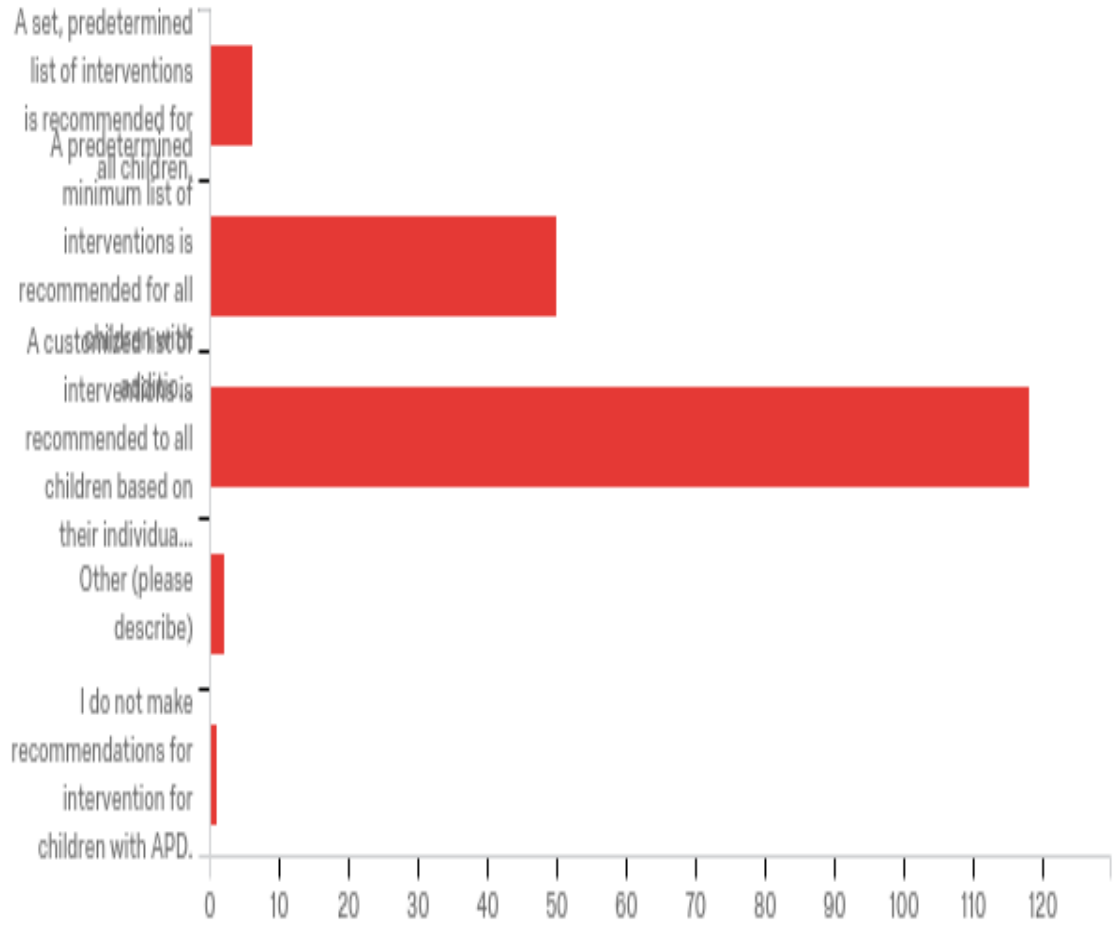


Answer	%	Count
A set, predetermined test battery is administered to all children.	12.36%	22
A predetermined minimum test battery is administered to all children with additional tests included based on their individual case history.	68.54%	122
A customized test battery is determined and administered to all children based on their individual case history.	15.73%	28
Other (please describe)	1.69%	3
I do not use a test battery to diagnose APD.	1.69%	3
Total	100%	178

Q30 - When completing an evaluation for a child suspected of having an auditory processing disorder (APD), how often do you incorporate each type of test/task into your test battery?

Question	Never		Rarely		Sometimes		Often		Always		Not sure		Total
Case history	0.00%	0	0.00%	0	0.56%	1	0.56%	1	98.88%	176	0.00%	0	178
Parent/Teacher questionnaire	2.81%	5	1.69%	3	10.67%	19	12.36%	22	71.91%	128	0.56%	1	178
Observation	12.36%	22	16.29%	29	24.16%	43	10.67%	19	35.39%	63	1.12%	2	178
Dichotic tests	0.56%	1	0.00%	0	1.12%	2	5.06%	9	92.13%	164	1.12%	2	178
Monaural low-redundancy speech tests	2.25%	4	2.25%	4	3.37%	6	7.87%	14	82.58%	147	1.69%	3	178
Temporal processing tests	1.12%	2	0.56%	1	7.87%	14	9.55%	17	79.78%	142	1.12%	2	178
Binaural interaction tests	5.62%	10	3.93%	7	10.11%	18	11.24%	20	68.54%	122	0.56%	1	178
Electrophysiologic tests	30.34%	54	23.03%	41	24.72%	44	8.43%	15	12.92%	23	0.56%	1	178
Auditory attention tests	12.36%	22	13.48%	24	30.34%	54	16.85%	30	24.72%	44	2.25%	4	178
Auditory memory tests	13.48%	24	8.99%	16	17.98%	32	13.48%	24	43.26%	77	2.81%	5	178
Word discrimination tests	2.25%	4	1.69%	3	4.49%	8	2.25%	4	88.76%	158	0.56%	1	178
Auditory conceptualization	29.21%	52	15.73%	28	17.42%	31	10.67%	19	8.43%	15	18.54%	33	178
Auditory closure	6.74%	12	6.18%	11	10.11%	18	13.48%	24	59.55%	106	3.93%	7	178
Auditory synthesis	16.29%	29	7.30%	13	14.04%	25	15.73%	28	36.52%	65	10.11%	18	178
Auditory association	25.84%	46	18.54%	33	12.92%	23	11.24%	20	16.85%	30	14.61%	26	178
Auditory comprehension	22.47%	40	10.11%	18	15.17%	27	12.92%	23	33.15%	59	6.18%	11	178
Phonemic awareness	14.04%	25	8.99%	16	11.80%	21	20.22%	36	39.89%	71	5.06%	9	178

Q31 - Which option best describes your approach for making recommendations for intervention for children with an auditory processing disorder (APD)?



Answer	%	Count
A set, predetermined list of interventions is recommended for all children.	3.39%	6
A predetermined minimum list of interventions is recommended for all children with additional recommendations made based on their individual assessment results.	28.25%	50
A customized list of interventions is recommended to all children based on their individual assessment results.	66.67%	118
Other (please describe)	1.13%	2
I do not make recommendations for intervention for children with APD.	0.56%	1
Total	100%	177

Q32 - Are there any thoughts or comments you would like to share regarding your clinical practices and/or experiences working with children suspected of having or diagnosed with an auditory processing disorder (APD)?

