

1. This document is created for accessibility and is intended to be a supplemental resource. If you would like to print a hard copy of this document, please follow the general instructions below to print multiple slides on a single page or in black and white.
2. This handout is for reference only. Non-essential images have been removed for your convenience. Any links included in the handout are current at the time of the live webinar but are subject to change and may not be current at a later date.
3. Copyright: Images used in this course are used in compliance with copyright laws and where required, permission has been secured to use the images in this course. All use of these images outside of this course may be in violation of copyright laws and is strictly prohibited.
4. Social Workers: For additional information regarding standards and indicators for cultural competence, please review the NASW resource: Standards and Indicators for **Cultural Competence in Social Work Practice**
5. Need Help? Select the “Help” option in the member dashboard to access FAQs or contact us.

How to print Handouts

On a Mac

- Open PDF in Preview
- Click File
- Click Print
- Click dropdown menu on the right “preview”
- Click layout
- Choose # of pages per sheet from dropdown menu
- Checkmark Black & White if wanted.

How to print Handouts

On a PC

- Open PDF
- Click Print
- Choose # of pages per sheet from dropdown menu
- Choose Black and White from “Color” dropdown

No part of the materials available through the continued.com site may be copied, photocopied, reproduced, translated or reduced to any electronic medium or machine-readable form, in whole or in part, without prior written consent of continued.com, LLC. Any other reproduction in any form without such written permission is prohibited. All materials contained on this site are protected by United States copyright law and may not be reproduced, distributed, transmitted, displayed, published or broadcast without the prior written permission of continued.com, LLC. Users must not access or use for any commercial purposes any part of the site or any services or materials available through the site.

Looking Back to Move Forward: A Retrospective on FHD in Clinical Practice, in partnership with the American Academy of Audiology

Jodi Baxter, AuD

Christina M. Roup, PhD



Disclosures

- **Presenter Disclosure:** Financial disclosures: Dr. Jodi Baxter is employed by Ohio State University. Non-financial disclosures: Dr. Jodi Baxter is Co-Chair and Management of Adult Hearing Loss Guidelines Committee. Financial: Dr. Christina Roup is employed by Ohio State University and Editor-in-Chief of AJA. Non-financial: Dr. Christina Roup is the Co-Chair, Management of Adult Hearing Loss Guidelines Committee.
- **Content Disclosure:** This learning event does not focus exclusively on any specific product or service.
- **Sponsor Disclosure:** This course is presented in partnership with The American Academy of Audiology.

Limitations/Risks

- The applicability and accuracy of the course content may vary by the clinical, geographical, and cultural context; you should evaluate the course accordingly.
- As healthcare is rapidly evolving, new findings may change the validity of the information presented in this course. Providers should always consult the latest research and guidelines from professional associations.
- The interventions discussed in this course may be limited in generalizability, requiring practitioners to consider specific individual and population factors.
- The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.
- Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.
- Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.
- It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.

Learning Outcomes

After this course, participants will be able to:

- Describe the demographic and clinical characteristics commonly observed in adults presenting with functional hearing difficulties.
- Identify audiologic test result patterns commonly observed in FHD patients and discuss their clinical implications.
- Apply data-informed strategies to incorporate FHD care into existing audiologic workflows.

Outline

Background and Introduction

Patient Profiles

Retrospective Clinical Analysis

Outcomes with Low-Gain Hearing Aids

Summary & Clinical Takeaways



Defining FHD's Clinical Presentation

1

Patient's present
to clinic with self-
perceived hearing
difficulties

2

Pure-tone
thresholds are
clinically 'normal'
 ≤ 25 dB HL

3

When tested,
suprathreshold
processing deficits
are detected



Terminology Used to Describe this Population

Obscure
Auditory
Dysfunction

Central
Presbycusis

Auditory
Processing
Disorder

Hidden Hearing
Loss

Speech
Perception in
Noise
Impairment

Subclinical
Hearing Loss



Why is this population important?



Reductions in Quality of
Life



Exhibit help-seeking
behavior



Diagnosed as 'normal'
without suprathreshold
testing

Treatment Options for Adults with FHD

**Low-gain
hearing
aids**

No treatment

Improve the
quality of the
speech signal

Auditory
training

Language
and cognitive
training



Purpose of this Retrospective Analysis

1. Provide our clinical experience providing assessment and management services for adults with FHD
2. Share real-world clinic data on low-gain hearing aid fittings
3. Explore clinical patterns and patient profiles of adults with FHD
4. Engage in discussion around care models for adults with FHD

Data Collection

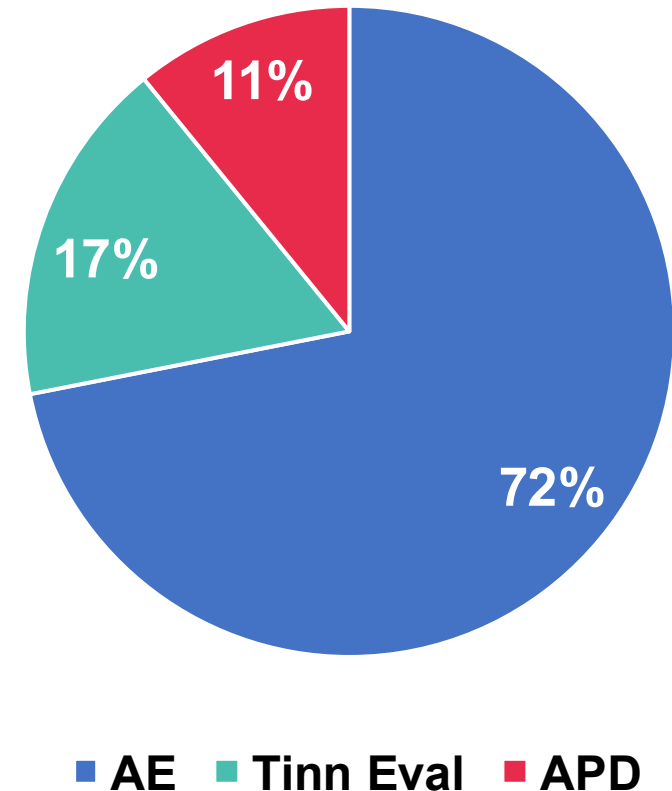
- Retrospective chart review from patients seen in the OSU Speech-Language-Hearing Clinic
 - Adults scheduled for Auditory Processing Evaluations from 2022 – 2024
 - Attempted to record relevant data
 - Demographic information
 - Comorbidities
 - Primary Listening Complaints
 - Evaluation Data
 - Outcomes
 - **Important to note: this was a retrospective chart review – not all patients had complete data in all areas**
 - Excluded patients:
 - Substantial amount of missing data
 - Patients who were found to have hearing loss and other otologic conditions
 - **Data coded by AuD student Aryn Robinson as part of her Capstone project**
-



Clinic Case Load

- **Total of 107 adults seen for Auditory Processing Evaluations between 2022 – 2024**
- Many referrals come from other audiologists and ENT physicians all over the state for adults who have normal pure-tone audiograms but functional hearing concerns
 - Additional referrals from neuropsychology, psychology, functional medicine physicians, etc.
- **APD evaluations represent approximately 11% of our adult new diagnostic appts**
 - Average of 33 per year or 2-3 per month

Adult New Diagnostic Appts



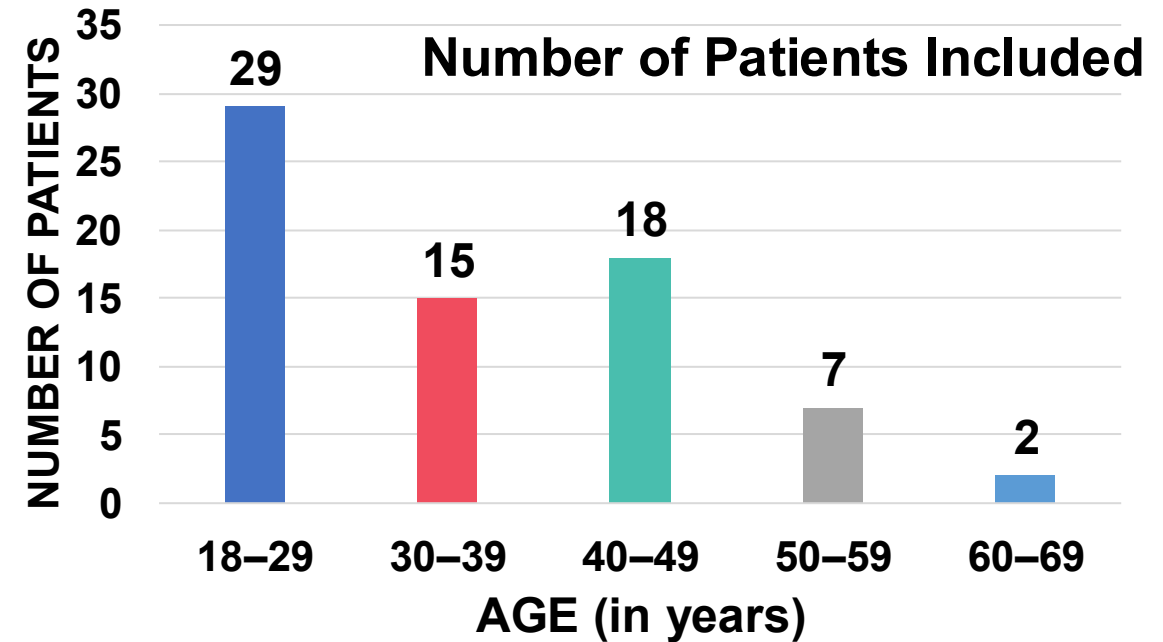


Patient Profiles

1. Patient Demographics
2. Co-Morbidities
3. Hearing Complaints
4. Pure-Tone Thresholds
5. Speech-in-Noise & Auditory Processing Performance

