
Educational Testing for Auditory Processing: A Retrospective Study

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Although school-based audiologists frequently assess auditory processing problems in children, there is a lack of standardized educational guidelines for auditory processing referrals. The American Speech-Language-Hearing Association (ASHA; 1996) statement on auditory processing provides definitions of auditory processing and the characteristics presented by children with auditory processing disorders. The procedures used to refer and test children suspected of auditory processing disorders within an educational system vary by state and by personnel providing these services within the school systems. There is little research on how educational teams decide which children should receive educational assessments for auditory processing problems. The purpose of this study was to determine if school districts followed recommended referral procedures when referring students for auditory processing evaluations.

Results revealed that school districts were following most of the recommended procedures for making auditory processing referrals in the two years studied. A retrospective analysis of student records indicated that school districts were meeting many of the 10 goals for student referral set forth by the Lincoln Intermediate Unit (LIU) #12 Task Force on Auditory Processing. Most of the referred children met the basic requirements of having intelligible speech, normal hearing, being in academic struggle, and completion of the Instructional Support Team process, completion of a psychoeducational evaluation and completion of the LIU #12 checklist for auditory processing referrals. Areas that still need improvement include completion of a full speech and language evaluation prior to the referral to the audiologist and the Instructional Support Team's use of prescreening forms.

Introduction

Although school-based audiologists frequently assess auditory processing and diagnose auditory processing problems in children, there is a lack of standardized educational guidelines for auditory processing referrals. This is due, in part, to vagaries in the approaches to referral practices in individual school systems within and across states and counties. There is an increasing literature concerning auditory processing in professional journals including those published by the American Speech-Language and Hearing Association (ASHA; 1996) and the Bruton Conference published by the American Academy of Audiology. The ASHA statement on auditory processing provides definitions of auditory processing and the characteristics presented by children with auditory processing disorders. The American Academy of Audiology (AAA) has not developed its own consensus statement on auditory processing, (S.H. Davis, personal communication, May 6, 2004). Although AAA has published numerous statements and opinion pieces on auditory processing disorders, (e.g. Jerger and Musiek, 2000), it has no official policy. The procedures used to refer and test children suspected of

auditory processing disorders within an educational system vary by state and by personnel providing these services within the school systems and within states.

Published Guidelines on Auditory Processing Disorders ASHA's 1996 technical report on central auditory processing provides a usable definition of central auditory processing. This report states:

"Central Auditory Processing is the auditory system mechanisms and processes responsible for the following behavioral phenomena:

- sound localization and lateralization
- auditory discrimination
- auditory pattern recognition
- temporal aspects of audition including-
 - temporal resolution
 - temporal masking
 - temporal integration
 - temporal ordering and
- auditory performance decrements with competing acoustic signals
- auditory performance decrements with degraded acoustic signals" (ASHA, 1996, p. 41).

This ASHA report (1996) suggests that the following areas be included in an evaluation of auditory processing: thorough case history, observations of auditory behaviors via standardized checklists or questionnaires, and audiological testing including both electrophysiological and behavioral techniques designed to "examine auditory function with rigorously specified conditions" (ASHA, 1996, p. 151). The Report of the Consensus Conference on the Diagnosis of Auditory Processing Disorders in School Aged Children (Jerger & Musiek, 2000) adds the following list of disorders that need to be ruled out before a diagnosis of auditory processing disorder (APD) can be made:

- a. Attention Deficit Hyperactivity Disorder (ADHD) language impairment
- b. reading disability
- c. learning disability
- d. autism spectrum disorder and
- e. reduced intellectual functioning.

The AAA's consensus statement stressed the need for differential diagnosis of APD. Furthermore, it indicated the difficulty in choosing appropriate students for referral and the minimal test battery needed for evaluating and identifying these students. The consensus statement reported the best diagnosis of APD was with a three-pronged approach: behavioral assessment, electrophysiological testing, and neuroimaging. Recognizing that the last two methods are expensive and not readily available in the schools, this report stressed the use of behavioral testing with some supplemental electrophysiological testing (Jerger & Musiek, 2002; Katz, et al., 2002). The test areas recommended were as follows:

"Behavioral Measures

- pure tone audiometry
- performance intensity functions for word recognition
- a dichotic task (e.g., dichotic digits, dichotic words or dichotic sentences)
- duration pattern sequence test
- temporal gap detection

Electroacoustic and Electrophysiologic Measures

- immittance audiometry
- otoacoustic emissions" (JAAA, 2000, p. 471-2).