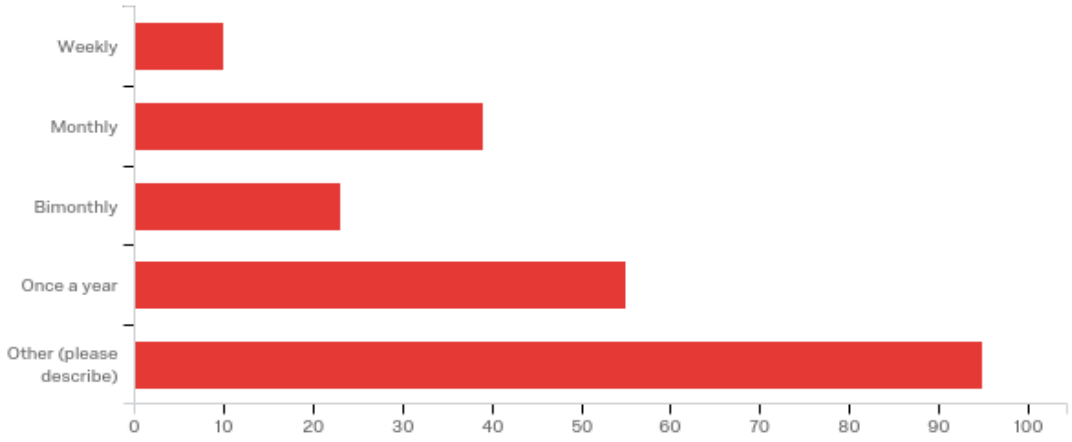
Q33 - How often do you write intervention goals for auditory processing disorders (APD) in collaboration with the audiologist/speech-language pathologist?

Answer	%	Count
Never	31.98%	71
Rarely	16.67%	37
Sometimes	24.32%	54
Often	17.12%	38
Always	9.91%	22
Total	100%	222

Q34 - How often do you provide intervention for auditory processing disorders (APD) in collaboration with the audiologist/speech-language pathologist?

Answer	%	Count
Never	33.78%	75
Rarely	18.02%	40
Sometimes	28.83%	64
Often	12.16%	27
Always	7.21%	16
Total	100%	222

Q35 - How often do you collaborate with the audiologist/speech-language pathologist about the care of a child with an auditory processing disorder (APD)?

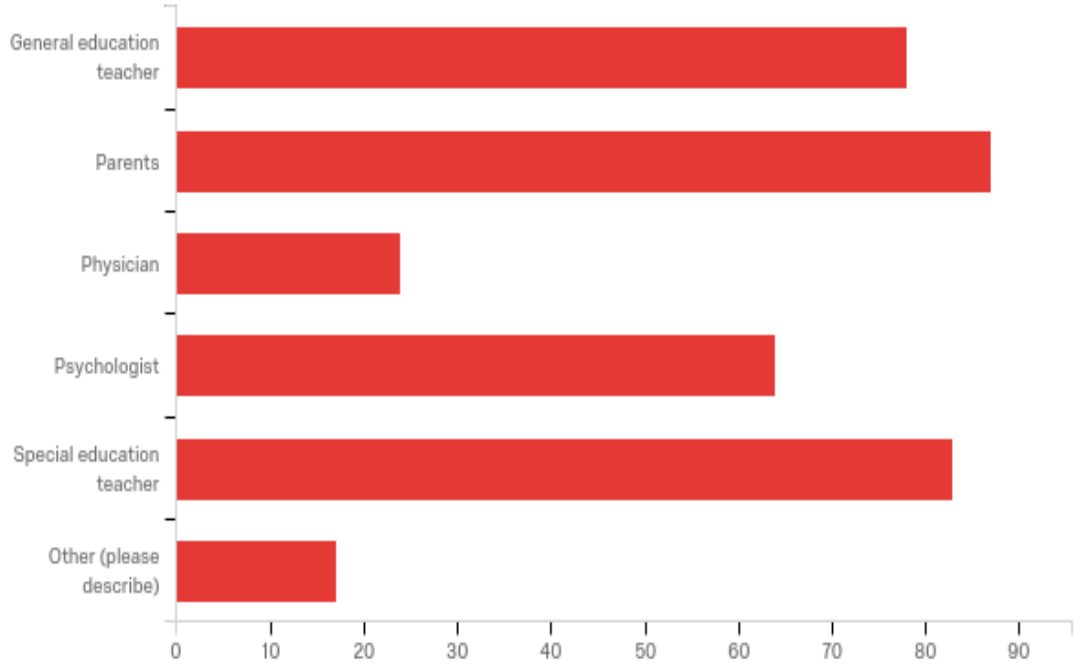


Answer	%	Count
Weekly	4.50%	10
Monthly	17.57%	39
Bimonthly	10.36%	23
Once a year	24.77%	55
Other (please describe)	42.79%	95
Total	100%	222

Q36 - Do you collaborate with professionals other than the audiologist/speech-language pathologist on a regular basis to discuss the care of a child with an auditory processing disorder (APD)?

Answer	%	Count
Yes	52.70%	117
No	47.30%	105
Total	100%	222

Q37 - Other than audiologists/speech-language pathologists, who do you collaborate with on a regular basis about the care of a child with an auditory processing disorder (APD)? Select all that apply.



Answer	%	Count
General education teacher	67.24%	78
Parents	75.00%	87
Physician	20.69%	24
Psychologist	55.17%	64
Special education teacher	71.55%	83
Other (please describe)	14.66%	17
Total	100%	116

Q38 - Please rank your preferred means of communication with the audiologist/speech- language pathologist about the care of a child with an auditory processing disorder (APD)? Select your choice and drag to the desired order.

Question	1		2		3		4		5		Total
Email	39.63%	86	30.41%	66	22.12%	48	4.15%	9	3.69%	8	217
Face-to-face discussion	29.95%	65	23.50%	51	25.35%	55	15.67%	34	5.53%	12	217
File sharing	5.99%	13	8.76%	19	27.65%	60	48.39%	105	9.22%	20	217
Phone	23.96%	52	35.48%	77	22.12%	48	17.51%	38	0.92%	2	217
Video conferencing	0.46%	1	1.84%	4	2.76%	6	14.29%	31	80.65%	175	217

Q39 - Which option best describes the time you spend collaborating with other professionals about a child on your caseload with an auditory processing disorder (APD) compared to the average child on your caseload?

