



The Gap Persists: Clinical Misconceptions on Early Identification and Intervention for Childhood Apraxia of Speech

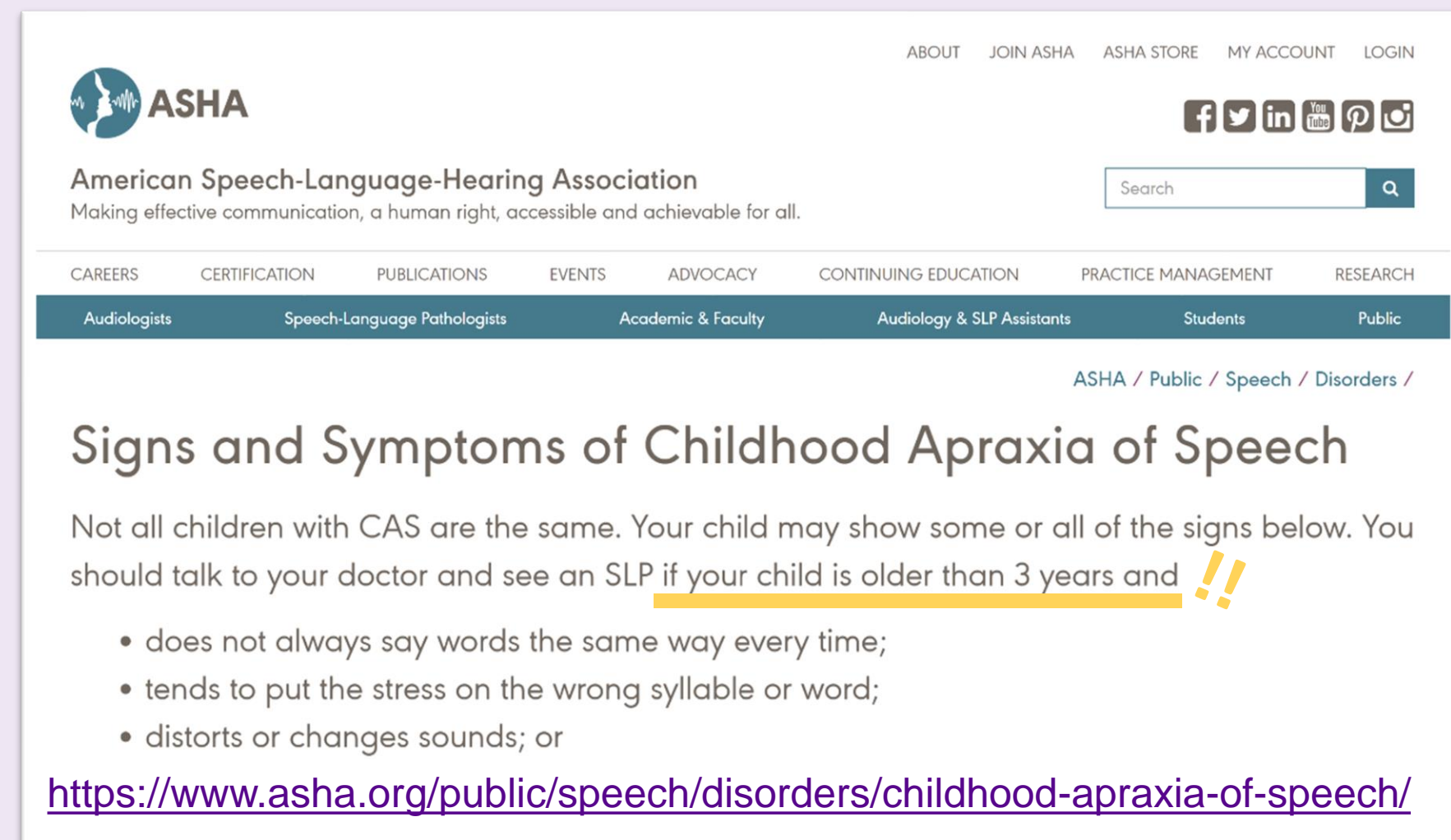
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Background

- Symptoms of CAS can emerge in infancy and toddlerhood (for a review, see Highman et al., 2023)
- Because of the complex history of differential diagnosis of CAS, a misconception emerged that it could not be diagnosed in children under three (ASHA, n.d.)



