ABSTRACT

Title of Thesis:	SLP PREPAREDNESS TO TREAT CO-OCCURRING APHASIA AND AUDITORY IMPAIRMENT IN TRAINING AND PRACTICE
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Despite the prevalence of co-occurring aphasia and auditory impairment, speech-language pathologists are often inconsistent in screening for hearing issues during aphasia rehabilitation. Studies have shown knowledge gaps and lack of interprofessional resources may contribute to inadequate screenings; however; this topic remains largely understudied. As auditory impairment can have a profound therapeutic and social impact on persons with aphasia (PWA), it is important to understand the challenges both future and current clinicians face in conducting. The purpose of this mixed-method study is to identify audiologic-related knowledge gaps and perceived preparedness in working with PWA among graduate students and clinicians. Twenty-four participants (student $n = 12$, clinician $n = 12$) completed a questionnaire assessing knowledge of hearing screenings, confidence, and preparedness via closed and audio-recorded, open-ended responses. A Welch's independent t-test and a Wilcoxon rank-sum test were conducted to determine if there were any group differences in knowledge score and perceived preparedness ratings. The open-ended responses regarding perceived preparedness were analyzed using reflexive thematic analysis. Results showed no statistically significant difference between graduate students and clinicians in knowledge scores or perceived preparedness ratings ($p \leq .05$).

Additionally, average scores for the students (M = 8.00, SD = 0.95) and clinicians (M = 7.42, SD = 1.62) were notably low (max score = 16). Qualitatively, three major themes emerged concerning perceived preparedness: Inadequate training for addressing co-occurring aphasia and auditory impairment, Limited resources and interprofessional barriers, and Ongoing training needs from graduate education to clinical practice. These findings support previous research and highlight the need for increased clinical exposure, ongoing interprofessional training and resources, as well as facility support which may help to improve overall treatment of co-occurring aphasia and auditory impairment.

SLP PREPAREDNESS TO TREAT CO-OCCURRING APHASIA AND AUDITORY IMPAIRMENT IN TRAINING AND PRACTICE

by

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Dedication

I dedicate this work to my Pata, William Shiflet, whose experience with hearing loss inspired this project. His positivity, unwavering support, and constant encouragement, especially his reminder to “keep sparkling,” have meant so much to me throughout my life.

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Introduction

Aphasia is a language disorder often characterized by difficulty in speaking, writing, or comprehending language. While aphasia can occur because of various brain and neurological injuries, it is most commonly a result of a cerebrovascular accident (CVA). Research has estimated 25-40% of individuals with CVA will experience aphasia (Le et al., 2024). Relatedly, approximately 75% of CVAs occur in adults aged 65 years and older (Yousufuddin & Young, 2019). Because both aphasia and auditory impairment are associated with aging and stroke-related risk factors, their co-occurrence is common. Consequently, the presence of concurrent auditory impairment is an important consideration in the assessment and treatment of aphasia. Auditory impairments include both sensory (i.e., hearing loss) and neurological (i.e., central auditory processing disorder) conditions impacting an individual's ability to process speech or sounds. This can be detrimental to persons with aphasia (PWA) who are already experiencing significant language difficulty.

Aphasia and Hearing Loss

In a foundational study, Street (1957) evaluated 90 PWA and found that 88% had some degree of hearing loss, with 55% experiencing speech frequency hearing loss (125, 250, 500, 1000, or 2000 Hz), thus significantly impacting effective communication. This type of hearing loss eliminates critical acoustic cues necessary for speech comprehension and understanding, and when combined with aphasia, further exacerbates communication difficulties. Using a large-scale registry of 76,020 participants, a Taiwanese study also found that PWA were 5.65 times more likely to develop sudden sensorineural hearing loss (SSNHL) than patients without a CVA within a 1-year period (Kuo et al., 2016). The authors emphasized the importance of accounting

for post-CVA hearing loss and attributed the historical underestimation of its incidence to a lack of clinical awareness, the under-investigation of this topic, and the general acceptance that hearing loss is inevitable, which has led to little effort being made to examine it in this population. This highlights a critical knowledge gap regarding CVA and hearing loss which has notable implications for aphasia rehabilitation.

Current literature also suggests that age-related hearing loss can reduce therapeutic success in aphasia rehabilitation. For instance, if instructions or stimuli are not audible, PWA can appear unresponsive or answer "incorrectly" during assessment, which can inflate severity estimates and risks invalid results (Zhang et al., 2018). Yet, despite the noted impact of hearing loss on aphasia assessment, hearing screenings are conducted inconsistently in this population (Medeiros et al., 2018). This further demonstrates the critical importance of considering both conditions in clinical practice.

Aphasia and Auditory Processing

In the absence of hearing loss, PWA may also experience reduced auditory processing in noisy environments, further complicating language abilities. Research has shown that PWA performs significantly worse than controls on speech perception tasks in noisy environments, despite having comparable pure-tone audiometry results (Rankin et al., 2014). Specifically, participants demonstrated impaired discrimination of sounds, reduced sentence comprehension in noise, and greater self-reported hearing disability compared to those without aphasia. These results show that PWA are more affected by speech in noise compared to people with normal hearing (Rankin et al., 2014). The study also found that hearing questionnaires administered to

gauge patient perception of deficits alone failed to capture the full extent of auditory disability, reinforcing the necessity of formal hearing evaluations.