Auditory Processing Disorders Services in Central Pennsylvania

In the State of Pennsylvania, part 300 of the Federal Register (US Government, 1999), and the Chapter 14 PA Regulations (Pa. Department of Education, 2001) defines

special education. These two sections define hearing impairment as "an impairment in hearing whether permanent or fluctuating, that adversely affects a child's educational performance, but that is not included under the definition of deafness in this section" (US Government, 1999; Pa. Department of Education, 2000 p.3). Pennsylvania law defines deafness as hearing impairment so severe as to preclude the child's use of linguistic information through hearing without amplification. The Lincoln Intermediate Unit (LIU), a state agency organized to provide special education services to 25 school districts in the State of Pennsylvania, used this definition of hearing impairment to provide services to many students with auditory processing difficulties needing educational support, but not qualifying for Learning Support Services.

In addition to the recommended battery of tests, the Recommended Professional Practices for Educational Audiologists (EAA, 1997) suggested that the educational audiologist must function as part of a multidisciplinary team. The audiologist is the logical member of the multidisciplinary team, to provide assessment, identification, and information on audition and how the child is receiving auditory information. The educational team must decide if the student fits the definition of a state defined category of special education.

The procedures used to refer and test children suspected of auditory processing disorders within an educational system vary by state, by local educational agencies, and by personnel providing these services within the school systems. There is little research on how educational teams decide which children should receive audiological educational assessments for auditory processing weaknesses. Recognizing this, the LIU Task Force on Auditory Processing set up standards for a processing referral of a school age student.

"In the Consensus Statement, Jerger & Musiek (2000) initially discussed the need to use standardized questionnaires for identifying children to refer for AP testing. This type of screening, designed for maximal sensitivity to APD traits in children, lacks specificity (Jerger and Musiek, 2000, p. 468). Blumsack (2001) suggested that screening with a standardized questionnaire should be an established part of a referral for an auditory processing evaluation to provide the examiner with information on the student's functional auditory skills. Blumsack described the following questionnaires that might be useful for such evaluations:

1. The Children's Auditory Performance Scale (C.H.A.P.S.; Smoski, Brunt, & Tannahill, 1998) evaluates diverse listening situations.

2. The Listening Inventory for Education (L.I.F.E.; Anderson & Smaldino, 1998) examines listening difficulty in a variety of situations.
3. The Screening Instrument for Targeting Educational Risk (S.I.F.T.E.R.; Anderson, 1989) and the Preschool Screening Instrument for Targeting Educational Risk (Preschool S.I.F.T.E.R.; Anderson & Matkin, 1996) assesses functional listening behavior.

The LIU created an informal Task Force on Auditory Processing to develop policies for audiologists and referring school districts. The task force consisted of supervisors of the Hearing Support, Preschool, Speech / Language Support and Psychological Services Programs as well as members from each of these programs.

This task force established the following prerequisites for referring students for auditory processing testing by the educational audiologist. The goal of these criteria was not to rule out any referral, but to try to make the referral system work for the student's benefit. The intention is to refer those students who are the most appropriate for testing. The pre-established criteria are as follows:

1. Referral Process: A team approach to assessment is best. An auditory processing assessment cannot be a single discipline assessment (Florida Department of Education, 2001). In Pennsylvania, the educational teams in elementary and middle/junior high schools are Instructional Support Teams (IST), chaired by an experienced teacher, who is in charge of the referral process. It is strongly suggested that a psycho-educational evaluation and a speech-language evaluation should comprise the initial part of the processing evaluation. This provides the audiologist with a basis on which to compare standard scores. Student referral should be through the IST process. The IST is a group of experienced educators implementing strategies to assist the teacher or child in difficulty. The LIU Task Force on Auditory Processing cannot provide school district policy, on this topic, it can only recommend "best practices" to the districts for whom it provides services
2. Academic Struggle: A student referred for auditory processing testing should be in academic struggle. The goal of this evaluation is to assist students in need of assistance, but not identify disabilities of children who are coping and doing well (Colorado Department of Education, 1998). The individual educational team in the child's home school

determines the definition of academic struggle. The IST and individual educational teams consider if the child is not working up to his or her potential, doing poorly in schoolwork or not testing well. The definition of academic struggle varies from district to district. The student may demonstrate weaknesses in the areas of reading or spelling while math skills, except for reading problems, are usually strong (Colorado Department of Education, 1998).