- Differential CAS diagnosis is dependent on speech characteristics, not a particular age (Iuzzini-Seigel et al., 2022; Murray et al., 2021; Shriberg et al., 2012; Strand et al., 2013)
- Early intervention SLPs play a crucial role in early identification and family education

Research Questions

- 1. Differential diagnosis**
 - a) What speech characteristics do early intervention SLPs associate with CAS?
 - b) What proportion of early intervention SLPs are not familiar with CAS feature lists?
- 2. Diagnosis under three**
 - a) What proportion of early intervention SLPs believe it is *not* possible to diagnose CAS under three?
 - b) What variables predict that belief?
- 3. Treatment under three: What service delivery models are being used for CAS in early intervention?**

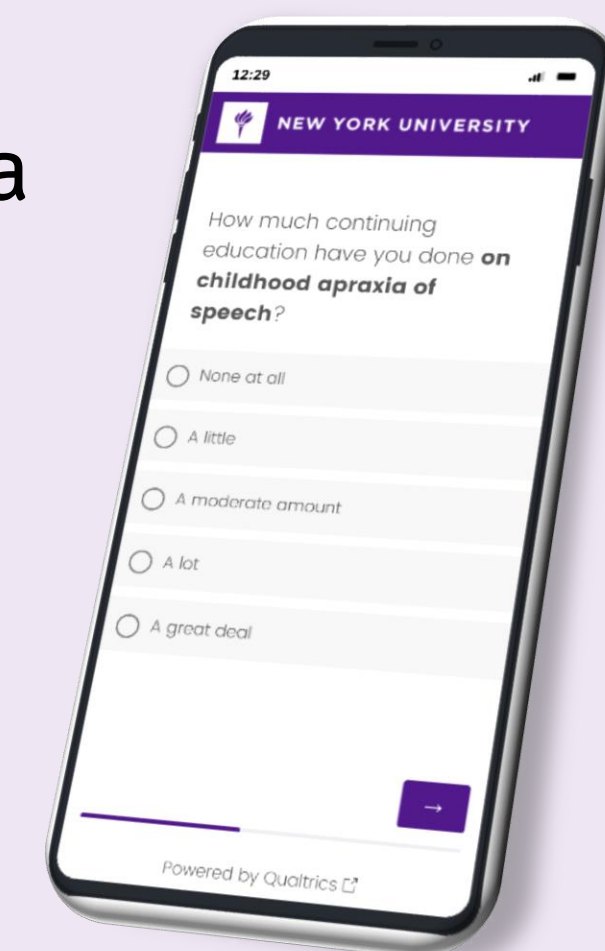
Methods

Survey Development (Groves et al., 2011)

1. Review the literature on early identification of CAS, surveys in CSD, and surveys on CAS
2. One focus group to explicate constructs
3. Draft survey
4. Two focus groups to refine survey wording, clarity, and cohesion for construct validity
5. Survey pretesting: cognitive interviews and concurrent think-alouds with ASHA-certified SLPs, both with and without expertise in CAS and/or early intervention (Willis, 2004)
 - Ten pretests total, with iterative changes
 - Continued until saturation
6. Consultation with statistician on statistical validity and face validity of survey
7. Useability and penetration testing to assure technical parts of survey operate correctly

Data Collection

- Distributed via Qualtrics online platform
- Mobile and desktop friendly versions
- Recruitment via convenience and snowball sampling, e.g., social media groups, clinical networks, & referral



Respondents (N=298)