Villard and Kidd (2019) had similar findings when they observed energetic masking (i.e., listening to non-speech noise) and informational masking (i.e., listening to unintelligible speech) on receptive speech processing among 12 PWA and 12 age-matched healthy controls (HC). Although both groups were similarly affected by the energetic masking condition, PWA showed greater susceptibility to the effects of informational masking. Furthermore, the observed susceptibility could not be attributed to age, hearing loss, or comprehension deficits. This suggests that PWA may struggle to separate target speech from other voices. When communication partners' speech is harder to detect in noisy environments, social engagement and even therapy progress can suffer. The authors note that clinicians often treat PWA in quiet settings; which is not reflective of their clients' everyday listening interactions (e.g., family gathering, crowded store). While the study was geared towards audiologists, SLPs and their clients may benefit from this knowledge as well as the implications of how noisy listening environments may impact speech processing in PWA.

Research has also found that acoustic and phonemic processing are impaired in PWA. Kries et al. (2023) examined rise time processing and phoneme identification in 29 PWA and 23 age-matched HC. They tested how well the brain can detect an increase in loudness over time at the onset of a speech syllable (rise-time processing), as well as phoneme identification, by discriminating speech sounds. Seventy-six percent of PWA in the study exhibited low-level acoustic or phonemic processing impairment. Results also showed that PWA had significantly poorer performance compared to HC, even after controlling for hearing levels and cognitive

function. The authors concluded that many PWA demonstrate impairments in spectro-temporal processing, core mechanisms that are not currently assessed or addressed in standard clinical practice. Taken together, these findings underscore the need for more comprehensive auditory assessment and intervention approaches in this population.

SLP Clinicians' Knowledge and Practices Concerning Aphasia and Auditory Impairment

Despite the prevalence of auditory impairments in individuals with CVA, and more specifically in PWA, consistent assessment for auditory impairment in this population remains limited. This is especially true for speech-language pathology (SLP). In a New Zealand study examining SLP clinicians' knowledge of hearing loss and perspective of audiology collaboration ($N = 25$), participants demonstrated a solid understanding of basic hearing loss concepts but reported limited experience with hearing devices and a lack of clarity around referral pathways (Collinson, 2020). More specifically, 48% of participants make 1-5 referrals a year, with only 12% making more than 10 (Collinson, 2020). Results also revealed that only 16% of participants collaborated with audiologists on a regular basis. This raises concern because although the participants demonstrated knowledge in ear anatomy and types of hearing loss, the lack of knowledge in hearing technologies and referral pathways may have a detrimental impact on clients.

Similar findings were observed in a study involving clinicians in Pakistan, which found that although participants possessed general knowledge of hearing loss, they lacked familiarity with hearing devices and formal referral procedures (Ali et al., 2025). The mean score on an assessment of their general knowledge of hearing loss among the participants (N=20) was 14.5 out of 20, with an 85% success rate in symptom identification. However, approximately half of

the participants reported a lack of familiarity regarding hearing technology devices (45%), and 75% of participants were confused on referral pathways. Participants also indicated collaboration with audiologists as high priority (4.5 out of 5 rating), demonstrating that lack of collaboration is not due to a lack of interest; but rather barriers in the workplace (Ali et al., 2025).

This challenge becomes even more complex when working with PWA. Silkes and Winterstein (2017) surveyed clinicians working with clients with aphasia to better understand their practices related to hearing screenings. Of the 102 respondents, 65 reported that they consider hearing in some capacity during assessment. However, only 39 of 65 participants reported conducting hearing screenings. More importantly, only one participant from the subgroup fully followed ASHA guidelines for hearing screening. Referral pathways also varied among the 39 participants when a patient failed a hearing screening. Reported referral practices included participants recommending a full hearing evaluation from an audiologist, physician-related referrals, the facility scheduling a full audiologic evaluation , or completing the necessary testing on their own. By contrast, of the 63 participants who indicated they did not conduct hearing screening, the three most reported reasons were lack of adequate equipment (n = 48), time constraints (n = 23) and cost-related reasons (n = 17, Silkes & Winterstein, 2017). Interestingly, over half of the 63 participants (n = 39) indicated they were not aware of ASHA guidelines for hearing screening (Silkes and Winterstein, 2017). These findings reveal that a combination of both resources and lack of procedural knowledge contributes to inconsistent and nonstandardized hearing screening practices. This may have negative effects on therapeutic outcomes and further emphasize the critical need to examine the knowledge, attitudes, and practices among clinicians working with PWA.

Purpose of the Study

Although several key knowledge gaps and strengths have been identified in this domain, the existing literature is notably sparse. To the researcher's knowledge, there are no studies that have examined the knowledge or preparedness of SLP graduate students in working with co-occurring aphasia and auditory impairment and how it compares to clinicians. Exploring the preparedness and confidence of graduate students could provide insight into the effectiveness of current academic and clinical training to better understand the full academic-to-practice continuum. Therefore, the purpose of this study is to examine knowledge gaps and perceived preparedness in aphasia and audiological assessment among SLP graduate students and clinicians. Using a mixed methods approach, this study aims to (1) examine group differences in knowledge and perceived preparedness and (2) explore themes related to perceived confidence and preparedness for clinical practice.

Methods

Participants

Participants were recruited via email, professional and academic SLP-related listservs, and word-of-mouth referrals. General eligibility criteria included: US residency and access to a microphone for the recording of open-ended survey responses. Graduate students had to be currently enrolled in a graduate speech-language pathology program with at least one full year of completion. Students were required to have taken at least one neurogenic-related course with aphasia content. Clinicians must have had at least one year of clinical experience, including experience evaluating PWA. Experience could include the clinical fellowship and could have

occurred at any point in their career. Forty-four individuals were screened with one volunteer who declined to participate. Of the 43 who decided to proceed, there were a total of 17 full and 7 partial survey completers (i.e., completed at least two full sections of the survey). The final total for analysis was 24 participants, with 12 individuals in each group.