Answer	%	Count
I collaborate significantly less about the child with APD.	9.68%	21
I collaborate less about the child with APD.	10.14%	22
I collaborate the same amount for the children with APD.	40.09%	87
I collaborate more about the child with APD.	30.41%	66
I collaborate significantly more about the child with APD.	9.68%	21
Total	100%	217

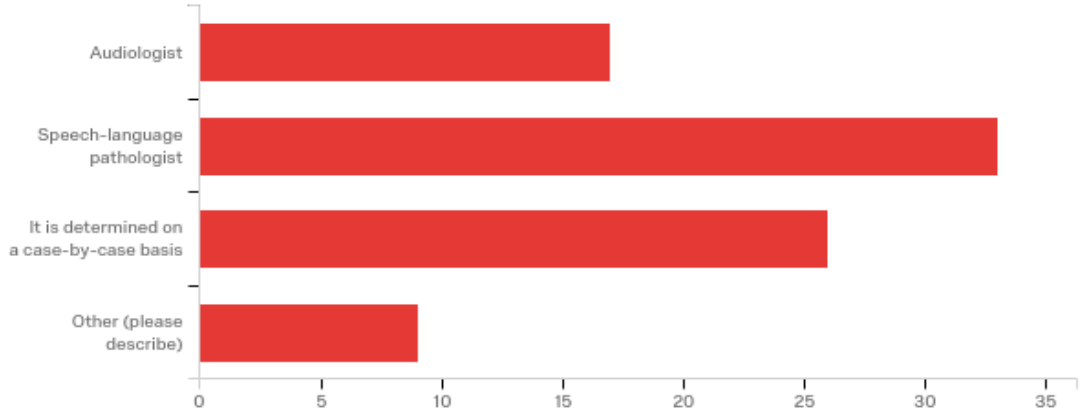
Q40 - Please complete the following statements where 1 is "Never" and 5 is "Always."

Question	Never		Rarely		Sometimes		Often		Always		Total
I want to collaborate about the care of children with APD...	2.76%	6	3.23%	7	17.51%	38	34.10%	74	42.40%	92	217
I am able to collaborate about the care of children with APD...	3.69%	8	12.90%	28	32.72%	71	27.65%	60	23.04%	50	217

Q41 - Do you establish who will be the primary contact for the classroom teacher (including training the classroom teacher on the child's accommodations and modifications) as soon as a child is identified as having an auditory processing disorder (APD)?

Answer	%	Count
Yes	40.74%	88
No	59.26%	128
Total	100%	216

Q42 - Who is typically responsible for being the primary contact for the classroom teacher when a child is identified as having an auditory processing disorder (APD)?

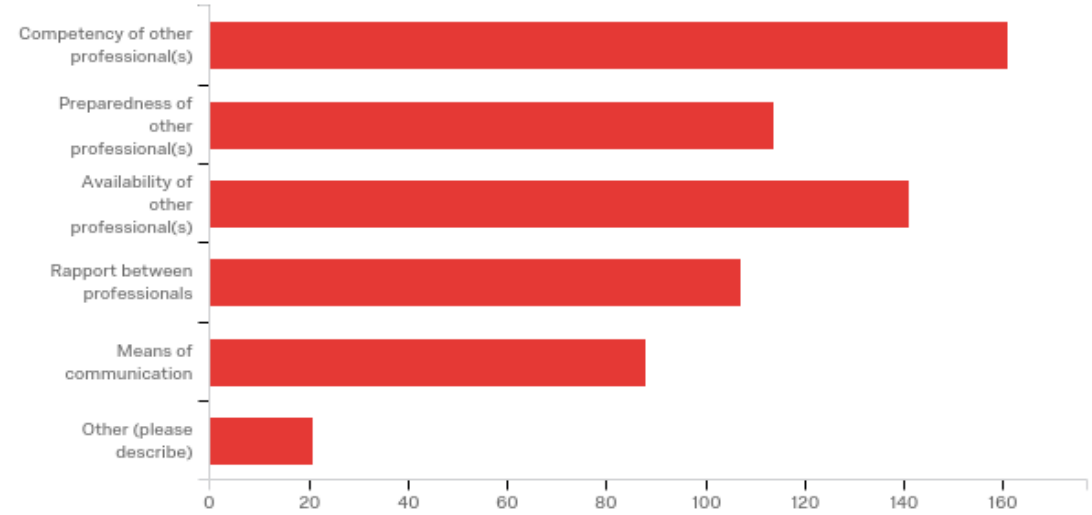


Answer	%	Count
Audiologist	20.00%	17
Speech-language pathologist	38.82%	33
It is determined on a case-by-case basis	30.59%	26
Other (please describe)	10.59%	9
Total	100%	85

Q43 - On a scale from 1 (Extremely Ineffective) to 5 (Extremely Effective), how effective has your collaboration with the audiologist/speech-language pathologist regarding the care of a child with an auditory processing disorder (APD) been in the past?

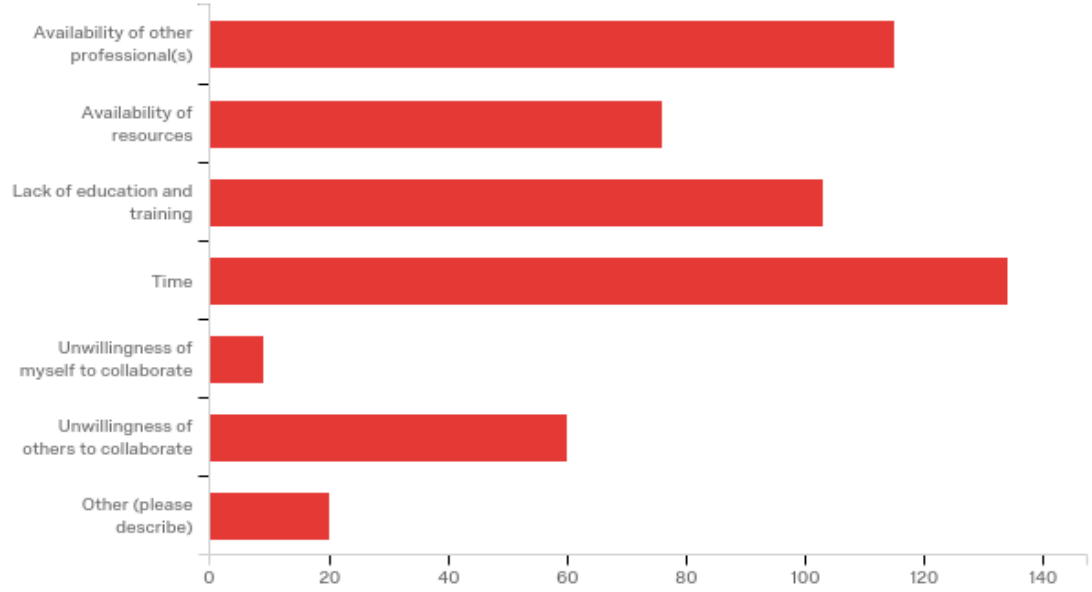
Answer	%	Count
Extremely Ineffective	3.92%	8
Ineffective	3.92%	8
Undecided	31.86%	65
Effective	48.04%	98
Extremely Effective	12.25%	25
Total	100%	204

Q44 - What factors contribute to the success of collaboration? Select all that apply.



Answer	%	Count
Competency of other professional(s)	78.92%	161
Preparedness of other professional(s)	55.88%	114
Availability of other professional(s)	69.12%	141
Rapport between professionals	52.45%	107
Means of communication	43.14%	88
Other (please describe)	10.29%	21
Total	100%	204

Q45 - What barriers exist that affect your ability to collaborate about children with an auditory processing disorder (APD)? Select all that apply.