- Region:
 - Northeast=42%
 - Midwest=15%
 - South=28%
 - West=15%
- Experience: 1-45 years practicing (M=11.7; SD=8.9)
- Caseload under three: ranging from 1-75 kids (M=11.4, SD=10.7)

Statistical Analyses

1. Differential diagnosis
 - a) Descriptive statistics of most selected answer
 - b) Confidence intervals from linear regression
2. Diagnosis under three
 - a) Confidence interval from linear regression
 - b) Multiple logistic regression; predictors: amount of CE, CAS knowledge score, and years
3. Treatment under three: descriptive statistics

Results

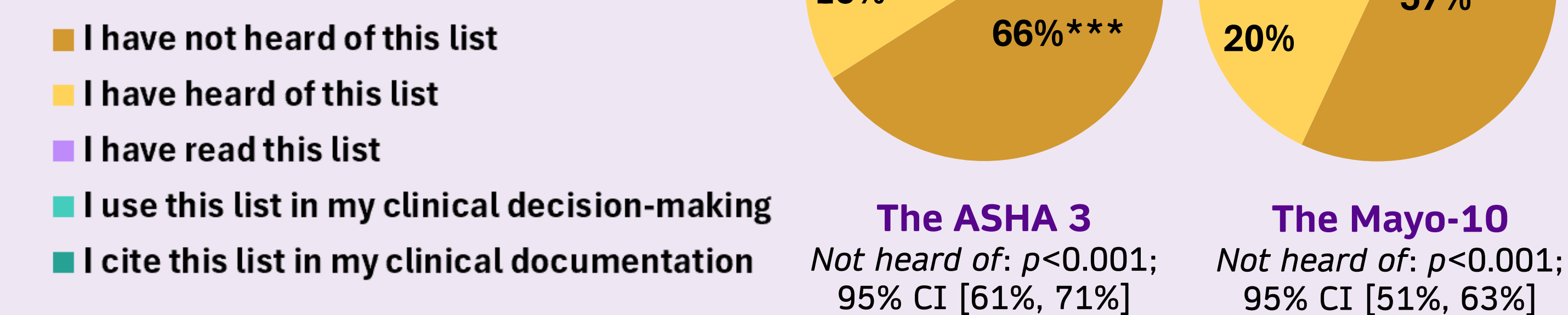
1. Differential diagnosis (N=298)

- a) "To differentially diagnose childhood apraxia of speech over other pediatric speech sound disorders, how indicative are the following characteristics? Consider childhood apraxia of speech in isolation, with **no comorbidities.**"

"Not Indicative"	N%	"Somewhat Indicative"	N%	"Highly Indicative"	N%
weakness of oral musculature	59%	difficulty with purposeful non-speech oral motor tasks (e.g., blowing, kissing, smile)	40%	inconsistent errors	88%
patterns or classes of speech sound errors	59%	poor breath support	38%	awkward movement from one articulatory posture to another	80%
low volume or volume decay	43%	intrusive schwa	32%	articulatory groping	80%
poor auditory discrimination of speech sounds	40%			vowel distortions	80%
				increased difficulty producing longer words	69%
				prosodic errors (i.e., lexical stress errors, equal stress, syllable segmentation)	68%
				limited vowel and consonant inventory	63%
				low speech intelligibility	58%
				slow diadochokinetic (DDK) rates	51%
				voicing errors	44%

- b) A significant portion of early intervention SLPs are unfamiliar with CAS feature lists