- a. Typically, the student referred for auditory processing testing should have difficulty following auditory instructions, or observed to have difficulty listening in noise (Jerger & Musiek, 2000).
- b. The student with auditory processing weaknesses often has a chronic history of middle ear problems in early childhood (Keith, SCAN, p. 4).
- c. Examples of academic struggle might be demonstrated if a child:
 - i. gets Cs (if IQ is above 95), or Ds and Fs (if IQ is above 80) as report card grades
 - ii. now gets Cs and Ds, but used to get As and Bs
 - iii. is young (first or second grade) and reads well but demonstrates no comprehension of the material, thus affecting performance
 - iv. gets Bs or Cs but spends more than one (elementary), two (middle school), or three (high school) hours every night on homework and studying to achieve those grades
 - v. if a child demonstrates excessive frustration (crying, refusing to go to school, pulling out hair, isolating) in relation to homework
 - vi. if a child is not meeting basic curriculum objectives (and IQ is above 80-85).
3. Cognitive Abilities: The student should have normal intelligence; not more than 1.5 standard deviations below the norm so that intelligence is not considered a factor involved in auditory processing testing. This allows for a differential diagnosis, assuming a child with reduced intellectual skills would have reduced auditory skills (Jerger & Musiek, 2000).

4. Speech and Language Competencies:
 - a. The student referred for auditory processing testing must have a minimum language age of six years or better, be within a year of his or her chronological age of language development, so that language processing and vocabulary are not problematic with regards to auditory processing testing. The variability of auditory skill maturity in children younger than 6 years is too diverse, which makes reliable testing difficult (Florida Department of Education, 2001).
 - b. The student's primary language should be English. The examiner assumes that any other language background will influence test interpretation and results (Keith, 1986; Florida Department of Education, 2001).
 - c. Since most test results for auditory processing require a verbal response, the student's speech must be intelligible. The speech and language pathologist can accurately evaluate this criterion.
5. As Jerger & Musiek (2000) emphasized, no other identified disability should be present, to allow for a differential diagnosis. It would be advantageous for the audiologist to be the last member of the educational team to test the student. If the educational team can rule out the possibility of a student, having a complicating or competing disability the audiologist will be able to diagnose APD with more assurance. To enable an APD diagnosis without confusion, Jerger and Musiek want to identify the following disabilities: attention deficit disorder, language problem, autism spectrum disorders, neurological problem or other learning difficulties. These disorders show increased auditory difficulties as a part of their diagnosis, and may be mistaken for an auditory processing disability (Jerger & Musiek, 2000).
6. Hearing Sensitivity:
 - a. The student needs to have normal and approximately equal hearing in both ears. According to Pennsylvania State Standards for School Nurse testing, school nurses screen all children every other year and should perform a hearing test prior to referring a child for auditory processing testing (Commonwealth of Pennsylvania, 1985). If the student has a hearing loss, it is assumed that she or he will have processing difficulty due

to the hearing loss and further specific testing for auditory processing will not provide specific diagnosis (Keith, 1986; Florida Department of Education, 2001).

- b. A significant middle ear dysfunction, such as the presence of ear fluid or infection may influence test results, and should not be present at the time of testing (Keith, 1986).
7. Screening Tools: Educational teams should employ at least one screening tool to indicate the need for a child to have specialized auditory assessment. Before referring to an audiologist for an AP evaluation, the educational team should administer, score, and interpret the child's performance on a screening tool (DeConde Johnson, Seaton, & Benson, 1997; Colorado Department of Education, 1997). The following three screening tools were suggested in the Colorado Guidelines (1997):
 - a. The Screening Instrument for Targeting Educational Risk (Anderson, 1989)
 - b. Children's Auditory Performance Scale (Smoski et al., 1998)
 - c. Fisher's Auditory Problems Checklist (Fisher, 1985).

This project reviewed two years of auditory processing referrals of one audiologist (author) in the Lincoln Intermediate Unit (LIU) #12 in central Pennsylvania. This project set out to determine if the referring school districts followed the recommended procedures prior to referring a student for an auditory processing evaluation. Upon receiving an AP referral, the audiologist evaluated the information available in light of the ten variables desired. These referrals were categorized based on (1) educational placements or services received, (2) if any of the three appropriate prescreening forms were used prior to the referral, and (3) if the Communication Checklist, developed by the LIU #12 audiologists, was used prior to referring the student. (See Appendix A for checklist.)