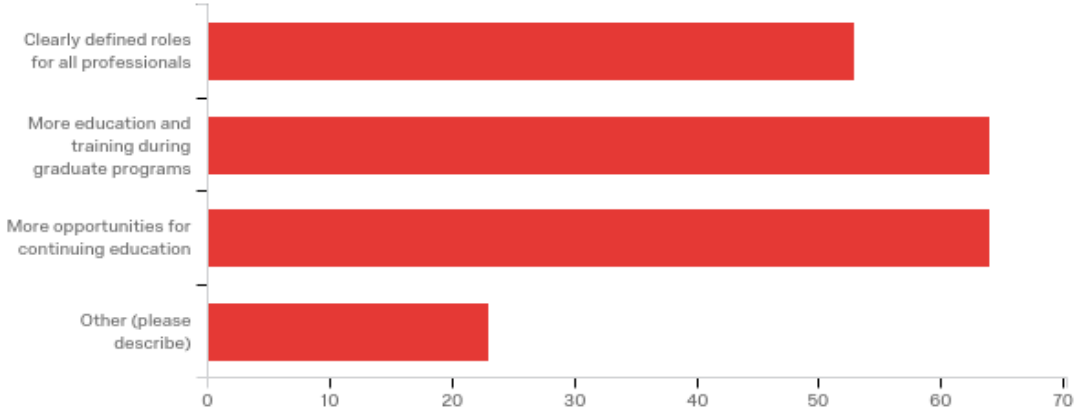


Answer	%	Count
Availability of other professional(s)	56.37%	115
Availability of resources	37.25%	76
Lack of education and training	50.49%	103
Time	65.69%	134
Unwillingness of myself to collaborate	4.41%	9
Unwillingness of others to collaborate	29.41%	60
Other (please describe)	9.80%	20
Total	100%	204

Q46 - Do you use any standardized or self-developed tools to guide your collaboration?

Answer	%	Count
Standardization tools	17.65%	36
Self-developed tools	6.37%	13
Both	29.41%	60
Neither	46.57%	95
Total	100%	204

Q47 - What resources/tools would be most helpful to you when collaborating with others regarding the care of children on your caseload with APD?



Answer	%	Count
Clearly defined roles for all professionals	25.98%	53
More education and training during graduate programs	31.37%	64
More opportunities for continuing education	31.37%	64
Other (please describe)	11.27%	23
Total	100%	204

Q48 - How often is your diagnosis of an auditory processing disorder (APD) made in collaboration with a speech-language pathologist?

Answer	%	Count
Never	17.28%	28
Rarely	20.37%	33
Sometimes	29.63%	48
Often	20.99%	34
Always	11.73%	19
Total	100%	162

Q49 - What information do you share with speech-language pathologists about a child with an auditory processing disorder (APD)? Select all that apply.

Answer	%	Count
A description of all diagnostic tests administered.	79.01%	128
Performance results from all tests that were administered.	88.89%	144
Performance results (scores) from some tests that were administered.	28.40%	46
A detailed explanation of my clinical impression(s).	82.72%	134
A brief summary of my clinical impression(s).	33.33%	54
Total	100%	162

Q50 - Is there any additional information you share with the speech-language pathologist on a regular basis about a child with an auditory processing disorder?

Q51 - Are there any strategies/techniques you would like to share that have worked well when collaborating with other professionals for the care of a child with an auditory processing disorder (APD)?

Q52 - Are there any other thoughts or comments you would like to share regarding your experiences collaborating with other professionals for the care of a child with an auditory processing disorder (APD)?

Q53 - Which statement best describes your academic coursework related to auditory processing disorders (APD) during your graduate program(s)?

Answer	%	Count
I took a full course dedicated to APD.	7.55%	4
I took a course in which some APD content was addressed.	66.04%	35
I did not learn about APD in any of my courses.	26.42%	14
Total	100%	53

Q54 - Which statement best describes your academic coursework related to auditory processing disorders (APD) during your graduate program(s)?

Answer	%	Count
Information presented about APD focused primarily on assessment.	5.56%	3
Information presented about APD focused primarily on intervention.	3.70%	2
Information presented about APD focused equally on assessment and intervention.	35.19%	19
Limited information was presented about APD.	55.56%	30
Total	100%	54

Q55 - Did you have the opportunity to COMPLETE a diagnostic evaluation for a child suspected of having an auditory processing disorder (APD) during your graduate program(s)?

Answer	%	Count
Yes	22.22%	12
No	77.78%	42
Total	100%	54

Q56 - Did you have the opportunity to OBSERVE a diagnostic evaluation for a child suspected of having an auditory processing disorder (APD) during your graduate program(s)?

Answer	%	Count
Yes	25.93%	14
No	74.07%	40
Total	100%	54

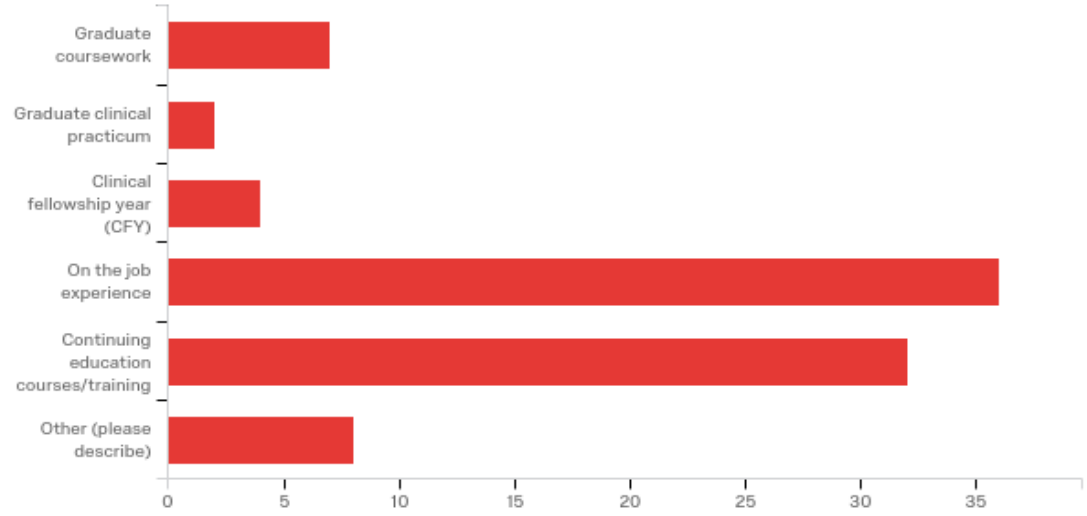
Q57 - Did you have the opportunity to provide intervention for a child diagnosed with an auditory processing disorder (APD) during your graduate program(s)?

Answer	%	Count
Yes	26.92%	14
No	73.08%	38
Total	100%	52

Q58 - Have you completed any continuing education courses/trainings on auditory processing disorders (APD) since earning your highest degree?

Answer	%	Count
Yes	78.85%	41
No	21.15%	11
Total	100%	52

Q59 - Which experience(s) contributed the most to your knowledge about auditory processing disorders (APD)? Select all that apply.



Answer	%	Count
Graduate coursework	13.46%	7
Graduate clinical practicum	3.85%	2
Clinical fellowship year (CFY)	7.69%	4
On the job experience	69.23%	36
Continuing education courses/training	61.54%	32
Other (please describe)	15.38%	8
Total	100%	52

Q60 - On a scale from 1 (Extremely Uncomfortable) to 5 (Extremely Comfortable), how comfortable do you feel with the following tasks related to auditory processing disorders (APD)?