Demographics: Age

- Total of 69 participants were included in this analysis from 2022 – 2024
- Average age at initial evaluation across all 3 years: 35 years
 - 2024: 36 years old
 - 2023: 37 years old
 - 2022: 31 years old



Additional Demographics

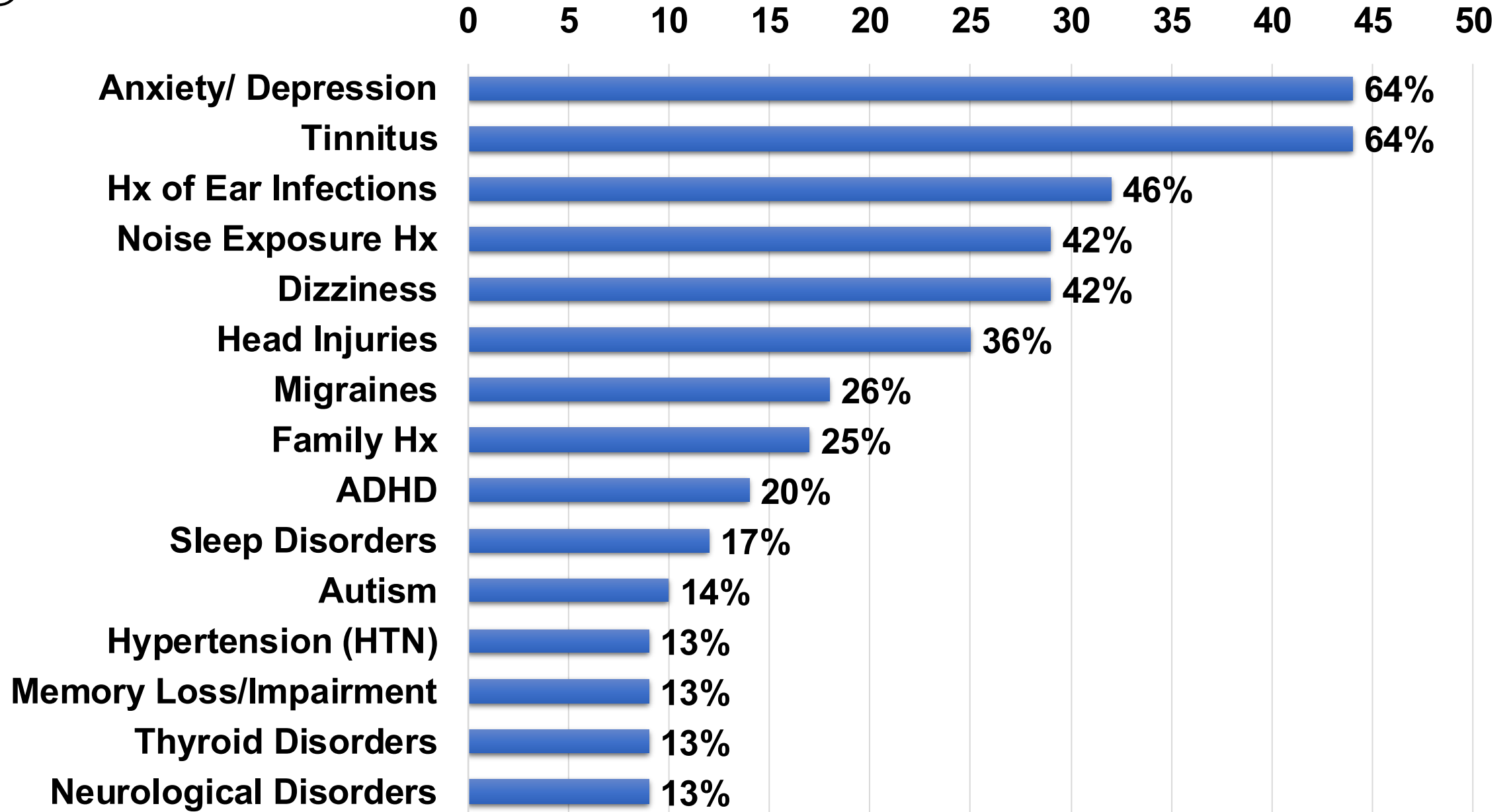
Gender	#	%
Female	43	62.30%
Male	22	31.90%
Not Reported	3	4.30%
Non-binary	1	1.40%

Education Level	#	%
Graduate Degree	17	25%
Associate / Some College	17	25%
Bachelor's Degree	12	17%
High School / GED	9	13%
In Graduate/Prof School	5	7%
Not Reported	8	12%
Not Listed	1	1%

Employment Status	#	%
Full-Time	29	42%
Unemployed / Not Employed	8	12%
Self-Employed	8	12%
Part-Time	7	10%
Not Reported	7	10%
Student	6	9%
Retired	2	3%
Disabled	2	3%

- Almost 75% report some level of post high-school education
- Majority (73%) are active in the work-force to some degree (including students)