Method

Data sources

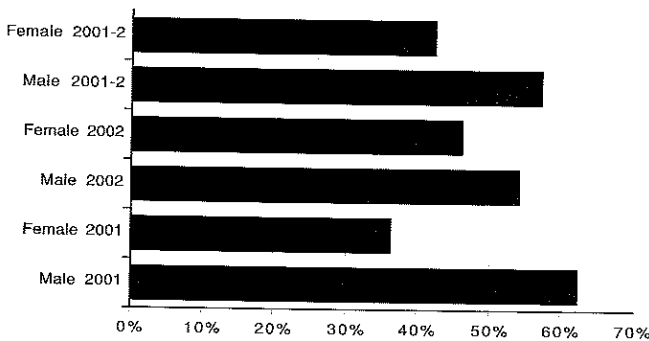
The data sources for this review were the audiological records of the students referred to the LIU #12 audiologist (author) for auditory processing testing in 2001-2002. In 2001, the audiologist tested thirty-five students for testing for auditory processing. In 2002, the audiologist tested

fifty-six students for auditory processing. The only data extracted for use in this review were the student's age, sex, resulting educational placement (if any), and a listing of the type of information supplied at the time of the referral to the audiologist. No other individual student or district information identified the data sources.

Subjects

Of the total number of students (N = 35) referred during the first year, 62% (N=22) were male and 36% (N=13) were female. In the second year, the students (N =56) were broken down into 54% (N=30) male and 46% (N=26) female referrals. Combined, the total referrals for the 91 students in both years, were 38% (N = 35) referred in the in the first year and 62% (N=56) in the second year. Overall, the male-female referral breakdown was 57% (N=52) male and 42% (N=39) female. In 2001, the average age for a referred student was 8 years and in 2002, it was 9 years.

Figure 1. Ratio of Male to Female Students in the Study



Required Information

The following is a list of the information that was required by the audiologist from referral sources prior to the audiologist beginning auditory processing testing. These variables comprise the information acquired prior to testing. The bolded items are the Figure heading displayed in Figure 2.

1. Screening Tools: Did the educational team (IST) use at least **one prescreening tool** prior to the referral?
2. Speech-Language Competencies: Was the child's English skill level within 1 year of his chronological age and at least at the 6-year age level? A **speech-language evaluation** accurately determines this.
3. Cognitive Abilities: Did the student have any **other** identified educational **disabilities** that might impair his/her auditory processing?

4. Cognitive Abilities: Did the referring school use a **psycho educational evaluation** to look at child in his or her educational environment?
5. Cognitive Abilities: Did the child have **normal intelligence**?
6. Screening Tools: Did the educational team (IST) use the LIU #12 **Communication Profile** prior to referring the child for evaluation?
7. Referral Process: Did the referring team use the **IST Process**? Were child data reviewed and analyses by a team approach? Did the referring school use a team approach?
8. Academic Struggle: Was the student in **academic struggle**?
9. Hearing Sensitivity: Did the student pass a **hearing screening**?
10. Speech-Language Competencies: Was the child's **speech intelligible**?

Procedures

There were several steps in this project. First, to establish a research basis for use of screening forms in determining AP candidacy, a graded literature review was proposed. The U.S. Department of Health and Human Services Agency for Healthcare Research and Quality Guidelines (2002) and modified levels of evidence rating approach (Appendix B) from the American Academy of Audiology (2000) were applied to the literature review. This established a scientific basis for evaluating any studies on APD screening tools. The goal of a graded review of scientific research was to establish support for improved prescreening methods for auditory processing referrals.

Second, the author reviewed records of candidates referred for auditory processing evaluation in a K-12 educational setting over the past two years. This review process involved retrospectively evaluating whether those referrals met the established criteria of the LIU #12 Auditory Processing Task Force. Results were tallied in a chart format.

Three outcomes were possible. These included the following:

- (1) the child was determined to be in need of special services,
- (2) the child was determined not to be in need of special services, or
- (3) the child was not in need of special services but a 504 plan was established to support the child in other ways such as preferential seating, testing in a quiet room, etc.

Results

For the past 20 years, the Lincoln Intermediate Unit has worked to educate its employees and district personnel on auditory processing and to develop a specialized referral system. In the first year of this study (2001), school districts referred 35 students for auditory processing testing (2001), and school districts referred 56 students in second year (2002).

Examining the records review in a category-by-category basis, most of the children tested had intelligible speech (98% or N=89), normal hearing on a school nurse screening (97% or N= 88), and presented the educational teams with academic struggle (92% or N=84). A slightly lower number of referrals came through the IST process (90% or N=82) and used the LIU #12 Communication Checklist for Auditory Processing Referrals (79% or N=72).