Questionnaire

A study-specific questionnaire was developed to assess the knowledge and perceived confidence and preparedness of the participants. Knowledge questions from this survey were based on the American Speech Language and Hearing Association (ASHA) adult hearing screening components (ASHA, n.d.). The remaining questions, including several knowledge questions, were based on questionnaires used in previous literature (Ali et al., 2025; Collinson, 2020; Silkes & Winterstein, 2017) and the study's purpose. The questionnaire was refined for clarity and relevance by incorporating feedback from two current graduate students, a clinician, and audiologist. There were five screening questions and 30 survey questions across three sections: history and demographics (e.g., Have you ever directly collaborated with an audiologist regarding a client with aphasia?); knowledge of audiological assessment (e.g., Briefly describe how you would conduct a hearing screening for a new patient); and perceived confidence and preparedness (e.g., How confident do you feel initiating collaboration with audiologists or related professionals regarding auditory impairments?). The final section included rating questions on a 5-point Likert scale ranging from Strongly Agree to Strongly Disagree, as well as open-ended questions in which participants audio-recorded their responses (e.g., How well do you feel your academic training prepared you to work with clients experiencing auditory impairments?). Audio recordings were used in an effort to capture longer, more detailed

responses. The questionnaire took participants up to 20 minutes to complete and is provided in Appendix A.

Procedure

The anonymous questionnaire was administered via Qualtrics due to its multiple layers of encryption and security measures to protect data. Participants were shown an information screen at the start of the survey which outlined the study's purpose, procedures, potential risks and benefits, confidentiality measures, and the voluntary nature of participation. This study utilized implied consent; by proceeding past the consent screen and beginning the survey, individuals indicate their agreement to participate. For the open-ended questions that required audio recording, participants were instructed not to include any personally identifying information (e.g., their name, school, or company name) in their responses. Upon completing the questionnaire, participants received a $15 online gift card for their time and effort. The study was approved by the Institutional Review Board (IRB) at the University of Maryland, College Park.

Data Analysis

Quantitative analyses were conducted using R Version 4.5.2. Responses in the knowledge section were scored based on predefined response criteria from the literature (American Speech-Language-Hearing Association, n.d.; DHH Education, n.d.). A subset of responses was independently scored by the researcher and faculty advisor to confirm consistency. Once agreement was confirmed, the researcher scored the remaining responses using the same criteria. Total knowledge scores were calculated by summing item scores, with higher scores indicating greater knowledge. The maximum possible score for the section was 16 points. A

Welch's independent t-test was conducted to determine if there were differences in mean knowledge scores between students and clinicians. Knowledge scores for each group were normally distributed, as assessed by Shapiro-Wilk test (p =0.208) . There were no outliers based on visual inspection of the boxplots and the groups were homogeneous, as assessed by Levene's test (p = 0.117). As the perceived confidence and preparedness ratings are ordinal data, a Wilcoxon rank sum test was conducted to determine if median differences exist between the groups. The multiple ratings were combined into a single score, based on an acceptable level of internal consistency (α = .70) using Cronbach's alpha. All tests were two-tailed with an alpha level of .05.

Qualitatively, the open-ended responses from the perceived confidence and preparedness section were transcribed, organized, and coded manually in a spreadsheet to facilitate data management. Data analysis was conducted using Braun and Clarke's reflexive thematic analysis (RTA; Braun and Clarke, 2013). This qualitative research method is a flexible, but systematic 6-phase approach that utilizes both inductive and deductive analysis to identify patterns within the data: familiarization, coding, generating themes, reviewing themes, defining themes, and writing up. The hallmark of this approach is that it emphasizes the researcher's active role and background in the interpretation process. The primary analysis was conducted by an SLP graduate student. The faculty advisor, an experienced medical SLP clinician, contributed to analytic discussions and theme refinement. During the analysis, reflexive discussions were used to examine how such experiences and assumptions may influence coding and theme development. Coding was iterative and interpretive rather than consensus driven. Themes were developed through ongoing engagement with the data, memo writing, and reflexive discussion regarding analytic decisions.

Results

Descriptively, the majority of students had experience evaluating a PWA (67%, *n* = 8) with half of the student participants expressing future interest in working with PWA (50%, *n* = 6). The clinicians had an average of 17.35 years of experience (*SD* = 9.35) with one-third of clinicians indicating they had worked with clients with co-occurring aphasia and auditory impairment (*n* = 4). Regarding the entire cohort, 33% (*n* = 8) participants endorsed previous collaboration with an audiologist with 2 of the participants (both clinicians) directly collaborating with an audiologist regarding a client with aphasia. The participants also had a diverse range of setting experience, with most participants currently externing or working at a clinic, hospital, or school setting. An overview of the participants' professional experience is outlined in Table 1.