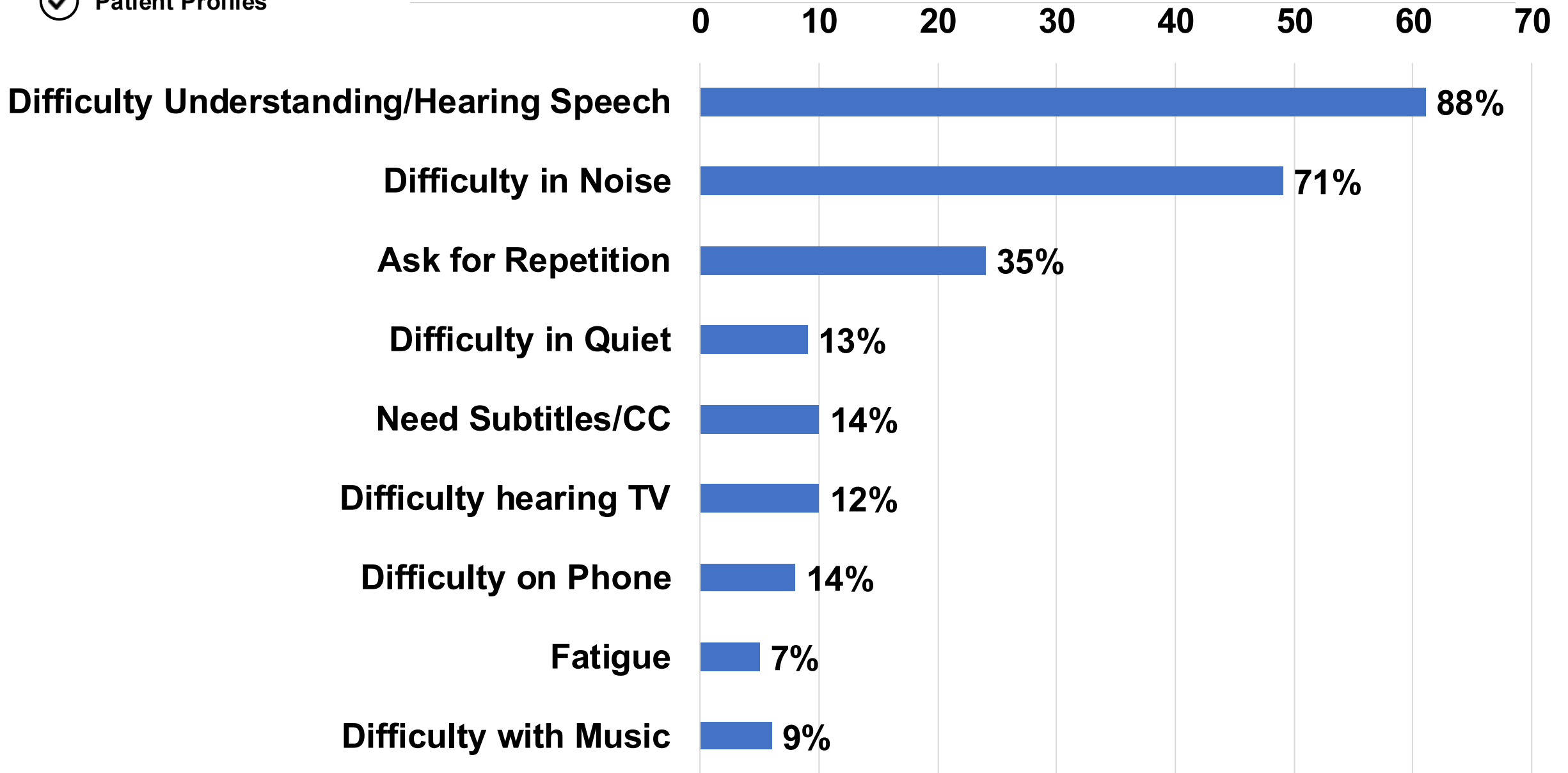
Top 15 Comorbidities



Other Reported Comorbidities

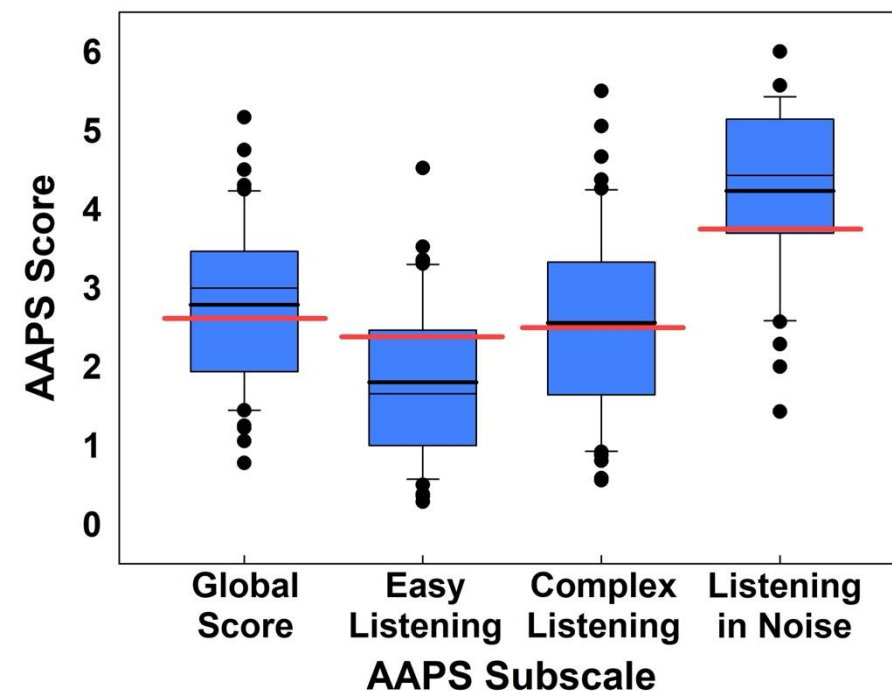
ALL CONDITIONS	N	Prevalence (%)
Fibromyalgia	4	5.8
POTS	4	5.8
Arthritis	4	5.8
Allergies	4	5.8
Gastrointestinal Issues	4	5.8
Diabetes/Pre-diabetes	3	4.3
Autoimmune/Connective Tissue	3	4.3
Narcolepsy	2	2.9
Cancer	2	2.9
PCOS	2	2.9
BPPV	1	1.4
Hx of Ototoxic Meds	1	1.4

Hearing Concerns



Self-Perceived Hearing Difficulties: **Adult Auditory Performance Scale** *Roup et al., 2021*

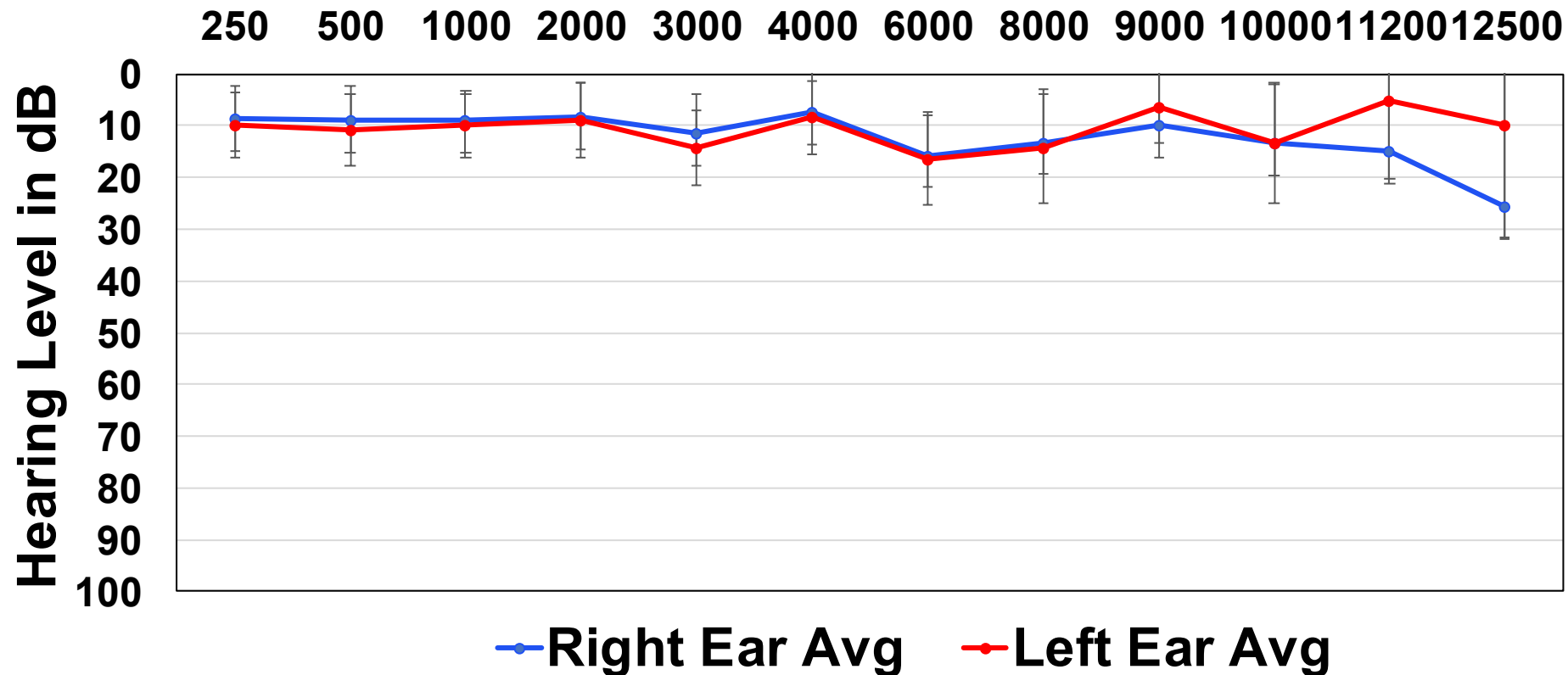
- Unaided AAPS data: **N = 50**
- Abnormally high self-perceived hearing difficulties were observed for:
 - Global Score = 60%
 - Easy Listening = 30%
 - Complex Listening = 50%
 - Listening in Noise = 68%





Average Pure Tone Thresholds

Frequency (Hz)