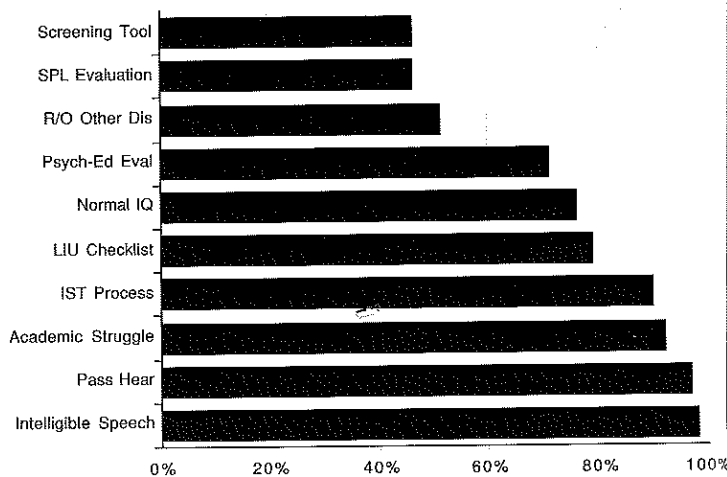
Most of the referrals (76% or N=69) sent to the audiologist could be classified as having normal intelligence on either psychological or other standardized testing (testing by the guidance counselor). In fact many did have a full psychoeducational battery prior to being seen by the audiologist (71% or N=65). In 51% (N=46) of the referrals, the educational teams ruled out other disabilities prior to referring to the audiologist. A speech and language evaluation was only done in less than half (46%, N=42) of the referrals. Referral sources used one of the three screening tools in 46% (N=42) of the referrals to the audiologist.

The inclusive figure of two years of results shows that most of the children referred had intelligible speech (98%), passed the school nurse's hearing screening (97%), were in academic struggle (92%), and went through the IST process prior to the referral to the audiologist (90%). Many of the referring school districts used the LIU #12-communication check list for auditory processing disorders prior to referring a student for an auditory processing evaluation (77%) and in over 76% of the instances an educational team could verify through some type of testing that the student tested at a normal level of intelligence (76%). Educational teams were only able to rule out other disabilities in 50% of the instances prior to referring to the audiologist. A speech and language evaluation done on only 46% of the referrals, so levels language and speech of development was not be verified prior testing. This lack of clear language scores may influence results. In 46% of the referrals, the referring team used one of the screening tools – the CHAPS, the FISHER or the SIFTER .

The SIFTER was one of the forms most often used by the district personnel when referring a student for an AP

evaluation. Personnel found the SIFTER easy to fill out and fast. Instructional Support Teachers reported it made sense to use the SIFTER because it provided data on how the student compared to peers in the classroom. The introduction of the CHAPS and the FISHER to the districts was slow. The Instructional Support Teachers reported the CHAPS was cumbersome to administer and difficult to score. The FISHER, while shorter, was too similar to the other forms they use for behavior and attention difficulties.

Figure 2. Variables of Categories of Information Acquired Prior to Testing (2001-2002)



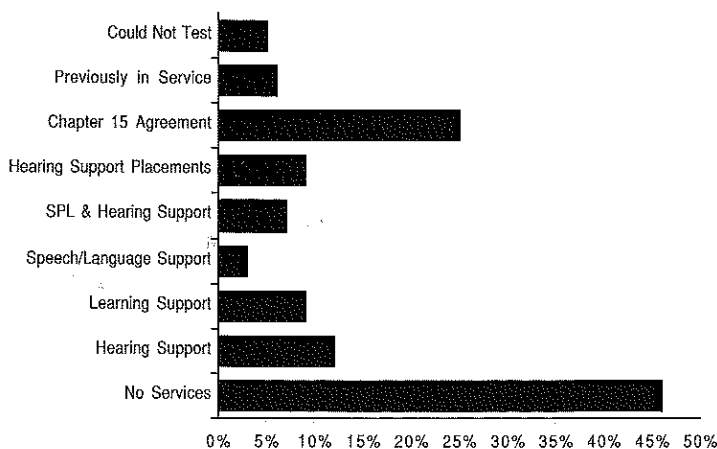
In the combined figures of 2001 and 2002, with a total student population of 91, 46% (N=42) of the students received no special education service as a result of receiving an auditory processing evaluation and resulting educational team meetings. The largest category of placement was in Hearing Support Services (12%, N=11) followed by Learning Support (10%, N=9). The rest of the placements remained stable for both years and combined: Hearing, Speech, and Language Placements (7%, N=6), Speech and Language placements (4%, N=4 students), students with conductive or cochlear hearing loss and Hearing Support placements were 9% of the population (N=8 students). Students who could not be tested were 5% of the population (N=5 students) and 7 were previously placed students (6% of the total population).