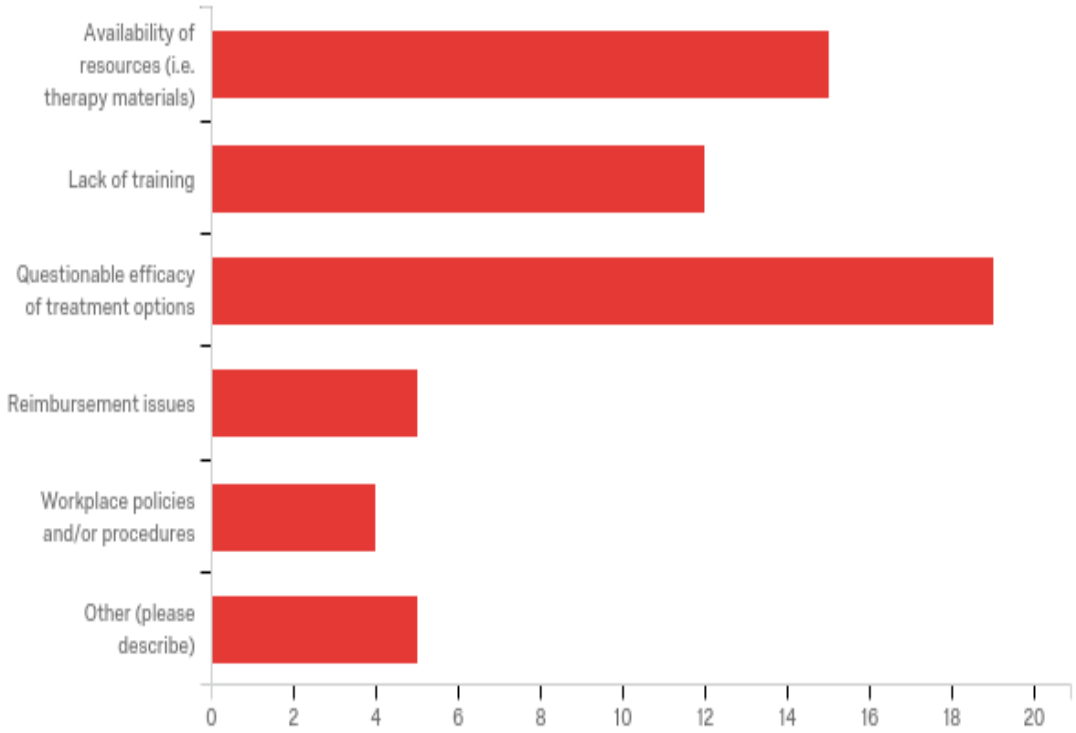
Question	Extremely Uncomfortable		Uncomfortable		Undecided		Comfortable		Extremely Comfortable		Total
Interpreting APD assessment results	0.00%	0	11.54%	6	15.38%	8	50.00%	26	23.08%	12	52
Interpreting recommendations for APD intervention made by other professionals	0.00%	0	7.69%	4	11.54%	6	55.77%	29	25.00%	13	52
Making recommendations for APD intervention based on assessment results	1.92%	1	9.62%	5	30.77%	16	40.38%	21	17.31%	9	52
Implementing environmental modifications and compensatory strategies for APD intervention	0.00%	0	11.54%	6	11.54%	6	55.77%	29	21.15%	11	52
Implementing direct remediation for APD intervention	0.00%	0	15.38%	8	19.23%	10	44.23%	23	21.15%	11	52

Q61- Are there any thoughts or comments you would like to share regarding how your educational preparation has influenced your level of comfort working with children diagnosed with an auditory processing disorder (APD)?

Q62 - What percentage of your caseload is dedicated to providing intervention for children with an auditory processing disorder (APD)?

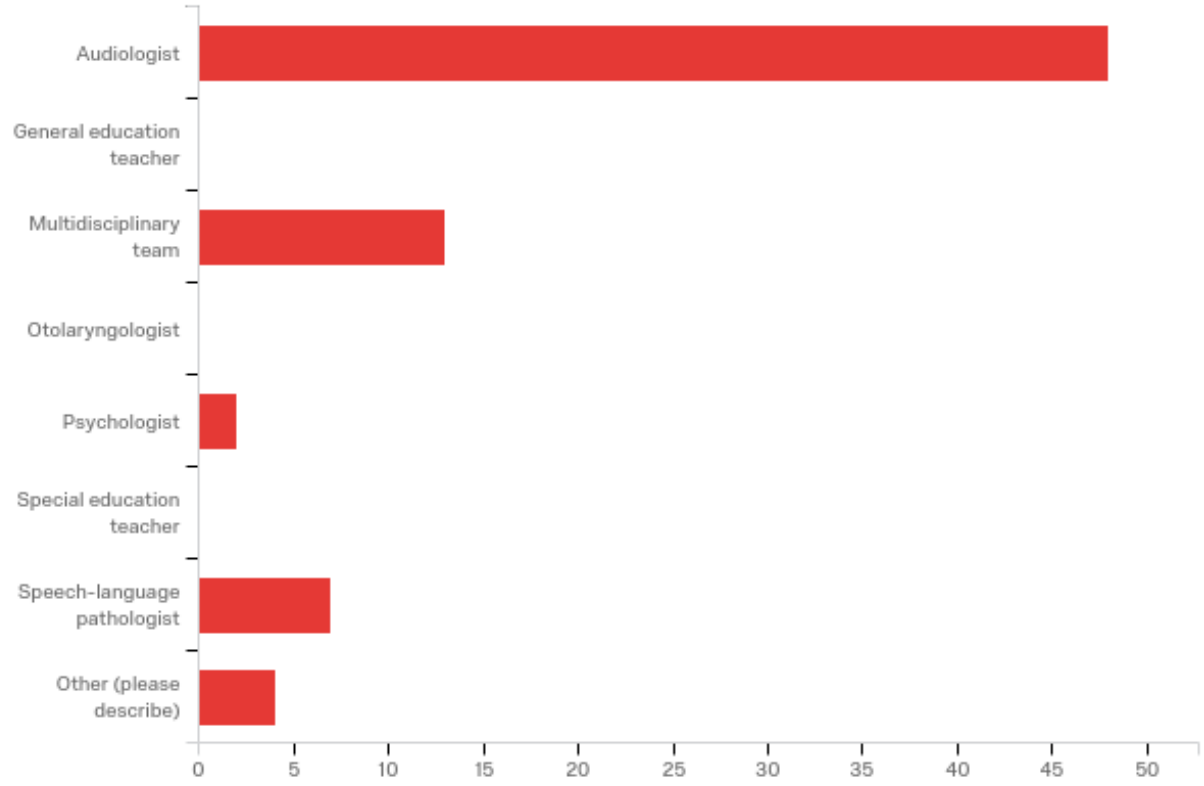
Answer	%	Count
Less than 25%	82.35%	42
25-50%	13.73%	7
51-75%	1.96%	1
Greater than 75%	1.96%	1
Total	100%	51

Q63 - Do any of the following factors prevent you from providing intervention for auditory processing disorders (APD)? Select all that apply.