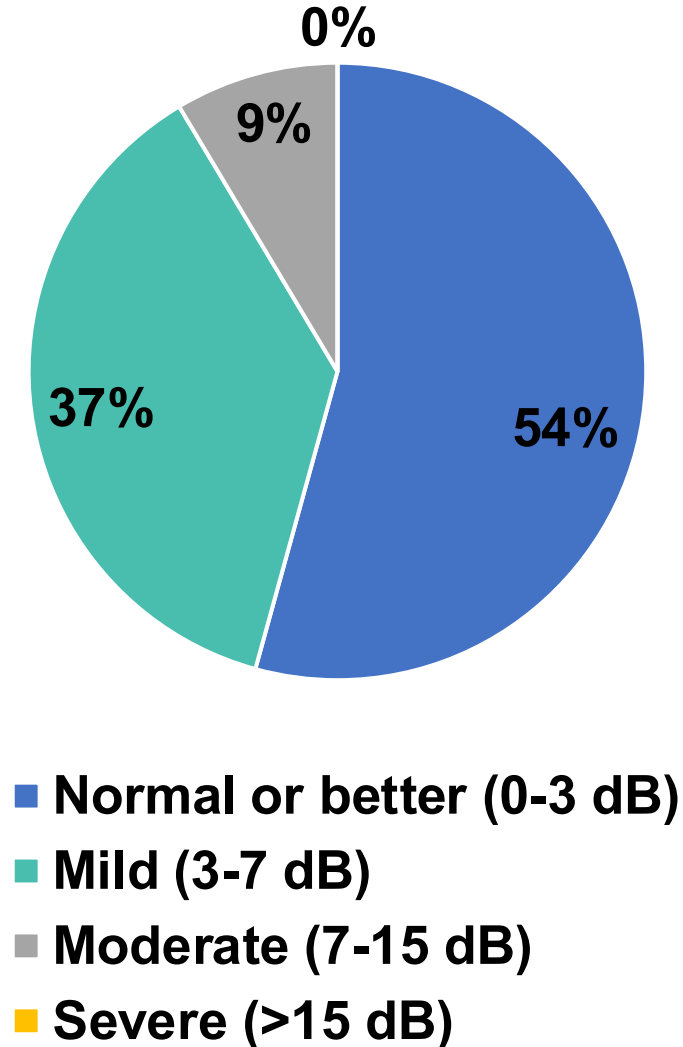




Quick SIN Results

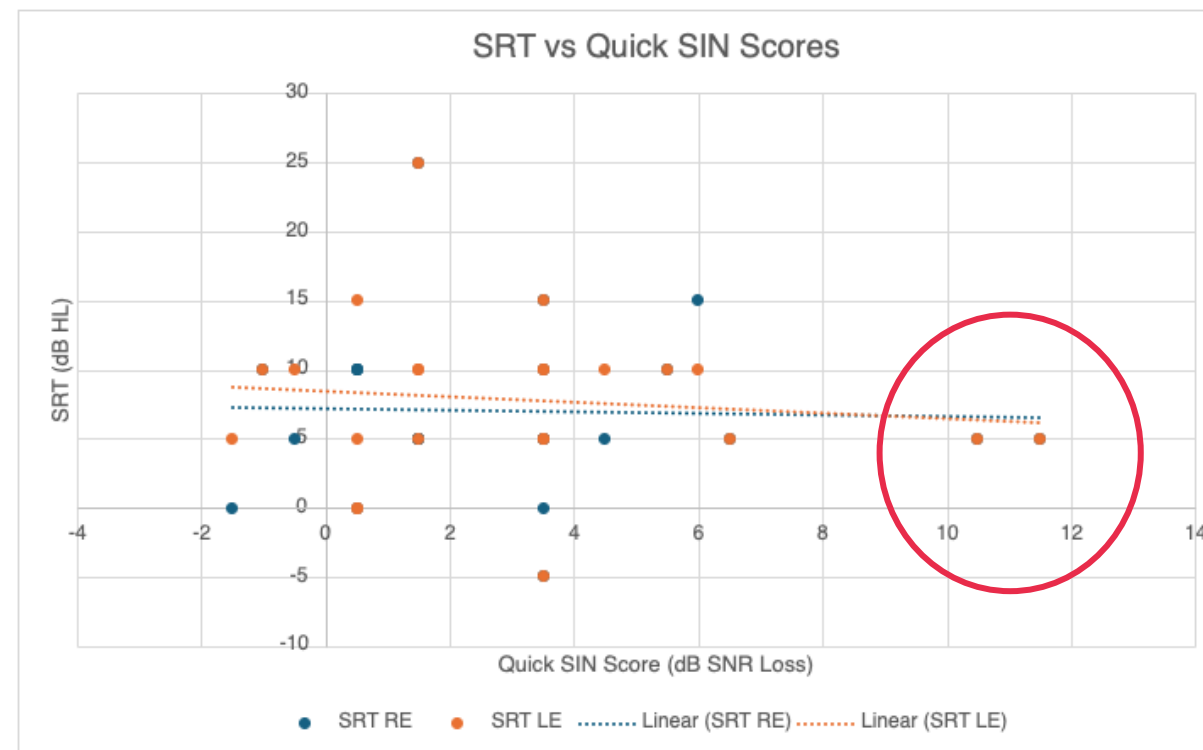
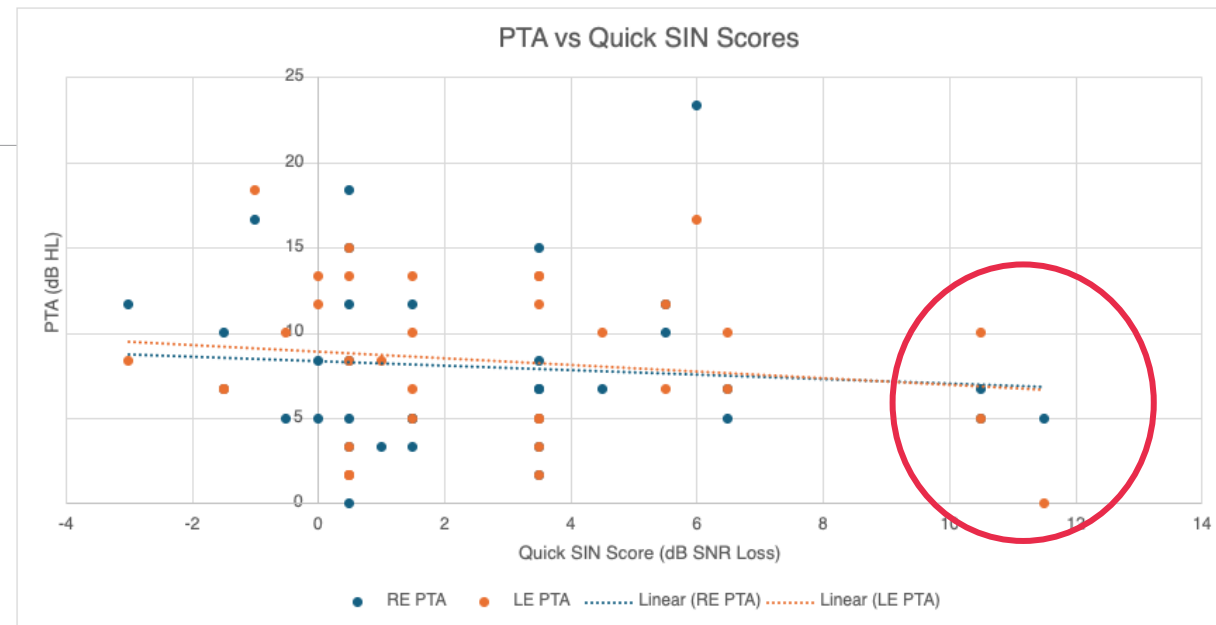
- Results from 35 patients
- Average:
 - 3 dB SNR Loss (SD = 3.48)