In both years of this study, 26% of students tested received either Chapter 14, Special Education referrals primarily due to AP testing or Chapter 15, Protected Education services as a result of AP testing. A Chapter 14 or Special Education placement due to AP testing would include any students placed in speech or hearing services due to AP testing and not due to other impairments or sensory deficits. The initial two Chapter 14 groups:

learning support (N=9, 10%) and students with hearing loss (N=5, 5%) were not placed in services due to AP testing. The twenty one students in Chapter 14 Services who were placed due to AP testing (23%) would include eleven students placed in hearing support (12%), three students placed in speech and language support (3%), and six students placed in a combination of speech and hearing support services (7%). When added to the three students for whom a Chapter 15 or Protected Education or 504 plan was written (3%), this suggests an AP placement rate of 26% per year.

Placements in education are not static and vary with the child's needs. Testing for APD that does not result in Chapter 14 or Chapter 15 services does not mean those children are not receiving extra help through other means in their school, and it does not mean they may not require services later. Of the 42 student not placed in service at this time, 30 students (71% of those not served) received no speech and language evaluation prior to referral for AP testing. Twelve or 29% of the students who required no services after AP testing received a speech and language evaluation prior to their referral. Fifty percent of students receiving either Chapter 14 or Chapter 15 services received speech and language evaluations prior to referral to the audiologist and 50 % had no previous speech and language evaluation that was available to the audiologist.

Figure 3. Student Placements after APD Testing



Discussion

A review of the information available on the 91 students referred for auditory processing testing to the educational audiologist in the Lincoln Intermediate Unit in central Pennsylvania over a 2-year period was the basis for this study. The statistical information provided by this project to the intermediate unit and the school districts on the referral procedures for audiological referrals in the

existing educational system is needed so that a baseline is established for further study. Providing statistical information to the end users on the use of appropriate prescreening forms, selection criteria for APD referrals, and developing a guide for other intermediate units for APD referral criteria was also a part of this project. Based on the retrospective data, the school districts referring students were meeting many of the ten goals set forth by the LIU auditory processing task force. Most of the children referred met the basic requirements of:

- having intelligible speech,
- normal hearing, being in academic struggle,
- having gone through the IST process,
- having tested at a normal intelligence level,
- having had a psychoeducational evaluation, and
- referred using the LIU #12 checklist for auditory processing referrals.

This was a lengthy process, requiring negotiations with representatives of all disciplines and referral sources involved. Most of the referring school districts and the intermediate unit have worked closely on appropriate referral procedures for auditory processing for over 15 years refining policies and discussing how best to implement changes.

Areas that still need work include a full speech and language evaluation prior to the referral to the audiologist (available in only 46% of the instances). If a student received a speech and language evaluation before the referral of a student to the audiologist, the educational team's ability to rule out other disabilities would improve. Before diagnosing APD, therapists must rule out a speech and language disorder. Children without prior testing by a speech and language pathologist were referred for testing after the audiologist tested if there were any concerns. This delayed the educational process for all involved stakeholders. Inservicing the districts and in the intermediate unit personnel on the need for prior speech and language evaluations for APD referrals would speed up the referral process.

For the past three years, school districts were encouraged to use the three prescreening forms for AP referrals. A 46% (N= 42) response is considered reasonable for the use of new tools in the educational system. Training school district personnel in the acceptance and the use of a new test or system is difficult and takes time. The SIFTER is familiar to the school districts. The Hearing Support staff used the SIFTER to evaluate hearing support students in the York County area yearly. A literature review revealed

no research data to support the use of the CHAPS or Fisher's Checklist as a pre-screening tool for AP assessment, therefore, no evidence supporting the use of these tools was analyzed.

Based on this review of the data obtained through this project, it is evident that there is an additional need for inservice instruction on referral procedures for auditory processing testing. Both educators and instructional support teachers who make the initial referrals, and psychologists and speech and language pathologists who do much of the district testing would be candidates for recipients of this type of training. Ideally, training would reinforce appropriate practices for those employed by both the intermediate unit and school districts. Inservicing working professionals on appropriate AP referral techniques would enhance the referral process and decrease the inappropriate students referred by educational teams.

The referral teams from the school districts and the audiology staff should continue to discuss the usefulness and appropriateness of prescreening forms when referring children for auditory processing evaluations. The IST personnel from some school districts asked for a pre-screening form to assist them in determining appropriate candidates for AP referrals. The LIU #12 Auditory Processing Task Force selected the SIFTER, the CHAPS and the FISHER to be used and evaluated as prescreening for AP referrals. Previously, the LIU had designed and used an LIU Communication Checklist as a pre-referral checklist for APD students. Due to its familiarity to the school districts, the LIU Communication Checklist was the most common form returned with APD referrals (77%, N=65). This form provides basic information on the child's medical history and auditory and academic difficulties. Given more inservice time and more experience, the school teams may feel more comfortable using the SIFTER, the CHAPS or the FISHER as pre-screening tools for auditory processing referrals. The danger in prescreening is always selectivity and specificity. The best prescreening form is a compromise between referring too few and too many students.