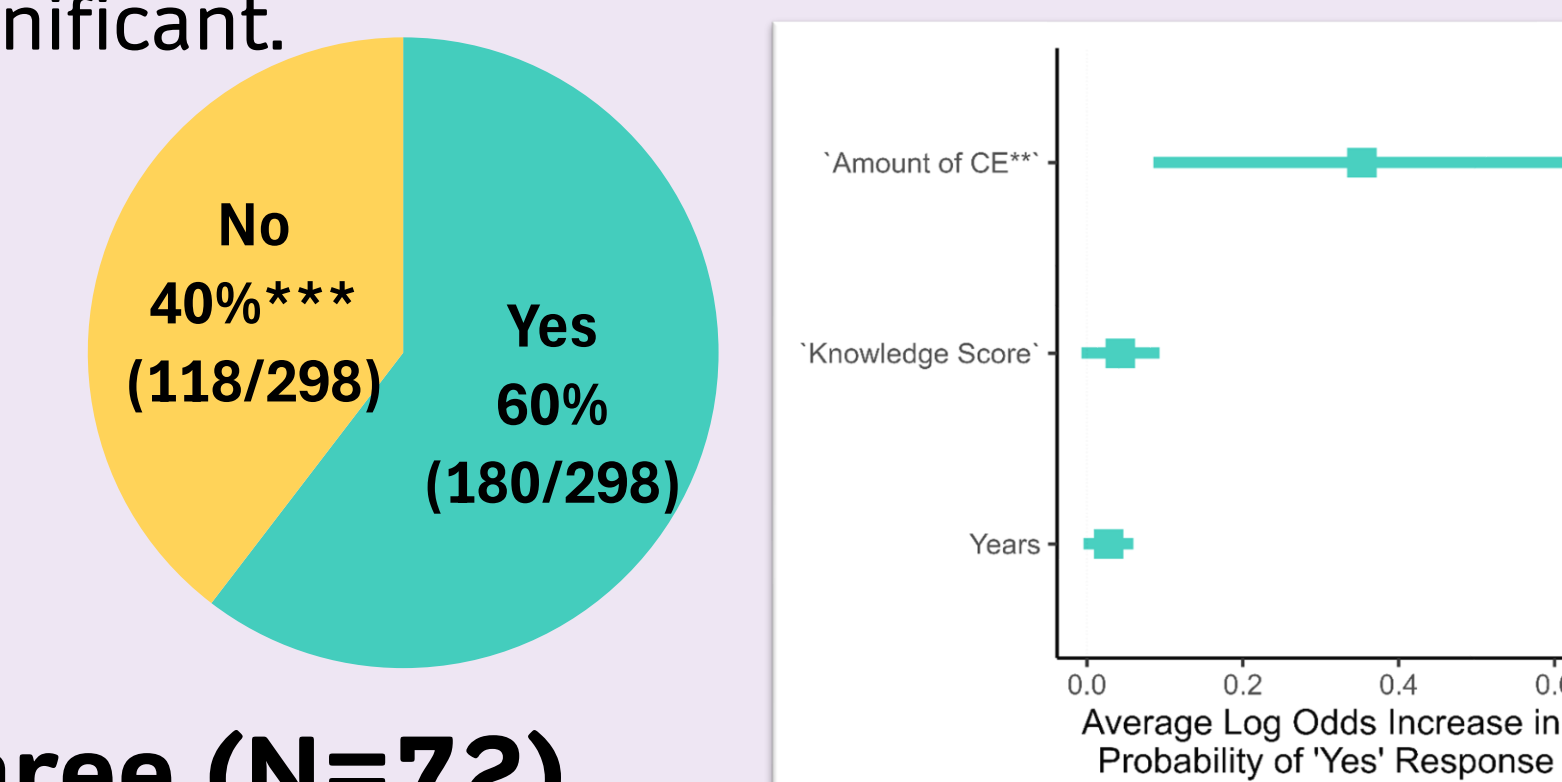
"What is your familiarity with the following lists of childhood apraxia of speech characteristics?"