Killion et al., 2004



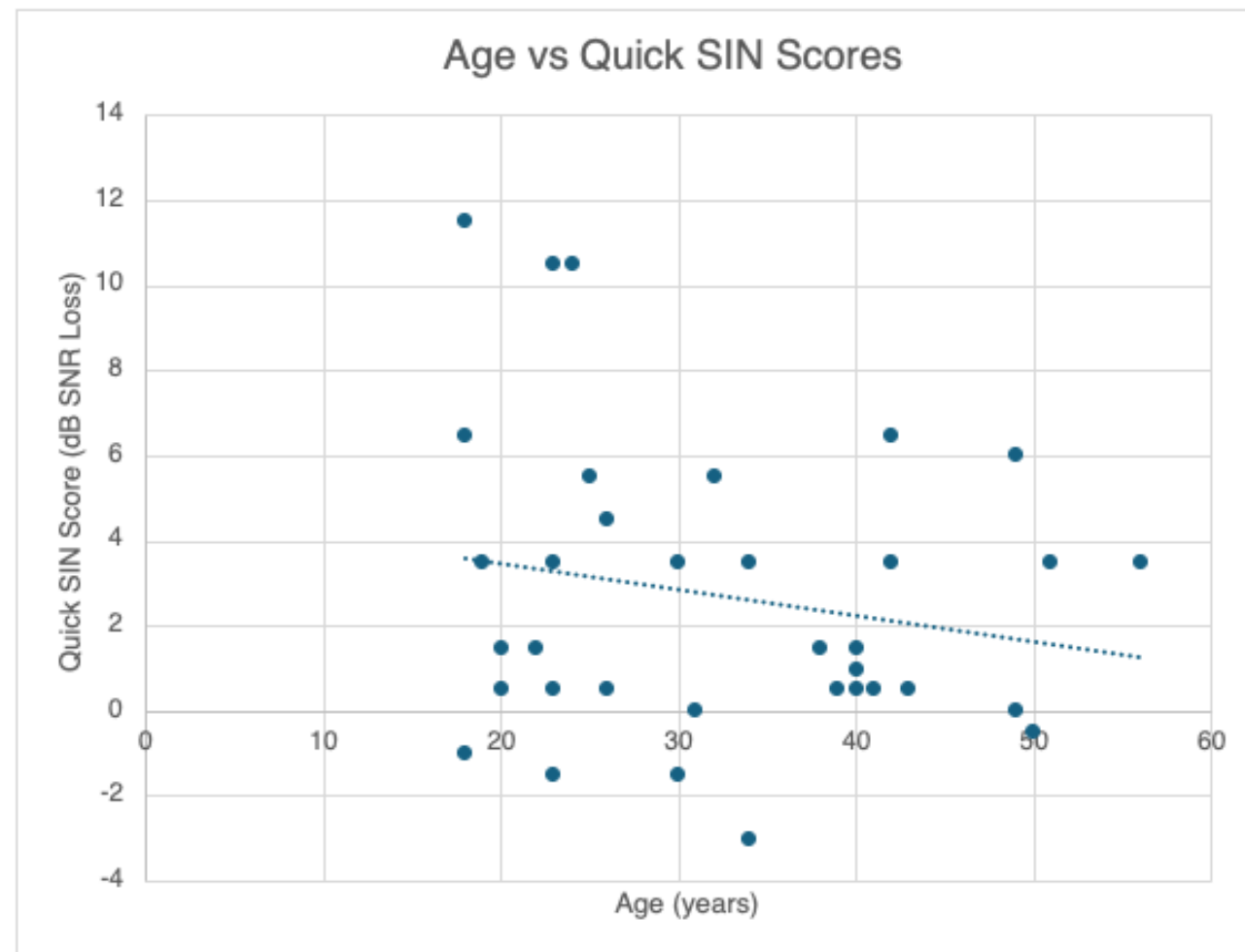
Quick SIN vs. Thresholds

- Quick SIN performance could not be reliably predicted by PTA or SRT
- Consistent with evidence that detection in quiet may not be the best indicators of real-world performance



Quick SIN vs. Age

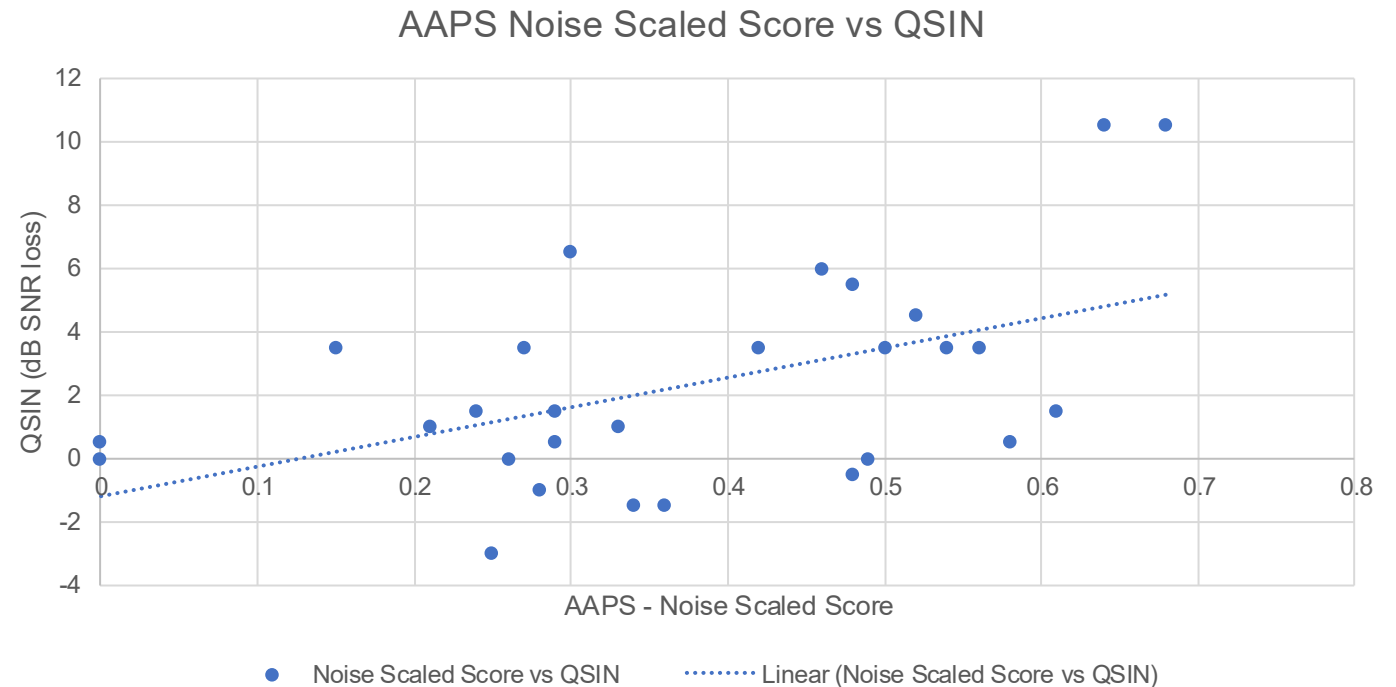
- **Very weak** trend for decreased speech in noise performance with age
- Not a clinically significant relationship
- Age alone was not a good predictor of speech in noise performance





Quick SIN vs. AAPS (Noise)

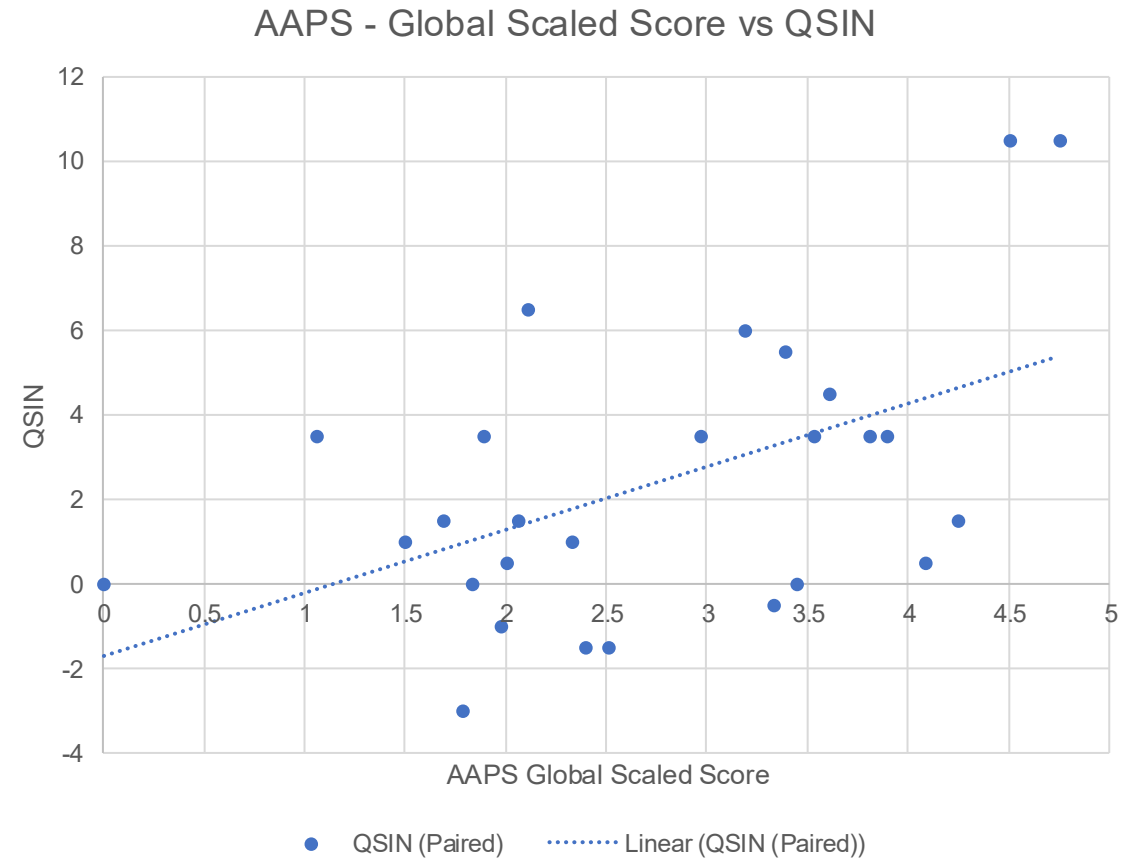
- AAPs was sensitive to detecting self-perceived difficulty for hearing in noise
- Statistically significant correlation between Noise Scaled Score and QuickSIN Score