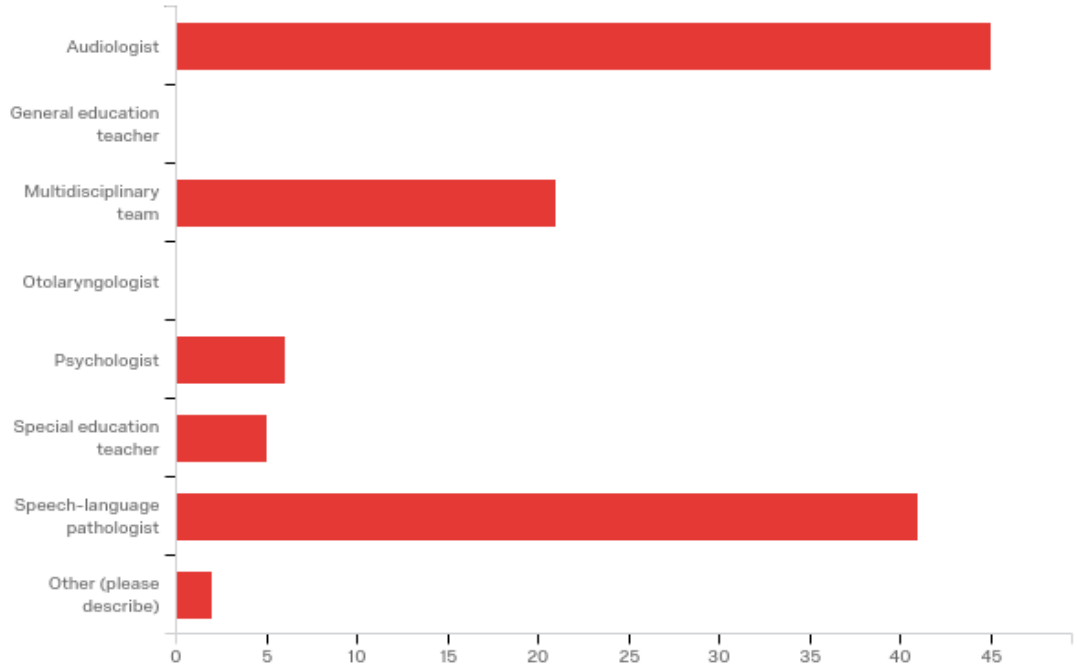
Answer	%	Count
Availability of resources (i.e. therapy materials)	45.45%	15
Lack of training	36.36%	12
Questionable efficacy of treatment options	57.58%	19
Reimbursement issues	15.15%	5
Workplace policies and/or procedures	12.12%	4
Other (please describe)	15.15%	5
Total	100%	33

Q64 - Who is qualified to make a diagnosis of auditory processing disorder (APD)? Select all that apply.



Answer	%	Count
Audiologist	94.12%	48
General education teacher	0.00%	0
Multidisciplinary team	25.49%	13
Otolaryngologist	0.00%	0
Psychologist	3.92%	2
Special education teacher	0.00%	0
Speech-language pathologist	13.73%	7
Other (please describe)	7.84%	4
Total	100%	51

Q65 - Who is responsible for recommending intervention strategies for a child with an auditory processing disorder (APD)? Select all that apply.



Answer	%	Count
Audiologist	88.24%	45
General education teacher	0.00%	0
Multidisciplinary team	41.18%	21
Otolaryngologist	0.00%	0
Psychologist	11.76%	6
Special education teacher	9.80%	5
Speech-language pathologist	80.39%	41
Other (please describe)	3.92%	2
Total	100%	51

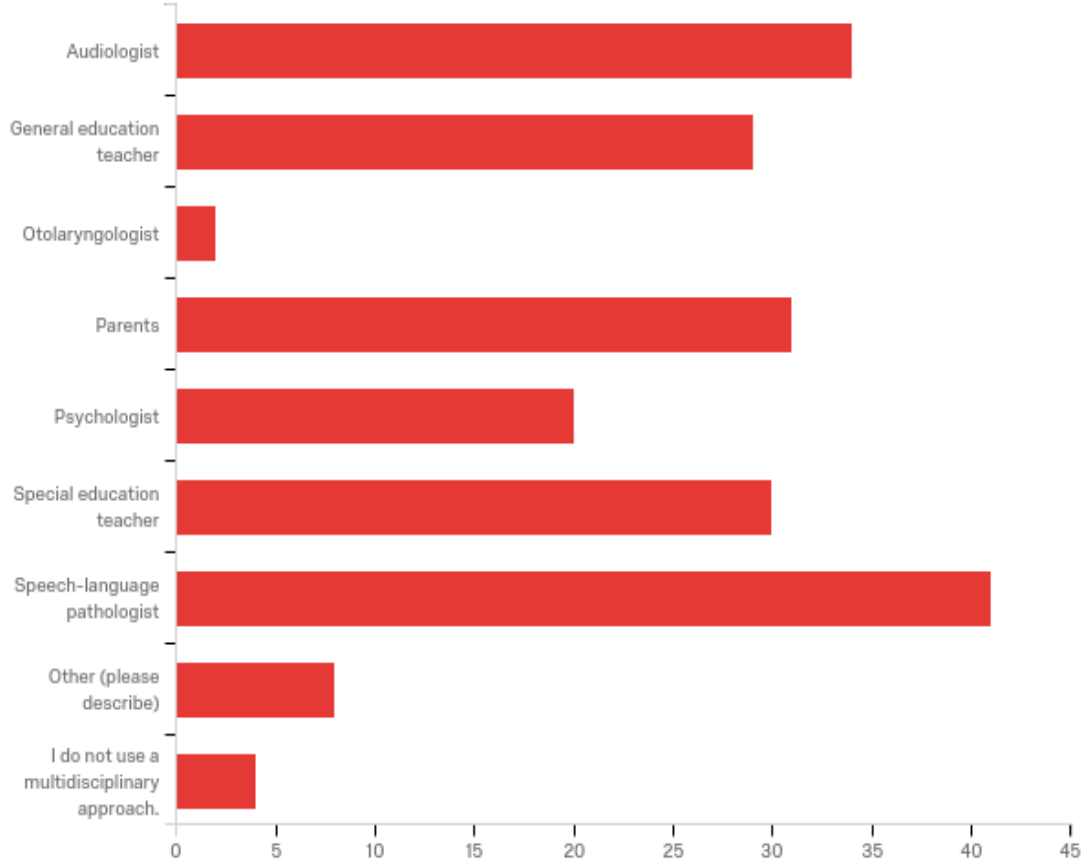
Q66 - Who is responsible for implementing each of the following intervention strategies? Select all that apply.