Table 1. Professional Experience of Student and Clinician Participants

	Students (*n* = 12)	**Clinicians (*n* = 12)**	**Total (N = 24)**
Training/Work			
Years in graduate school, *M (SD)*	1.08 (.289)	–	–
Previous experience working with a PWA, *n* (%) Yes No	 8 (67) 4 (33)	–	–
Interest in working with a PWA, *n (%)* Yes No Unsure	 6(50) 1(8) 5(42)	–	–
Years of SLP experience, *M (SD)*	–	17.5(9.35)	–

Years of experience working with a PWA, *M(SD)*	–	15.25 (11.82)	–
Currently working with a PWA, n(%) Yes No	– 	 9(75) 3(25)	–
Population			
Experience working with a client with co-occurring aphasia and auditory impairment, *n(%)* Yes, currently Yes, previously, but not currently No Don't know/Don't Remember	 0(0) 3(25) 9(75) 0(0)	 4 (33) 7(58) 0(0) 1(8)	 4(17) 10(42) 9(38) 1(4)
Experience collaborating with an audiologist, *n(%)* Yes No	 4(33) 8(67)	 4(33) 8(67)	 8(33) 16(67)
Experience directly collaborating with an audiologist for a client with aphasia, *n(%)* Yes No	 0(0) 12(100)	 2(17) 10(83)	 2(8) 22(92)
Setting			
Previous externship or work setting(s), *n(%)* Clinic Home Health Hospital Private Practice Schools Skilled Nursing Facility Other	 7(58) 0(0) 5(42) 3(25) 8(67) 0(0) 0(0)	 8(67) 8 (67) 11(92) 3(25) 8 (67) 9(75) 5(42)	 16 (67) 8 (33) 16 (67) 6(25) 16 (67) 9 (38) 5 (21)
Current setting, *n(%)* Clinic Home Health Hospital Private Practice Schools Skilled Nursing Facility Other (e.g., academia)	 0(0) 0(0) 4(33) 2(17) 5 (42) 1(8) 0(0)	 2(17) 0(0) 3(25) 0(0) 0(0) 1(8) 6(50)	 2(8) 0(0) 7(29) 2(8) 5(21) 2(8) 6(25)

Quantitative Results

Participant scores on the knowledge section of the questionnaire ranged from 5-10 out of a maximum possible score of 16. Results from the Welch's *t*-test indicated no statistically significant difference in mean knowledge scores between students (n = 12 , M = 8.00, SD = 0.95) and clinicians (n = 12 , M = 7.42, SD = 1.62), $t(17.795) = 1.0743$, $p = 0.297$. Similarly, the Wilcoxon rank sum test showed no statistically significant difference in perceived confidence and preparedness ratings between students (n =12 , Mdn = 2.59) and clinicians (n = 12 , Mdn = 2.50), $W = 73$, $p = 0.977$. Overall, the quantitative analyses did not reveal meaningful differences between graduate students and clinicians in knowledge or perceived preparedness, indicating that increased experience does not necessarily translate into higher levels of perceived preparedness or knowledge within this sample.

Qualitative Results

The qualitative analysis was based on the collective data from 17 participants (student n = 8, clinician n = 9). Three themes and six subthemes were identified from open-ended responses regarding perceived confidence and preparedness for clinical practice (Table 2). Each theme is described in greater detail below with corresponding illustrative quotes with participants referred to as "participant" followed by a unique number and their group membership in parentheses. Names and any other identifying information were removed, and light editing was performed for readability (e.g., removing repetitive, non-essential fillers).

Table 2. Qualitative Themes for Participants' Perceived Confidence and Preparedness For Working with Clients with Co-occurring Aphasia and Auditory Impairment

Theme	Subthemes	Description
Inadequate Training for Addressing Co-Occurring Aphasia and Auditory Impairment	Pediatric-focused training Lack of interdisciplinary curriculum	Participants said their education was mostly pediatric-focused and did not adequately prepare them to address hearing issues among adults, particularly PWA.
Limited Resources and Interprofessional Barriers	Limited access to resources Challenges in interprofessional communication	Participants described limited clinical tools, few resources, and weak collaboration between speech-language pathology and audiology, which made it harder to support this population effectively.
Ongoing Training Needs from Graduate Education to Clinical Practice	Interdisciplinary trainings/courses Better facility support	Most participants felt more training was needed across both graduate school and clinical practice, including hands-on learning, continuing education, and more collaboration with audiologists.

Theme 1: Inadequate Graduate Training for Addressing Co-Occurring Aphasia and Auditory Impairment

Participants consistently reported that their training was largely pediatric-focused, leaving them feeling underprepared to address auditory impairment in adults with co-occurring aphasia. Students and clinicians also expressed limited hands-on clinical experience concerning hearing considerations in adult populations, such as hearing screenings or managing hearing loss in PWA, which further impacted their preparedness.

> "I do think that as with pediatrics, I feel more confident, but when it comes to older adults with co-occurring morbidities like aphasia … I don't know how to sort and make sure that what they're hearing, what they're encoding, where that breakdown could be." (Participant 103, student)

> "My experience with learning about auditory impairment is confined to kids…my primary experience is in my undergrad minor, which was in a school of audiology, and when I worked at a school for the deaf, so a lot of [experience with] cochlear implants, tubes, a lot of pediatric concerns…" (Participant 107, student)

Minimal opportunities for collaboration with audiologists were also noted, with graduate coursework rarely incorporating audiology content or interdisciplinary experiences:

> "We don't really connect with the audiology department too much in grad school." (Participant 106, student)

> "In grad school I had to complete a certain number of hours completing hearing screenings, but that is about the extent of my hands-on training." (Participant 113, clinician)

Collectively, these experiences contributed to a lack of confidence and insufficient preparation for addressing co-occurring aphasia and auditory impairment across adult patient populations.

<u>Theme 2: Limited Resources and Interprofessional Barriers:</u>

Participants emphasized that gaps in knowledge and training were compounded by limited access to resources. Many participants reported few educational materials, clinical tools, or structured guidance available in both academic and clinical settings.