2. Diagnosis under three (N=298)

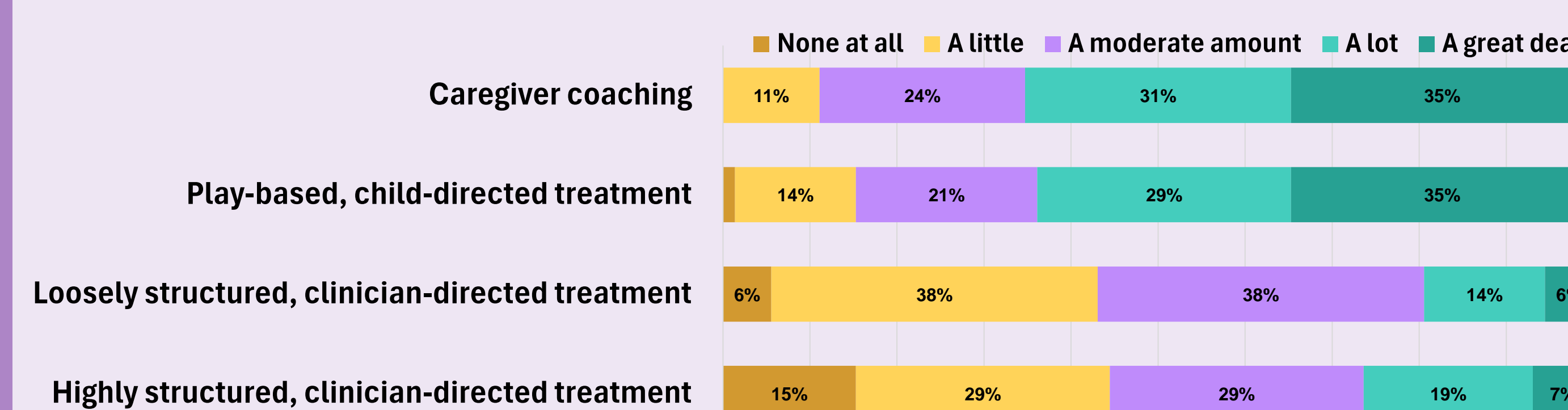
- a) 40% of early intervention SLPs report that CAS cannot be diagnosed under three ($p < 0.001$; 95% CI [34%, 45%])
- b) Amount of continuing education is a significant predictor of correct "yes" response ($\beta = 0.35$; $SE = 0.14$; $p < 0.01$); CAS knowledge score and years practicing are not significant.

"In your clinical opinion, is it possible to **diagnose** childhood apraxia of speech in children under three years old?"



3. Treatment under three (N=72)

"For children under three years old with childhood apraxia, please rate the degree to which you use the following service delivery models"



Conclusions

- **There are both strengths and weaknesses in early intervention SLPs knowledge on CAS**
 - *Strengths*: high consensus on classic characteristics
 - *Weaknesses*: low consensus on other characteristics; underutilization of feature lists
- **Clinical misconceptions about early identification for CAS remain concerningly prevalent**
 - This has implications for motor plan development in these children
 - High risk of missed opportunities for family education and support in early intervention
- **There may be a mismatch between best practices in early intervention and best practices for treating CAS**
 - Future work could consider how to integrate these approaches

Supplemental Information

Scan to download this poster with references, survey questions, and more!



Acknowledgements & Disclosures

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View the survey (skip logic removed):
https://nyu.qualtrics.com/jfe/preview/previewId/d01258bf-1eba-40af-8e3d-4c9e3890f0ed/SV_1WZIp8VPYHF8QbY?Q_CHL=preview&Q_SurveyVersionID=current



Please enter the year your master's degree in speech-language pathology was awarded:

How much continuing education have you done **on childhood apraxia of speech?**

None at all

A little

A moderate amount

A lot

A great deal

The following questions ask about your knowledge on childhood apraxia of speech characteristics, diagnosis, and treatment. If you don't specialize in childhood apraxia of speech, it's very likely you won't know some of this information! Feel free to answer honestly and without judgment. Selecting "unsure" is completely fine. These questions are just included to gauge what SLPs may have heard about this diagnosis.

Additionally, note that this portion of the survey is focused on only verbal speech. While alternative and augmentative communication (AAC) is commonly used with this population, it is not addressed in this survey because it is not the focus of the current research.