Question	Audiologist		Speech-Language Pathologist		Other Professional		Total
Auditory training/Direct remediation	59.57%	28	91.49%	43	14.89%	7	47
FM system	89.36%	42	63.83%	30	31.91%	15	47
Other environmental strategies	74.47%	35	91.49%	43	53.19%	25	47
Metacognitive strategies	27.66%	13	100.00%	47	42.55%	20	47
Metalinguistic strategies	17.02%	8	100.00%	47	31.91%	15	47
Other compensatory strategies	57.45%	27	100.00%	47	65.96%	31	47

Q67 - Do you use a multidisciplinary approach to provide intervention for a child with an auditory processing disorder (APD)?

Answer	%	Count
Always	40.43%	19
Often	17.02%	8
Sometimes	23.40%	11
Rarely	12.77%	6
Never	6.38%	3
Total	100%	47

Q68 - Who is typically included as part of your multidisciplinary team for a child with an auditory processing disorder (APD)? Select all that apply.

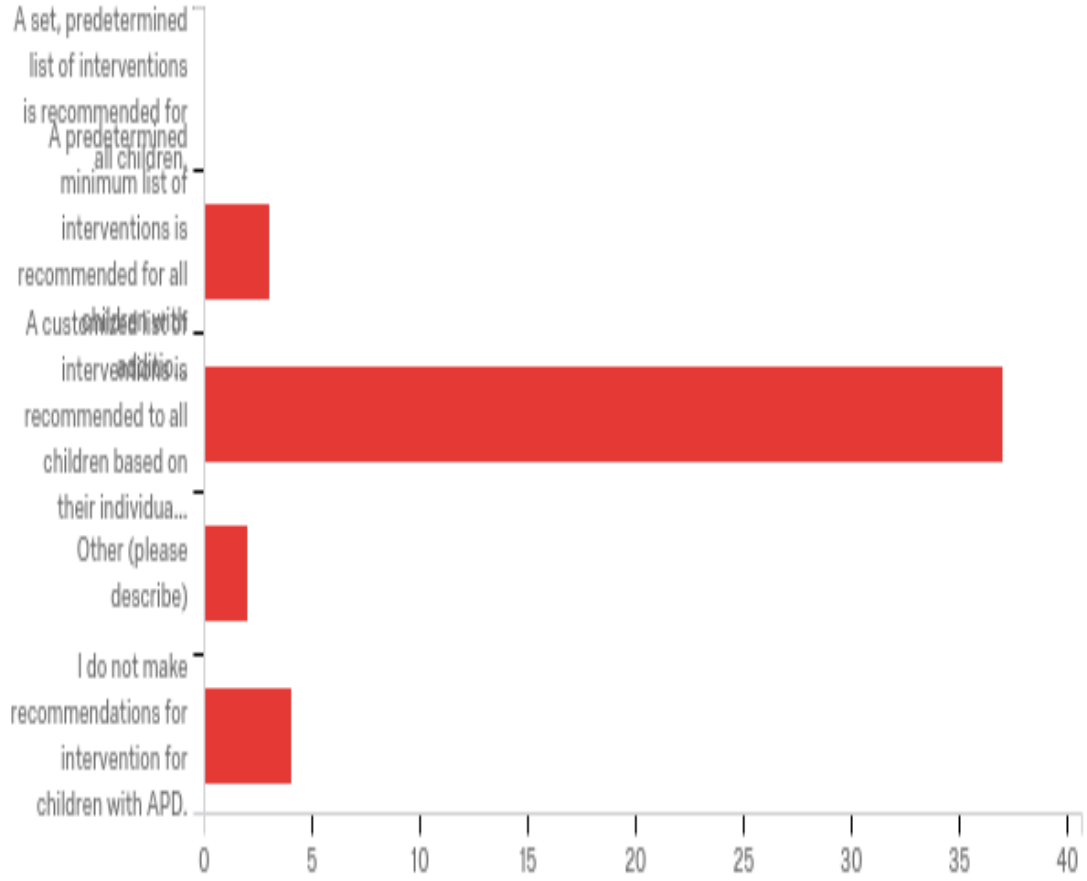


Answer	%	Count
Audiologist	72.34%	34
General education teacher	61.70%	29
Otolaryngologist	4.26%	2
Parents	65.96%	31
Psychologist	42.55%	20
Special education teacher	63.83%	30
Speech-language pathologist	87.23%	41
Other (please describe)	17.02%	8
I do not use a multidisciplinary approach.	8.51%	4
Total	100%	47

Q69- When a child is suspected of having an auditory processing disorder (APD), how often do you administer tests that assess the following auditory and/or linguistic skills?

Question	Never		Rarely		Sometimes		Often		Always		Not sure		Total
Case history	0.00%	0	0.00%	0	14.89%	7	12.77%	6	72.34%	34	0.00%	0	47
Parent/Teacher questionnaire	2.13%	1	2.13%	1	14.89%	7	21.28%	10	59.57%	28	0.00%	0	47
Observation	6.38%	3	6.38%	3	8.51%	4	14.89%	7	63.83%	30	0.00%	0	47
Auditory memory	0.00%	0	2.13%	1	8.51%	4	12.77%	6	74.47%	35	2.13%	1	47
Word discrimination	0.00%	0	2.13%	1	8.51%	4	17.02%	8	72.34%	34	0.00%	0	47
Auditory conceptualization	6.38%	3	4.26%	2	8.51%	4	21.28%	10	44.68%	21	14.89%	7	47
Auditory closure	2.13%	1	6.38%	3	14.89%	7	19.15%	9	46.81%	22	10.64%	5	47
Auditory synthesis	4.26%	2	2.13%	1	19.15%	9	17.02%	8	40.43%	19	17.02%	8	47
Auditory association	6.38%	3	2.13%	1	17.02%	8	8.51%	4	51.06%	24	14.89%	7	47
Auditory comprehension	0.00%	0	0.00%	0	6.38%	3	8.51%	4	85.11%	40	0.00%	0	47
Phonemic awareness	2.13%	1	0.00%	0	14.89%	7	6.38%	3	76.60%	36	0.00%	0	47
Receptive vocabulary	0.00%	0	0.00%	0	6.38%	3	6.38%	3	87.23%	41	0.00%	0	47
Expressive vocabulary	0.00%	0	0.00%	0	10.64%	5	4.26%	2	85.11%	40	0.00%	0	47
Receptive syntax	2.13%	1	0.00%	0	12.77%	6	12.77%	6	72.34%	34	0.00%	0	47
Expressive syntax	0.00%	0	0.00%	0	12.77%	6	8.51%	4	78.72%	37	0.00%	0	47
Pragmatics	0.00%	0	6.38%	3	19.15%	9	21.28%	10	53.19%	25	0.00%	0	47

Q70 - Which option best describes your approach for making recommendations for intervention for children with an auditory processing disorder (APD)?



Answer	%	Count
A set, predetermined list of interventions is recommended for all children.	0.00%	0
A predetermined minimum list of interventions is recommended for all children with additional recommendations made based on their individual assessment results.	6.52%	3
A customized list of interventions is recommended to all children based on their individual assessment results.	80.43%	37
Other (please describe)	4.35%	2
I do not make recommendations for intervention for children with APD.	8.70%	4
Total	100%	46

Q71 - Are there any thoughts or comments you would like to share regarding your clinical practices and/or experiences working with children suspected of having or diagnosed with an auditory processing disorder (APD)?