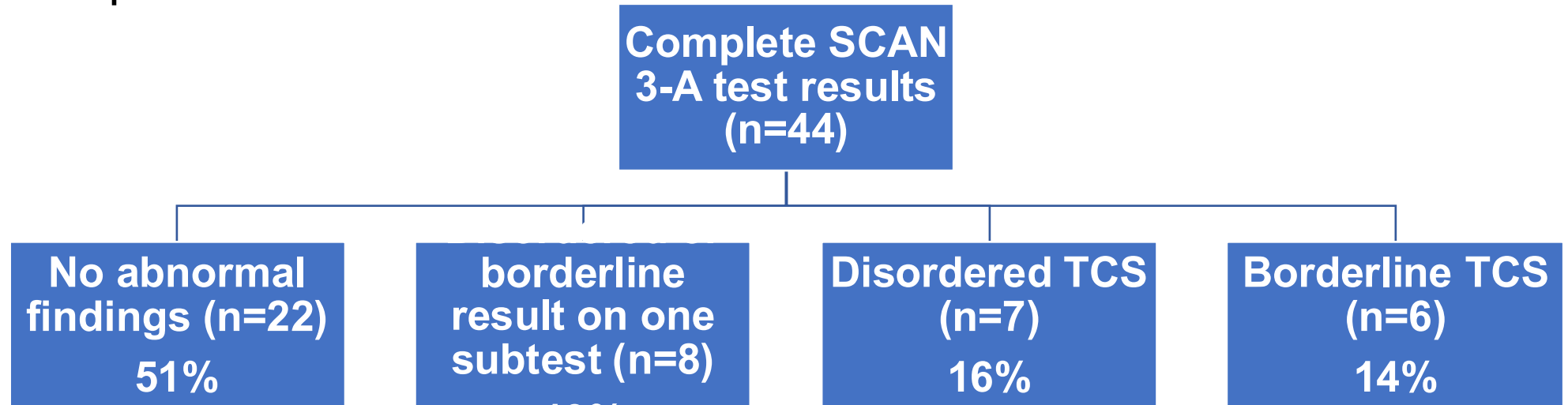
Quick SIN vs. AAPS (Global)

- AAPs was sensitive to detecting self-perceived difficulty for hearing in noise
- Statistically significant (moderate) correlation between Noise Scaled Score and QuickSIN Score

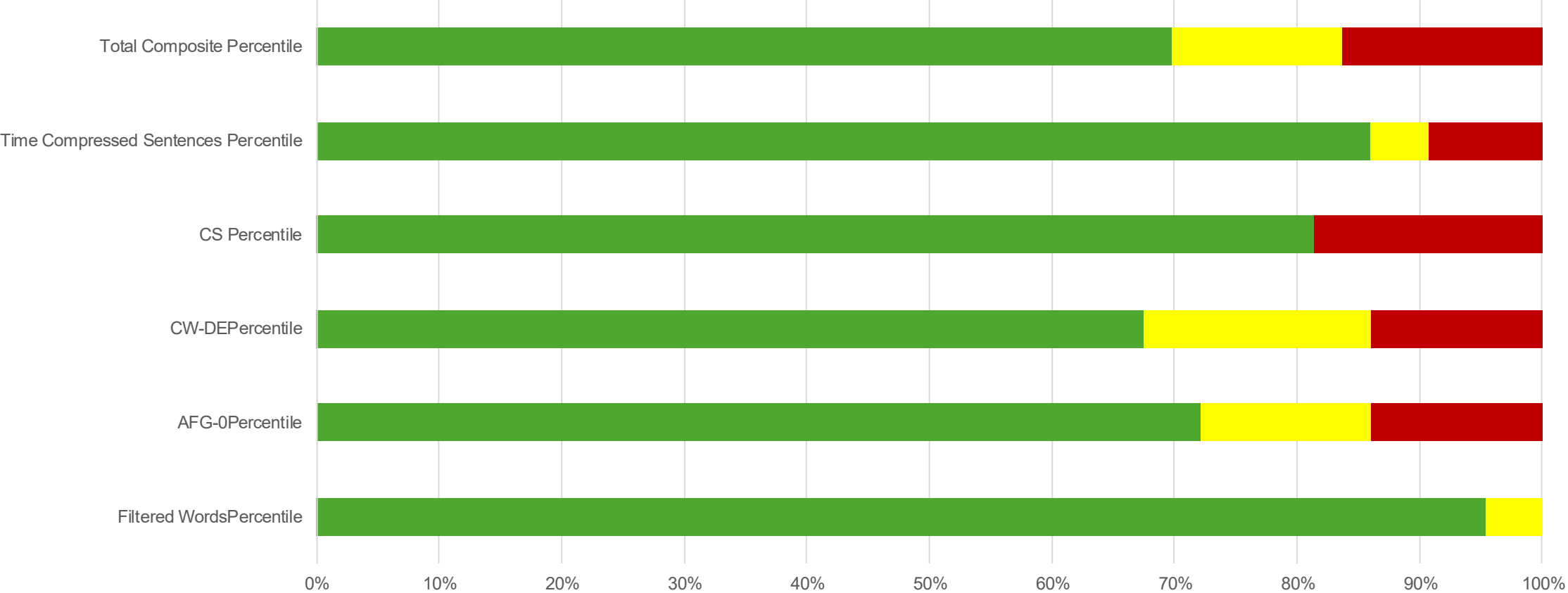


SCAN Results

- Data from 43 adults with complete SCAN-3A test results
 - Results are not reported for patients outside of normative age range or have incomplete test results
 - Reported in percentiles



SCAN Results



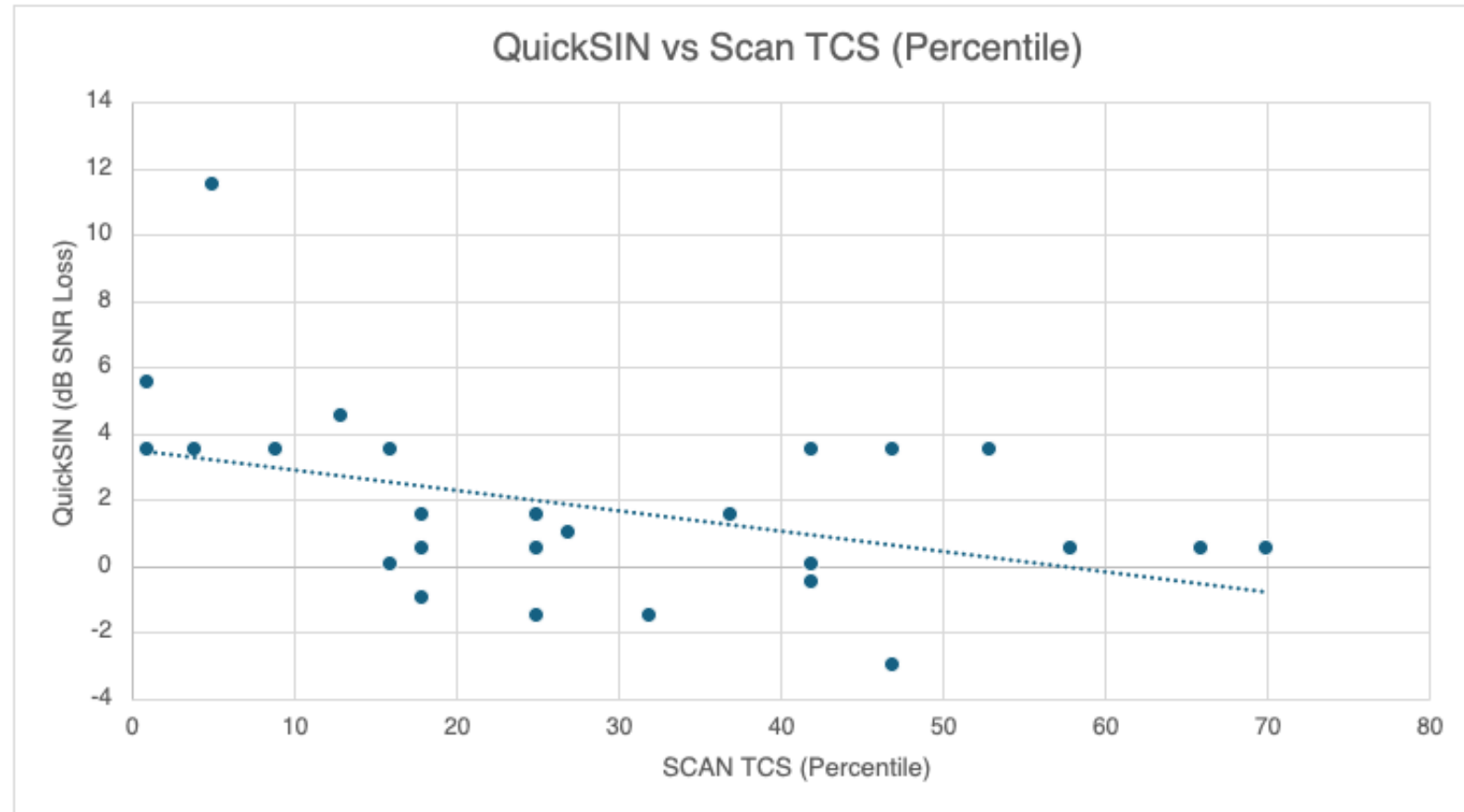
	Filtered WordsPercentile	AFG-0Percentile	CW-DEPercentile	CS Percentile	Time Compressed Sentences Percentile	Total Composite Percentile
■ % Normal	95.35%	72.09%	67.44%	81.40%	86.05%	69.77%
■ % Borderline	4.65%	13.95%	18.60%	0.00%	4.65%	13.95%
■ % Abnormal	0.00%	13.95%	13.95%	18.60%	9.30%	16.28%