To **differentially diagnose** childhood apraxia of speech over other pediatric speech sound disorders, how indicative are the following characteristics? Consider childhood apraxia of speech in isolation, with **no comorbidities**.

Expert answers noted in purple!

	Not indicative	Somewhat indicative	Highly indicative	Unsure
prosodic errors (i.e., lexical stress errors, equal stress, syllable segmentation)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
articulatory groping	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
intrusive schwa	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
slow diadochokinetic (DDK) rates	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
increased difficulty producing longer words	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
awkward movement from one articulatory posture to another	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
	Not indicative	Somewhat indicative	Highly indicative	Unsure
weakness of oral musculature	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
low speech intelligibility	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
limited vowel and consonant inventory	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
voicing errors	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
patterns or classes of speech sound errors	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
low volume or volume decay	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Not indicative	Somewhat indicative	Highly indicative	Unsure
inconsistent errors	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
difficulty with purposeful non-speech oral motor tasks (e.g., blowing, kissing, smile)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
poor breath support	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
poor auditory discrimination of speech sounds	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
vowel distortions	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
	Not indicative	Somewhat indicative	Highly indicative	Unsure



In your clinical opinion, in order for a child to receive a childhood apraxia of speech diagnosis, **how many characteristics** of the disorder should be observed? **Expert answers noted in purple!**

At least 1

At least 2

At least 3

At least 4

At least 5

6 or more

Unsure

In your clinical opinion, in order for a child to receive a childhood apraxia of speech diagnosis, **how many speech tasks** should characteristics of the disorder be observed in?

At least 1

At least 2

At least 3

At least 4

At least 5

6 or more

Unsure

What is your familiarity with the following lists of childhood apraxia of speech characteristics?

	I have not heard of this list	I have heard of this list	I have read this list	I use this list in my clinical decision-making	I cite this list in my clinical documentation
"The Rosenbek and Wertz 13"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"The ASHA 3"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"The MAYO 10" (also called "the Strand 10")	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Whose role is it to diagnose childhood apraxia of speech? (Select any that apply)

Occupational therapist

Special educator

Developmental pediatrician

Pediatric neurologist

Speech-language pathologist

Other, please describe:



For the following treatments listed, how appropriate are they **as the primary approach for treating speech characteristics** of childhood apraxia of speech? Think "in general." Of course, no single approach is appropriate for all children with childhood apraxia of speech.

Expert answers noted in purple!

	Not appropriate	Sometimes appropriate	Very appropriate	I'm not familiar with this approach
Maximal contrasts approach	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lee Silverman Voice Treatment (LSVT LOUD)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PROMPT	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traditional articulation drill therapy (e.g., Van Riper approach)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dynamic Temporal and Tactile Cueing (DTTC)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Auditory bombardment	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Minimal pairs approach	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-speech oral motor exercises	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rapid Syllable Transition Training (ReST)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
The Nuffield Dyspraxia Programme (NDP3)	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cycles approach	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kaufman Speech to Language Protocol (K-SLP)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Not appropriate	Sometimes appropriate	Very appropriate	I'm not familiar with this approach

The rest of the survey asks about services for children who are under three years old. The phrase "under three years old" refers to **children who have not yet had their third birthday**. This means children from 0-35 months old.

Does your caseload contain any children **under three years old**?

Yes

No

In your clinical opinion, is it possible to **diagnose** childhood apraxia of speech in children under three years old?

Yes

No



Have you ever **diagnosed** childhood apraxia of speech in a child under three years old?

Yes **N=72**

No

The remainder of the survey asks about your evaluation, diagnostic, and treatment practices **for children under three years old with childhood apraxia of speech**. When answering these questions, it may be helpful to **recall a few specific clients and answer these questions with those children in mind**.

For **children under three years old with childhood apraxia of speech**, please rate the degree to which you use the following service delivery models:

	None at all	A little	A moderate amount	A lot	A great deal
Highly structured, clinician-directed treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loosely structured, clinician-directed treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Play-based, child-directed treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Caregiver coaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>