Q72 - What information do audiologists share with you about a child with an auditory processing disorder (APD)? Select all that apply.

Answer	%	Count
A set, predetermined list of interventions is recommended for all children.	0.00%	0
A predetermined minimum list of interventions is recommended for all children with additional recommendations made based on their individual assessment results.	6.52%	3
A customized list of interventions is recommended to all children based on their individual assessment results.	80.43%	37
Other (please describe)	4.35%	2
I do not make recommendations for intervention for children with APD.	8.70%	4
Total	100%	46

Q73 - Is there any additional information that would be helpful for an audiologist to share with you about a child with an auditory processing disorder (APD)?

Q74 - How often do you share the following information about a child with an auditory processing disorder (APD) with the audiologist?

Question	Never		Rarely		Sometimes		Often		Always		Total
Lesson plans	43.90%	18	34.15%	14	12.20%	5	7.32%	3	2.44%	1	41
Therapy session data	29.27%	12	34.15%	14	21.95%	9	9.76%	4	4.88%	2	41
Informal summary of progress	12.20%	5	19.51%	8	26.83%	11	29.27%	12	12.20%	5	41
Formal progress report	21.95%	9	14.63%	6	21.95%	9	21.95%	9	19.51%	8	41

Q75- Is there any additional information you share with the audiologist on a regular basis about a child with an auditory processing disorder (APD)?

APPENDIX C

COMMONLY USED AUDIOLOGIC TESTS TO EVALUATE AUDITORY PROCESSING

Commonly Used Audiologic Tests to Evaluate Auditory Processing

Dichotic Listening Tests

- Dichotic Digits (DD)
- Staggered Spondaic Word (SSW)
- SCAN Competing Words
- SCAN Competing Sentences

Monaural Low-Redundancy Speech Tests

- Low pass filtered speech
- SCAN Filtered Words
- SCAN Auditory Figure Ground
- Speech-In-Noise (SIN)

Temporal Processing Tests

- Pitch Pattern
- Random Gap Detection Test (RGDT)

Binaural Interaction Tests

- Rapidly Alternating Speech Perception (RASP)
- Binaural Fusion Test (BFT)
- Masking Level Difference (MLD)

Electrophysiology Tests

- Auditory brainstem response (ABR)
- Middle latency response (MLR)

Note: This list was derived from survey results reported by Emanuel et al. (2011) and represents tests most commonly included in test battery from each category in no particular order. This is not a comprehensive list of audiologic tests available to assess auditory processing skills.

APPENDIX D

COMMONLY USED TESTS TO EVALUATE LANGUAGE SKILLS

Commonly Used Tests to Evaluate Language Skills

- Auditory Discrimination Test-Second Edition (ADT)
- Carrow Auditory-Visual Abilities Test (CAVAT)
- Clinical Evaluation of Language Fundamentals- Fifth Edition (CELF-5)
- Comprehensive Test of Phonological Processing (CTOPP)
- Goldman Fristoe-Woodcock Test of Auditory Discrimination (G-F-W TAD)
- Lindamood Auditory Conceptualization Test, Revised Edition (LAC-R)
- The Listening Test
- Phonological Awareness Profile
- Phonological Awareness Test (PAT)
- Test for Auditory Comprehension of Language-Third Edition (TACL-3)
- Test of Auditory Perceptual Skills-Revised (TAPS-R)

Note: Taken from Bellis (2011)

APPENDIX E

EXAMPLE TEST BATTERY FOR AUDITORY PROCESSING EVALUATION

Example Test Battery for Auditory Processing Evaluation

Test	Description	Process Assessed	Site of Lesion
SCAN-3:C Filtered Words	The child is asked to repeat the words that are presented to either the left or the right ear, with higher frequencies of sound removed, giving the sound of the words a muffled quality.	Auditory Closure	Brainstem and cortical lesions (specifically primary auditory cortex)
SCAN-3:C Auditory Figure Ground +8	The child is asked to repeat words that are presented to either the right or left ear against a background of noise, but the word has been recorded at a higher volume than the background noise (8 decibels higher).	Auditory Closure	Low brainstem and cortical lesions
SCAN-3:C Competing Words-Directed Ear	Different words are presented simultaneously to each ear and the child is asked to repeat both words, but specifically to state the word presented in either the left or the right ear first.	Binaural Separation	Cortical and corpus callosum lesions
SCAN-3:C Competing Sentences	Different sentences are presented simultaneously to each ear and the child is asked to repeat the sentence presented in one ear while ignoring the sentence presented to the opposite ear.	Binaural Separation	Cortical and corpus callosum lesions
Dichotic Digits	Two pairs of numbers are presented simultaneously to the ears (2 numbers to one ear and 2 numbers to the other ear) and the child is asked to repeat all of the numbers that are heard in any order.	Binaural Integration	Brainstem, cortical, and corpus callosal lesions
Random Gap Detection Test (RGDT)	The child is asked to identify whether two tones separated by varying time intervals sound as if they are one or two tones.	Temporal Resolution	Cortical lesions
Masking Level Difference 500 Hz	The child listens for tone pulses of various levels and phases in the presence of narrow band noise bursts.	Binaural Interaction	Gross brainstem lesions
Auditory Continuous Performance Test (ACPT)	The child listens to a list of words and indicates when a target word is heard.	Attention-related auditory skills	N/A
Middle Latency Response (MLR)	Electrically evoked response to an auditory stimulus; The child must be awake but no behavioral response is needed	N/A	Thalamocortical pathway dysfunction

(Information adapted from Bellis, 2011)

APPENDIX F

LIST OF ABBREVIATIONS

List of Abbreviations

AAA: American Academy of Audiology
ABR: Auditory brainstem response
ADT: Auditory Discrimination Test-Second Edition
APD: Auditory processing disorder
ASHA: American Speech-Language-Hearing Association
Au.D.: Doctorate of Audiology
BFT: Binaural Fusion Test
CANS: Central auditory nervous system
CAVAT: Carrow Auditory-Visual Abilities Test
CELF-5: Clinical Evaluation of Language Fundamentals- Fifth Edition
CFY: Clinical fellowship year
CTOPP: Comprehensive Test of Phonological Processing
DD: Dichotic Digits
G-F-W TAD: Goldman Fristoe-Woodcock Test of Auditory Discrimination
IDEA: Individuals with Disabilities Education Act
IEP: Individualized Education Plan
LAC-R: Lindamood Auditory Conceptualization Test, Revised Edition
MLD: Masking Level Difference
MLR: Middle latency response
OHI: Other Health Impairment
PAT: Phonological Awareness Test
RASP: Rapid Alternating Speech Perceptions
RGDT: Random Gap Detection Test
SIN: Speech-In-Noise
SLD: Specific Learning Disability
SLI: Speech or Language Impairment
SLP: Speech-Language pathologist
SSW: Staggered Spondaic Word
TALC-3: Test for Auditory Comprehension of Language-Third Edition
TAPS-R: Test of Auditory Perceptual Skills-Revised