After two years of use it was determined that the FISHER Checklist was heavily laden with language and attention items that will also highlight a child with attention and language difficulties, thereby decreasing the specificity but increasing the number of students referred. The FISHER checklist provides poorly established norms and confusing interpretations to the school district personnel. Based on this information, the LIU#12 Auditory Processing Task Force has discontinued the use of the Fisher's Checklist as a prescreening form.

Of the total students referred (N=91) 57% were male (N=52) and 42% were female (N=39), favoring the males students slightly each year and in the total. Most of the students referred for testing could complete the auditory testing battery with the exception of a very small number of children each year. This group was deemed inappropriate for testing due to having a sensorineural or conductive hearing loss (5%, N=5), severe language difficulty (2%, N=2), or emotional problems resulting in an inability to cooperate for testing (3%, N=3). The audiologist used an established test battery to evaluate the remaining children referred (89%, N=81). These findings suggest that when the referral procedure is used successfully, it serves to select students who can participate in the complex tasks involved in auditory processing testing. Increasing the number of speech and language evaluations administered to students prior to the referral to the audiologist may improve the LIU #12 AP referral system and may decrease over referrals. This would benefit the students and all stakeholders in the tri-county area.

This study demonstrated that the selected districts used in this study are effectively meeting many of the referral requirements. The intermediate unit needs to examine how all of the school districts involved in the intermediate unit refer students for auditory processing evaluations to determine inservicing needs. Due to the large geographical area and the regional differences in personnel, there may be slight differences in how districts work with students. Intermediate unit-wide inservicing usually insures that all intermediate unit personnel handle students suspected of auditory processing disorder in the same manner. The intermediate unit personnel then train their school district personnel. The development of a PowerPoint® presentation for distribution to all speech and hearing support personnel would assist this dissemination of information. This PowerPoint® presentation would include a basic definition of AP, the appropriate referral practices, the need to a pre-referral psychological and speech and language testing, and the use of a screening test to determine scope of candidacy. It would also serve to improve referral practices, standardize the use of standardized pre-referral forms, and help publicize the image of auditory processing testing as a multidisciplinary team effort.

When the Lincoln Intermediate Unit audiologists began testing for auditory processing there were concerns expressed by the school districts that this category of students was unstructured and poorly defined. The Lincoln Intermediate Unit Task Force on Auditory Processing established standards for measurement so that there would be an

“educational yardstick” on which to base an audiological diagnosis. The review of the final placement records of the students in this study established placement trends for the school districts in the central Pennsylvania Region. In both years of testing, and in the combined years, the largest category of students was those students who received no services at all (2001= 57%, 2002=39%, overall= 46%). The eight to nine year old age range included most of the children referred. This may represent a vulnerable period in the child’s growth and development. This is also an age/grade placement where academic instruction is delivered differently; children must assume more responsibility for their work. As children enter the upper grades there is more emphasis on auditory instructions and less on multi-sensory exposure (Battin, 1995). Most of the children tested received referral through the Instructional Support Teams and psychological evaluations, which would examine their learning difficulties and tried problem solving for behavioral solutions prior to a referral to the audiologist. For many of the children, who scored in the normal range on auditory processing tests, this testing provided reassurance to parents and educators concerned with the child’s progress.

Of the children placed, only a small number resulted in speech and language services. This outcome may be due to the fact that academic failure was a criterion for this referral. Speech and language needs identified in kindergarten or early intervention screenings account for some children already in service. Those with academic needs would begin to show up in third or fourth grade, when information moves from the primarily visual and auditory modes of transmission in the classrooms to the primarily auditory modes (Battin, 1995). The learning support placements are not a direct result of the auditory processing testing. Audiological testing cannot place a child in learning support services; only psychological testing can do that. However, the psychologist writing the report that will place the child in services might view the noted auditory processing weaknesses as a contributing factor. The 10% overall learning support placements are indirect results of auditory processing testing. The 12 % hearing support placements are a direct result of the auditory processing testing and represent children who, on the audiologist’s tests, failed at least two major tests of auditory processing skills at more than 1.5 standard deviations from the mean. This student would also have to have scored significantly below the mean on a hearing support teacher’s test battery to qualify for service. A smaller percentage of students receive both speech/language and hearing services

(7%, N= 64) and only 4% (N=4) receive speech and language services because of the audiologists testing for auditory processing.