> "There aren't really any [resources] available at my externship where I worked with adults with aphasia." (Participant 117, student)

> "For patients that are hard of hearing, it can be much more challenging to get the appropriate equipment to augment their hearing and communication." (Participant 113, clinician)

> "In my current skilled nursing facility there are very little resources for the speech pathology team to help them work with individuals who have auditory impairments, including those with co-occurring aphasia." (Participant 127, clinician)

Even when resources existed, participants described several barriers to interprofessional collaborative practice (i.e., audiologists and clients) that limited effective management of co-occurring aphasia and hearing impairment. Specifically, poor coordination and For patients that are hard of hearing, it can be much more challenging to get the appropriate equipment to augment their hearing and communication. (Participant 113, clinician)communication between speech-language pathology and audiology services as well as client challenges to seek audiologic care:

> " My hospital has an outpatient audiology clinic but I'm not aware of any existing collaborations or resources that are shared between inpatient speech pathology and outpatient audiology." (Participant 130, clinician)

> "Poor carryover between patients and families to get them referred to an audiologist for further assessment … finances can be a barrier for patients who don't feel like they can afford hearing aids." (Participant 119, clinician)

Together, these factors limited participants' ability to translate knowledge into practice and highlighted the need for better resource availability and utilization.

Theme 3: Ongoing Training Needs from Graduate Education to Clinical Practice

Although several participants (n = 4) indicated additional training was not needed given the profession's scope of practice (e.g., "As a speech pathologist I do not believe I need more training for auditory impairments because I do not have the ability to diagnose, evaluate or treat hearing disorders. I only have in my scope of practice the ability to screen and then I refer." Participant 120, clinician), the majority of participants identified ongoing training needs across the career journey. Students suggested that more structured and interspersed training opportunities, including hands-on experiences and targeted professional development courses, would enhance confidence and competence. Clinicians similarly expressed the need for continuing education that addresses the practical challenges of working with adults with co-occurring aphasia and auditory impairments in medical settings.

> "I do think that more graduate level training is needed, and it also needs to be dispersed more throughout so we get chances to actually practice what we are doing and not just hear about it but actual hands-on experience." (Participant 103, student)

> "I always, always think it's helpful to actually have direct concrete examples of assessment and treatment with this population. You know they'll give us kind of the educational background and a lot of the trainings, but then we don't get to see a lot of those things in practice or actually seeing you know catching how a hearing loss would impact their aphasia and vice versa if you don't have the experience kind of recognizing those very minute difficulties, they're harder to diagnose." (Participant 128, clinician)

> "I feel like the post-acute environment has become very challenging to optimize our patients' success, and I think having a course that addresses specifically skilled nursing facilities with this topic would be highly beneficial for many speech pathologists." (Participant 127, clinician)

An interprofessional focus was also reported as important, with participants advocating for increased collaboration with audiologists through in-services, joint clinical experiences, or integrated coursework to better prepare professionals for real-world practice:

> "I would love, wherever I work, if we had an in-service with audiology or with an audiologist that serves the population that could give us tips, give us the protocols for how to contact them, when it's appropriate to contact them, things like that, just so everything was very clear." (Participant 117, student)

> "I think that it would be best if there was more collaboration between speech and audiology, at least in our program that we have, and I think that would just better prepare everyone to work with a variety of different clients." (Participant 118, student)

Discussion

This mixed methods study examined knowledge gaps and perceived preparedness related to co-occurring aphasia and auditory impairment among SLP graduate students and clinicians. The results showed no statistically significant differences between students and clinicians in mean knowledge scores or perceived preparedness ratings. The absence of meaningful differences between graduate students and practicing clinicians is an important finding. A common assumption among trainees is that gaps in graduate education will be naturally resolved

once they enter the workforce through day-to-day exposure, mentorship, and repeated clinical experience. In this study, however, perceived confidence and preparedness did not appear to improve from the student to the clinician group, suggesting that "learning it on the job" may not be a reliable expectation regarding this population. Additionally, the generally low scores across both groups also highlight broader gaps in clinical training. On average, the students scored 50% on the knowledge section and the clinicians scored 46.4%. Both groups also indicated only a slightly moderate level of confidence and preparedness, reflecting observed knowledge gaps in audiological assessment.

Qualitatively, participants described consistent challenges related to limited preparation for co-occurring aphasia and auditory impairment, access to resources, and a strong desire for more targeted training across career stages. In Theme 1, inadequate graduate training, pediatric-dominant exposure to hearing loss content, limited hands-on clinical application, and minimal collaboration with audiology after undergraduate coursework were revealed as potential contributors to the participants' knowledge gaps. Several participants described confidence in pediatric contexts but uncertainty when faced with older adults and co-occurring impairments, especially around identifying the breakdown of the deficit (e.g., hearing, encoding, comprehension, or language processing) which underscores the importance of exposure and experience in training. This aligns with previous research regarding PWA training which emphasizes the importance of direct interaction with PWA, interprofessional and team-based education, as well as training approaches that combine structural instruction with experiential learning opportunities. (see Musaji et al., 2024 for a review). Limited resources and interprofessional barriers reflected in Theme 2 suggest that preparedness is not only an individual training issue but also a systems issue. Participants described limited access to