■ % Normal ■ % Borderline ■ % Abnormal



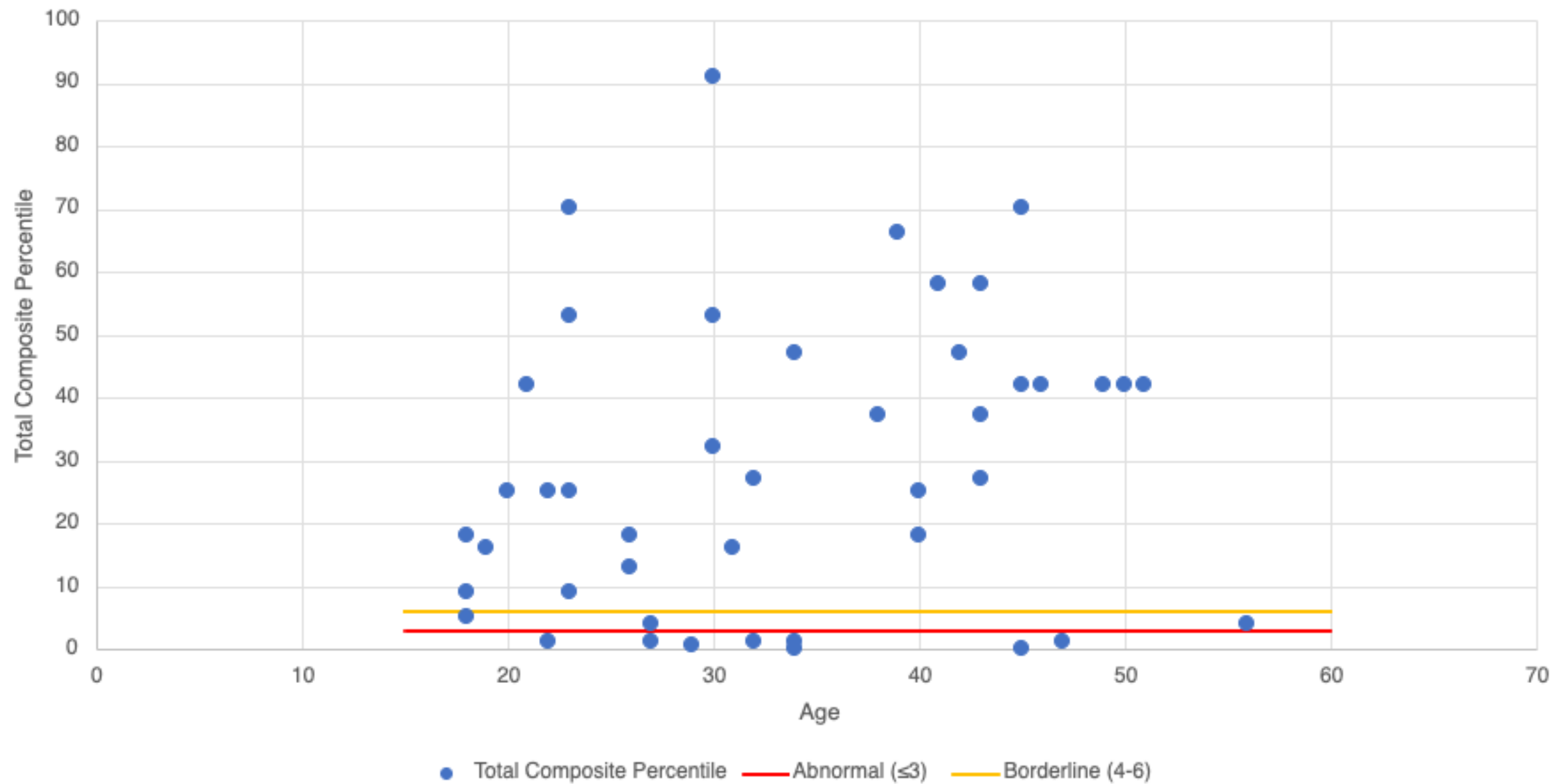
Retrospective Clinical Analysis

- Moderate negative correlation between Total Composite Scan Score (percentile) and QSIN
 - Lower QSIN scores observed in higher TCS percentiles



Correlation (r)	-0.438
R-squared (r ²)	0.192
Sample Size (n)	28
Direction	Negative

Age vs. SCAN TCS (Percentile)





Outcomes with Low-Gain Hearing Aids

1. Hearing Aid Adoption

- Technology level
- Demographics
- Speech-in-Noise

2. Unaided vs. Aided Speech-in-Noise Performance



Clinical Rationale for Low-Gain Hearing Aids

Provision of minimal shaped gain (5-10 dB)

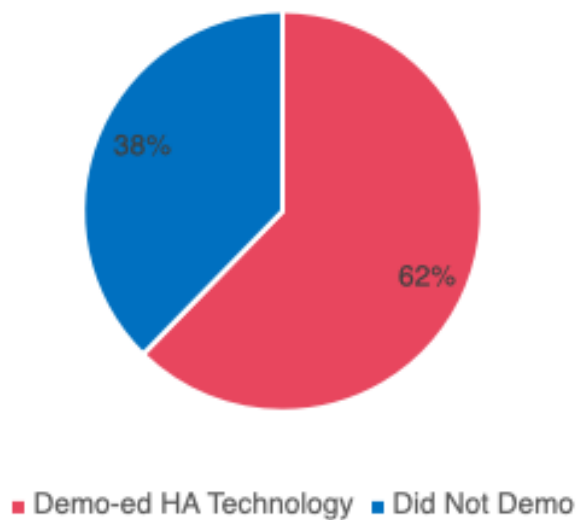
Improvement in SNR through signal processing

Reduced listening effort and listening-related fatigue

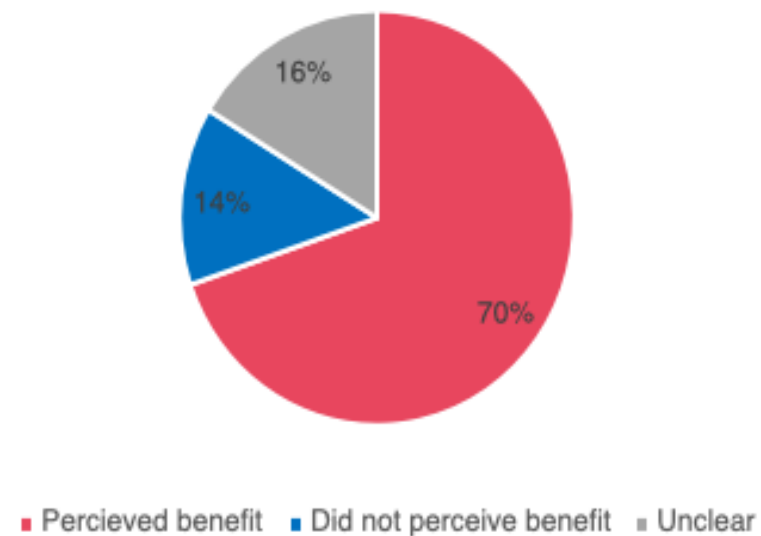
Provide support for suprathreshold processing deficits