The most interesting groups of students were those that could not complete the test. The “could not test” group (due to language or social/emotional difficulties) comprised 5% of the population (N=5). Those with hearing loss in the “could not test” group composed 5% (N=5) of the overall population.

A yearly descriptive analysis of auditory processing testing results would be beneficial. This would allow the LIU to determine if the percentages are stable over time. This review shows that referral to the audiologist is not an automatic placement into service. In addition, educational teams with children already in service have requested testing to obtain more information.

Educational auditory processing testing is a growing field and the audiologists need to continue to work closely with the districts they serve to develop appropriate methods of referral, feedback, and training in new techniques. Audiologists must make data collection a priority if they are to evaluate their own testing and referral procedures.

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APPENDICES

- A. Communication Profile: Communication Checklist For The Audiologist
- B. Quality Of Evidence For Analysis Of Data For Evaluating Prescreening Algorithms
- C. Sample Chart Of Retrospective Analysis Of Student Referrals For APD Testing

When referring a student for an Auditory Processing Evaluation- Please complete this form:

COMMUNICATION CHECKLIST FOR THE AUDIOLOGIST

Please submit to the LIU#12 with Chapter 14 (Special Education SE601)
or Chapter 15 (Protected Education also called a 504 Plan) Referral

Person Completing this Form: _____ Date: _____

Student Name: _____ Birthdate: _____ School: _____ Grade: _____

CHECK ALL THAT APPLY:

The SIFTER / FISHER / CHAPS was filled in and returned to the audiologist by _____.

The student is in academic struggle. (If the student is not in academic struggle the disability may be identified, but not served, as there may be no educational need.)

The student is labeled as Learning Disabled but is not successful in the Learning Support Classroom.

The student has a normal IQ and is not previously diagnosed as having a Neurological Impairment, Pervasive Developmental Delay, Autism, or other disability that would preclude a differential diagnosis.

The student has normal hearing in both ears.

The student has a history of ear infections and has / has not had PE tubes placed _____ times.

The student has difficulty following verbal instructions or directions.

The student has difficulty listening in noise.

The student has weaknesses in the following areas: (Circle all that apply):

READING SPELLING LANGUAGE MATH OTHER _____

Please list all medications the student is currently taking: _____

If the student is usually on medication daily prior to this evaluation, **PLEASE NOTIFY THE NURSE & THE PARENT TO CONTINUE THE MEDICATION.**

Does the student have a diagnosis either medical or educational? YES NO

If the answer is "YES", what is the diagnosis? _____

Persons requesting the referral are: Psychologist Teacher IST team Parent Doctor (kind of Dr _____) Speech Therapist Other

YORK COUNTY - YORKSHIRE CENTER - EASTERN SATELLITE OFFICE
295 Mills Street, York, Pa 17402 ** LIU #12 FAX: 717-757-1385, LIU# 12 PHONE 717-757-1531,

NOTE: APD EVALUATIONS TAKE APPROXIMATELY 2 HOURS AND ARE DONE AT ONE OF THE THREE MAIN OFFICES BY ONE OF THE AUDIOLOGIST

The parent needs to stay in the building with the child while the evaluation is taking place.

Quality of Evidence for Analysis of Data for Evaluating Prescreening Algorithms

Grade I: Strong evidence typically associated with randomized controlled trials or well designed clinical studies. Recommendation is indicated, accepted, and considered effective or useful.

Grade II: Evidence associated with retrospective analysis clinical studies, non-randomized and not well-controlled clinical trials, or panel consensus based on exacting guidelines and practice patterns. Recommendation is accepted, supported by weight of evidence, and considered effective or useful.

Grade III: Evidence associated with current or long-standing practice patterns without substantial supporting or basic clinical data. Recommendation is acceptable; however, necessity or usefulness may be questioned. Recommendation is not harmful.

Note: Adapted from "Audiology Clinical Practice Algorithms and Statements," by Joint Committee on Clinical Practice Algorithms and Statements, 2000, American Academy of Audiology, *Audiology Today* [Special Issue] August, p. 7 table 2.

Referral Number and Year	Sex	Age	IST Involved	Academic Struggle Present	Psycho-ed Evaluation Done	IQ was within Normal Range	R/O Other Disabilities	SPL Eval done	Speech Was Intelligible	Passed Hearing Screen	Used Screen Tools	Used Comm. Profile	Qualify For Service
2000-1	M	8	1	1	1	1	0	0	1	1	1	1	HS & SPL
2000-2	F	9	1	1	1	1	1	0	1	1	1	1	LD
2000-3													
2000-4													
Etc.													