equipment or facility-level support as well as difficulty obtaining appropriate resources for patients who are hard of hearing as significant challenges. Participants also expressed that even when audiology services exist within an organization, communication and coordination is often difficult or nonexistent. These barriers reinforce that competence and confidence may depend heavily on the clinical environment, not simply years of experience. Interprofessional challenges regarding patients (and their families) revealed important considerations navigating logistical and financial demands of care management. These findings mirror related research, where despite the high prevalence of co-occurring aphasia and depression, limited knowledge and systemic barriers such as inadequate resources and a shortage of psychologists contributed to less optimal care (Baker et al., 2021). Similar sentiments have also been observed in studies involving children in school-based settings For instance, Allen and Mayo (2020) found that while speech-language pathologists expressed a desire to work with audiologists, there were consistent system-level barriers related to staffing and available resources. The similarities in barriers across these conditions suggest a lack of interprofessional resources that are critical to the success of clients with co-occurring conditions. For PWA, without adequate resources to auditory impairment, clients may face poorer overall outcomes. Theme 3: Ongoing training needs across career stages revealed that participants want more structured, applied learning such as concrete clinical examples, decision-making guidance, and interprofessional processes. The focus on interdisciplinary collaboration, including clear protocols for when and how to consult audiology, suggests that preparedness is tied to role clarity and team workflows just as much as knowledge.

It is important to note that while some participants expressed feeling that their academic or prior training was sufficient, they emphasized that facility-level constraints limited their

ability to implement what they knew. These constraints included limited access to screening tools or amplification supports, lack of established workflows for hearing screening or audiology referral, and weak interprofessional communication between SLP and audiology services. An interesting pattern observed was a mismatch between perceived adequacy of training and demonstrated knowledge. Some participants described their preparation as adequate or expressed general confidence yet still scored notably low on the knowledge measure. This discrepancy suggests that self-perceived preparedness may not consistently reflect specific knowledge related to co-occurring aphasia and auditory impairment. Additionally, while many of the participants were able to define different types of hearing loss, few correctly identify corresponding audiograms or described hearing screening protocols. This suggests an "implementation gap" in knowledge, supporting the participants' sentiments of not receiving enough hands-on training to apply what they learned. Low hearing health literacy has been observed in other research which found that although SLP clinicians demonstrated high levels of general health literacy, they showed only marginal to low levels of hearing loss health literacy (Cooper et al., 2025). In that study, academic training and on-the-job experience predicted hearing loss terminology knowledge, while only on-the-job experience predicted deeper hearing loss content knowledge. Matsumoto (2020) also found that clinicians reported feeling the least confident when working with students on aural habilitative and rehabilitative treatment plans. Unsurprisingly, they reported feeling the most confident in areas such as executive functioning, phonological awareness, and articulation. Although these studies did not assess preparedness in aphasia and auditory impairment specifically, they do suggest a broader gap in hearing health literacy which may have a direct impact on working with PWA, further highlighting the need for more interdisciplinary training during graduate studies.

Clinical Implications

There are several important implications for SLP graduate education, clinical training, and workplace practices. First, graduate training may benefit from stronger, repeated integration of adult hearing-related content across courses and clinical placements, rather than isolating audiology content early and then discontinuing it. Participants repeatedly emphasized that knowledge without hands-on application is insufficient. Structured practice in hearing screening procedures, adapting aphasia assessment in the presence of suspected hearing loss, and interpreting results within a communication framework could address this need. As only 52% of SLP graduate programs require a course related to auditory rehabilitation (Henton & Glade, 2023), there is a critical need to address this concern. Emerging research regarding the implementation of interprofessional neurogenic education (Anjum et al., 2026; Davis et al., 2019) and simulated learning experiences (Alanazi et al., 2022; Henton & Vansant, 2024; Stead et al., 2024; Tinsley et al., 2024) has yielded promising results in improving confidence and knowledge of auditory impairment among SLP graduate students. These findings warrant further exploration to determine long-term practical outcomes.

Second, clinical settings should consider establishing clearer interprofessional protocols between SLP and audiology. Participants identified unclear referral pathways and limited collaboration even when audiology services were present. Simple workflow changes, such as shared screening guidelines, consultation triggers, and basic equipment access, could reduce barriers and improve confidence without requiring major program redesign. Global research on this topic suggests policy reforms, referral training, digital referral pathways, and more

comprehensive patient education as potential ways to mitigate audiologic referral barriers (Davine et al., 2025; Khoza-Shangase et al., 2025)

Lastly, continuing education should be tailored to real-world constraints in settings such as post-acute care and skilled nursing facilities, where limited resources are common. Participants' requests for concrete examples, diagnostic decision support, and practical tools (e.g., checklists, decision trees, brief handouts) suggest a gap that clinical education programming could directly address. This extends to counseling strategies and resource navigation supports for patients and caregivers, ensuring that clinicians receive adequate training to discuss hearing evaluation and amplification in a way that acknowledges patient needs and concerns. ASHA and a multidisciplinary panel of subject matter experts published clinical practice guidelines for working with adults with hearing loss which offers evidence-based counseling strategies and other practical recommendations such as auditory training (Basura et al., 2023). Dinh et al., 2025 also offers clinical recommendations and an in-person delivery model for clinicians to address hearing loss in neurogenic disorders. Targeted dissemination efforts to ensure this information is accessible to non-research clinicians may be beneficial in addressing training concerns at the professional level.

Limitations

While this study is an important contribution to the field, there are several limitations. First, the study relied on a convenience sample recruited primarily through word of mouth and professional listservs. As a result, participants may have been more likely to have a heightened awareness or interest in this topic area, which may have limited the representativeness of the sample. Although the study provided meaningful exploratory insights, the limited number of

participants reduced statistical power and may have made it more difficult to detect group differences that may exist in the broader population. However, previous studies on this topic have used similar or smaller sample sizes, including Collinson (2020), which included 25 participants, and Ali et al. (2025), which included 20 participants. The attrition of participants for the open-ended portion, while anticipated, also contributed to the smaller sample size. Although this reduced the amount of qualitative data available for analysis, the decision to include audio-recorded responses was intentional and supported by prior research suggesting that audio responses often yield longer and more detailed answers than written responses (Höhne et al., 2024; Perrodin & Todd, 2021). Lastly, while the knowledge section of this survey assessed important foundational components related to hearing, there were several domains not assessed that may have provided valuable information. For example, this study did not assess participants' knowledge of speech discrimination, despite documented evidence of speech discrimination deficits in this population (Sampson & Faroqi-Shah, 2011; Villard and Kidd, 2019). Future studies should examine knowledge and training related to speech discrimination and other auditory impairments known in aphasia management. Although these limitations warrant caution regarding the generalizability of the results, this study provides a critical starting point for future studies on this population.

Conclusion

This study is among the first to examine the knowledge and preparedness of graduate students in assessing auditory impairment in PWA. As SLP graduate programs must adhere to certain clinical training standards, students reported lack of preparedness points to meaningful gaps in existing curriculum rather than isolated weaknesses in individual programs. At the same

time, the similar sense of unpreparedness reported by practicing clinicians in the study challenges the assumption that these gaps will naturally resolve through professional experience alone. Together, these findings suggest that current training and practice environments are not adequately preparing clinicians to address this complex and common comorbidity. Participants across groups emphasized the need for more targeted instruction, greater exposure to clients with co-occurring conditions, and stronger interprofessional collaboration with audiologists. These perspectives offer an important direction for ongoing professional development, particularly regarding interprofessional education and practice. Future research should build on these findings with larger, more diverse samples to further explore how graduate students and clinicians alike can be better prepared to identify auditory impairments and refer when necessary.

Appendix A

Screening. Please answer the following questions to determine your eligibility for the study: Your answers will not be shared outside of the research team.

Section	Question	Response Options
Screening	Do you currently reside in the US?	Yes No
Screening	This survey requires the use of a microphone to record your answer for several questions. Are you currently using a computer or mobile device with a microphone?	Yes No
Screening	Are you currently a graduate student enrolled in a speech-language pathology program OR practicing speech-language pathologist?	Yes No
Screening (Students only)	Have you completed at least one year of graduate study?	Yes No
Screening (Students only)	Have you taken at least one neurogenic-related course with aphasia content?	Yes No
Screening (Clinicians only)	Do you have at least one full year of experience working as a SLP?	Yes No
Screening (Clinicians only)	Do you have experience evaluating persons with aphasia (PWA)?	Yes No

History and Demographics. The following questions help us learn more about your background, including your academic and clinical experiences. Please answer each question as accurately as possible.

Section	Question	Response Options
History and Demographics (Students only)	How many full academic years have you completed as an SLP graduate student? (This includes time within a PhD program)?	Open-ended
History and Demographics (Students only)	Have you ever evaluated a client with aphasia?	Yes No
History and Demographics (Students only)	Do you have any interest in working with clients with aphasia during your career?	Yes No Unsure

History and Demographics (Clinicians only)	How many full years of experience do you have as an SLP?	Open-ended
History and Demographics (Clinicians only)	How many full years of experience do you have working with PWA?	Open-ended
History and Demographics (Clinicians only)	Are you currently working with clients with aphasia?	Yes No
History and Demographics	Have you ever worked with a client with co-occurring aphasia and auditory impairments such as hearing loss or auditory processing disorder?	Yes; currently Yes; previously, but not currently No Don't know/don't remember
History and Demographics	Have you ever directly collaborated with an audiologist?	Yes No
History and Demographics	Have you ever directly collaborated with an audiologist regarding a client with aphasia?	Yes No
History and Demographics	In what settings have you worked or completed an externship/outplacement?	Skilled Nursing Facility Hospital Private Practice Clinic Schools Home Health Other
History and Demographics	What is your current setting?	Skilled Nursing Facility Hospital Private Practice Clinic Schools Home Health Other
History and Demographics	How old are you? (years)	Open-ended
History and Demographics	Do you or someone you know (e.g., family member, friend, coworker) have hearing loss?	Yes No

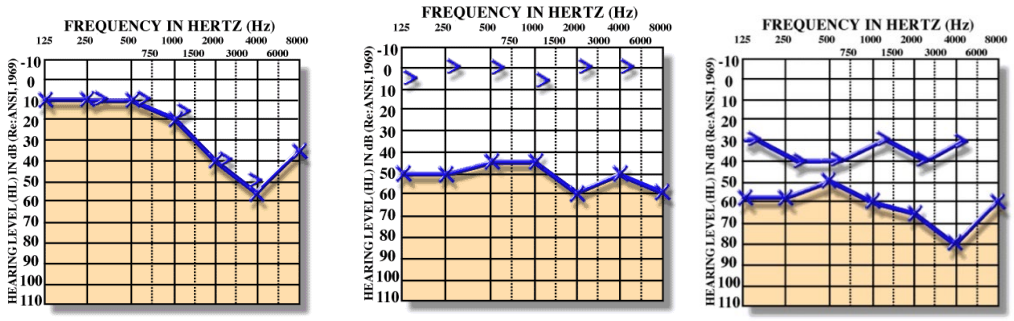
History and Demographics	What degrees do you hold, select all that apply?	Bachelors in Communication Science Disorders/ SLP Bachelors in a different area Master's in Communication Science Disorders/SLP PhD in Communication Science Disorders/SLP PhD in other area

Knowledge of Audiological Assessment. This section assesses your current knowledge of auditory impairments, specifically hearing screenings. For each statement, provide an answer that best reflects your current understanding. Please do not use any external aids (e.g., ChatGPT, Google, colleague) to answer the questions, they should be based on your current knowledge. Except for the last question, you will have 3 minutes to answer each question in this section.

Section	Question	Response Options
Knowledge of Audiological Assessment	Match the following terms with their definition.	**Terms:** A. Conductive Hearing Loss B. Sensorineural Hearing Loss C. Mixed Hearing Loss **Definitions:** A. Hearing loss caused by a problem in the outer or middle ear that blocks sound from reaching the inner ear. B. Hearing loss caused by damage to the inner ear or auditory nerve, making sound transmission to the brain less effective. C. A combination of conductive and sensorineural hearing loss, involving both the outer/middle ear and the inner ear or nerve.
Knowledge of Audiological Assessment	Match the following terms with the correct audiogram.	**Terms:** A. Conductive Hearing Loss B. Sensorineural Hearing Loss C. Mixed Hearing Loss **Audiograms:** below

Knowledge of Audiological Assessment	Briefly describe the protocol for assessing hearing loss in a new patient. Your response should include specific instruments or tools used.	**Response should include:** case history, otoscopy, hearing screening (tympanometry, acoustic reflexes, pure tone screening), Pure-tone audiometry, speech audiometry, if needed: OAEs, ABRs, Speech-in-noise, interpretation, counseling, referrals to ENT, Audiologist, SLP clinicians...
Knowledge of Audiological Assessment	How do you know if a client passed their hearing screening (i.e., pass-fail criterion) and what would you do if they failed their hearing screener? Note: the patient is an adult.	**Open text; Response should include:** A client must pass at all frequencies tested in both ears - meaning they are able to raise their hand and identify sounds played in each ear. Can re-screen in 2-4 weeks to rule out ear infection or congestion. Refer to an audiologist for full diagnostic testing.
Knowledge of Audiological Assessment	How would auditory impairments (e.g., hearing loss, auditory processing issues) affect treatment in a patient with aphasia?	**Open text; Response should include:** Can affect how the patient understands and interprets instructions, may need supplementary materials such as images (multimodal approaches) to help them understand, caregiver and family training, amplification, environment, clear speech
Knowledge of Audiological Assessment	Are you aware of ASHA guidelines regarding hearing screenings as part of communication assessments?	Yes No

Audiograms



1- Sensorineural Hearing Loss *2 - Conductive Hearing Loss* *3 - Mixed Hearing Loss*

Source: DHH Education. (n.d.). Audiogram illustrating hearing loss [Image]. *DHH Education*. Retrieved from https://dhheducation.weebly.com/audiograms--hearing-loss.html

Perceived Confidence & Preparedness – Part I. The following items ask about how confident or prepared you feel in certain clinical situations related to auditory impairments. Please answer each question to the best of your ability.

Section	Question	Response Options
Perceived Confidence & Preparedness	How confident do you feel conducting or administering hearing screening tools?	1 = Not at all confident / prepared 2 = Slightly 3 = Moderately 4 = Very 5 = Extremely confident / prepared
Perceived Confidence & Preparedness	How confident do you feel initiating collaboration with audiologists or related professionals regarding auditory impairments?	1 = Not at all confident / prepared 2 = Slightly 3 = Moderately 4 = Very 5 = Extremely confident / prepared
Perceived Confidence & Preparedness	How well do you feel your academic training prepared you to work with clients experiencing auditory impairments?	1 = Not at all confident / prepared 2 = Slightly 3 = Moderately 4 = Very 5 = Extremely confident / prepared Don't remember
Perceived Confidence & Preparedness	To what extent does your current setting have adequate resources to conduct a hearing screening?	1 = Not at all confident / prepared 2 = Slightly 3 = Moderately 4 = Very 5 = Extremely confident / prepared Don't Know Not applicable
Perceived Confidence & Preparedness	To what extent does your current setting have a clear and established referral pathway for clients with hearing loss?	1 = Not at all confident / prepared 2 = Slightly 3 = Moderately 4 = Very 5 = Extremely confident / prepared Don't Know Not applicable

Perceived Confidence & Preparedness – Part II. In this final section, you are asked to record your answer using the built-in audio tool.

Remember:

- Do **not** include any identifying information about yourself or clients, including where you work or attend school.
- Minimize background noise and ensure no one else is speaking in your environment during the recording.
- Speak clearly and at a good volume so your recording is easy to hear.

Section	Question	Response Options
Perceived Confidence & Preparedness	Can you describe the learning opportunities you've had regarding auditory impairment, including the co-occurrence of aphasia? Examples include courses, trainings, workshops, or continuing education.	Open-ended; audio-recorded
Perceived Confidence & Preparedness	What types of training or resources are available at your facility or externship/outplacement site (if any) to support your ability to work with individuals who have auditory impairment, including those with co-occurring aphasia?	Open-ended; audio-recorded
Perceived Confidence & Preparedness	What barriers, if any, hinder your confidence or preparedness for working individuals with auditory impairment? This includes clients with co-occurring aphasia (e.g., training, clinical practice, systemic factors)	Open-ended; audio-recorded
Perceived Confidence & Preparedness	What kinds of future training, coursework, or professional development opportunities would best prepare you to work with clients with auditory impairments, including those with co-occurring aphasia?	Open-ended; audio-recorded
Perceived Confidence & Preparedness	Do you believe more graduate-level training is needed regarding auditory impairments? Why or why not.	Open-ended; audio-recorded

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