Amplification

Demoed Hearing Technology

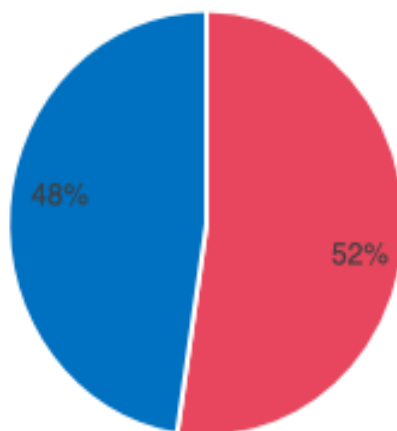


SelfReported Benefit of Demos



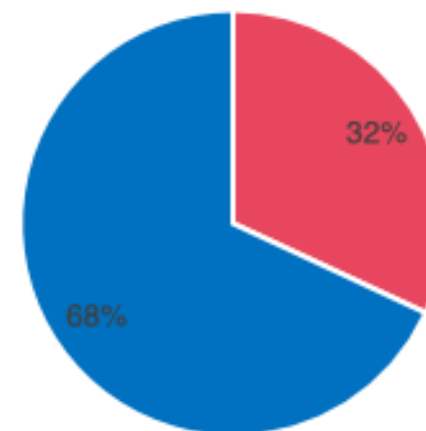
HA Adoption Rates

Adopted HAs after demoing



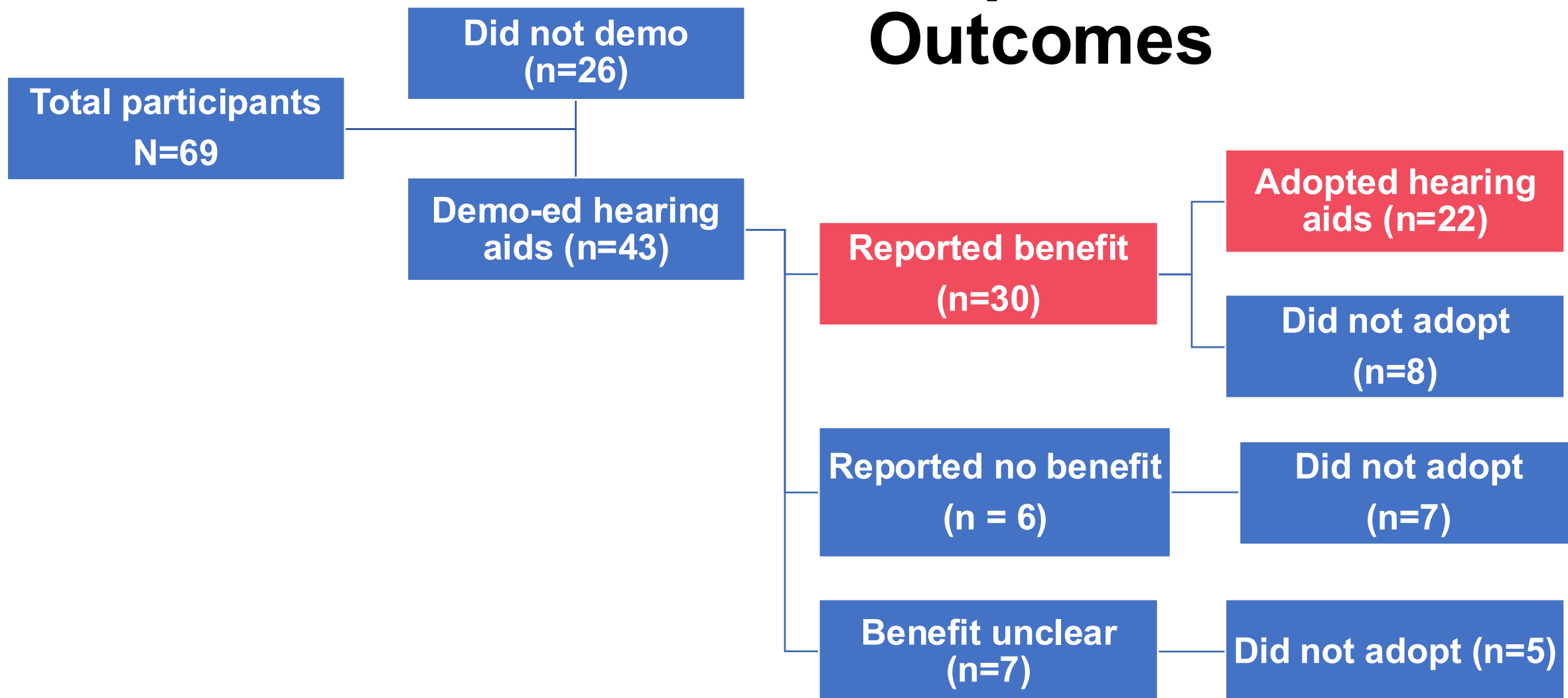
■ Adopted hearing aids ■ Did not adopt

Adopted HAs (entire group)

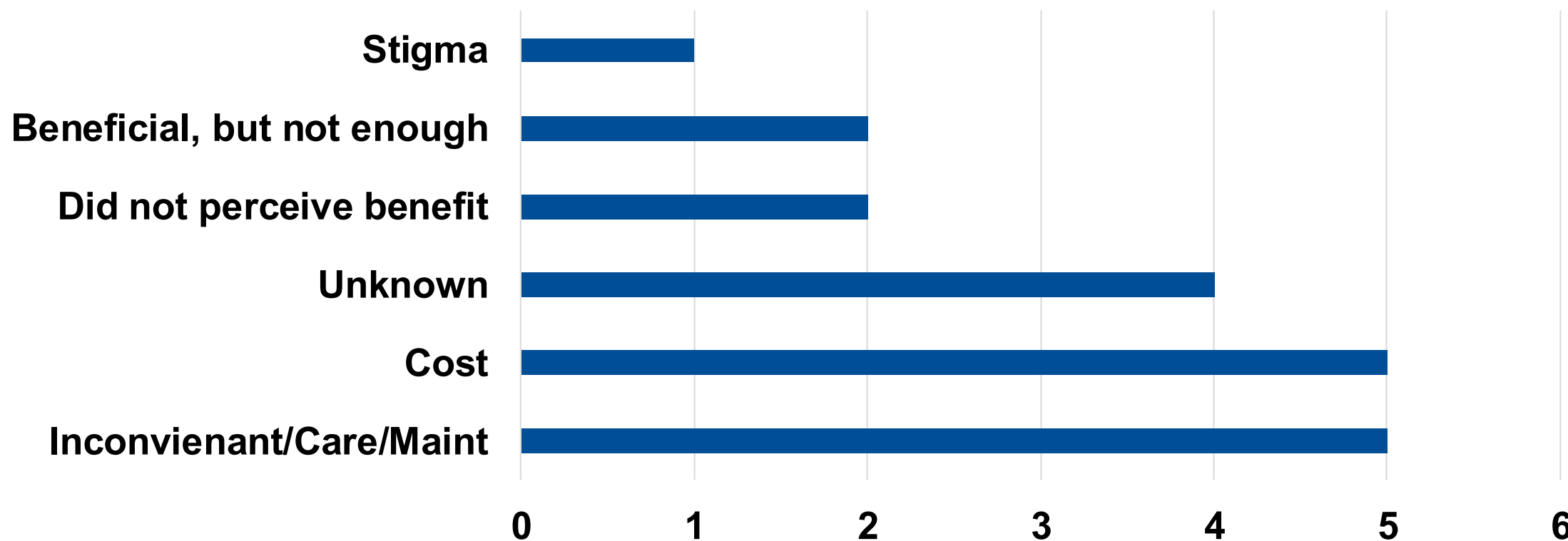


■ Adopted hearing aids ■ Did not Adopt (including did not demo)

Amplification Outcomes



Non-Adopters – Reasons for not keeping





Outcomes with Low-
Gain Hearing Aids

Technology Levels

Adopters

Technology Level	N	Percentage
Advanced	11	50%
Mid	3	14%
Entry	8	36%

Non-Adopters

Technology Level	N	Percentage
Advanced	14	70%
Mid	3	15%
Entry	2	10%
Roger Focus	1	5%

Technology Levels: Individual Cases

Entry level and advanced level hearing aids

- Unaided RSPIN: 92% HP & **62%** LP
- Advanced tech Aided RSPIN with Advanced: 100% HP & **92%** LP
- Entry level tech Aided RSPIN with Entry: Entry 92% HP & **58%** LP
- Purchased advanced level technology

Advanced level hearing aids with remote mic and Roger Focus

- Greater RSPIN improvement with Roger Focus
- Purchased hearing aids due to greater ease of use outside of the classroom



Outcomes with Low-
Gain Hearing Aids

Adopters vs Non-Adopters

Adopters

Education Level	N	Percentage
HS	5	23%
Associates	1	5%
College Student	3	14%
Bachelor's	6	27%
Advanced Degree	6	27%
Unknown	1	5%

Non-Adopters

Education Level	N	Percentage
HS	9	45%
Associates	0	0%
College Student	2	10%
Bachelor's	4	25%
Advanced Degree	4	25%
Unknown	0	0%

Adopters vs Non-Adopters

Adopters

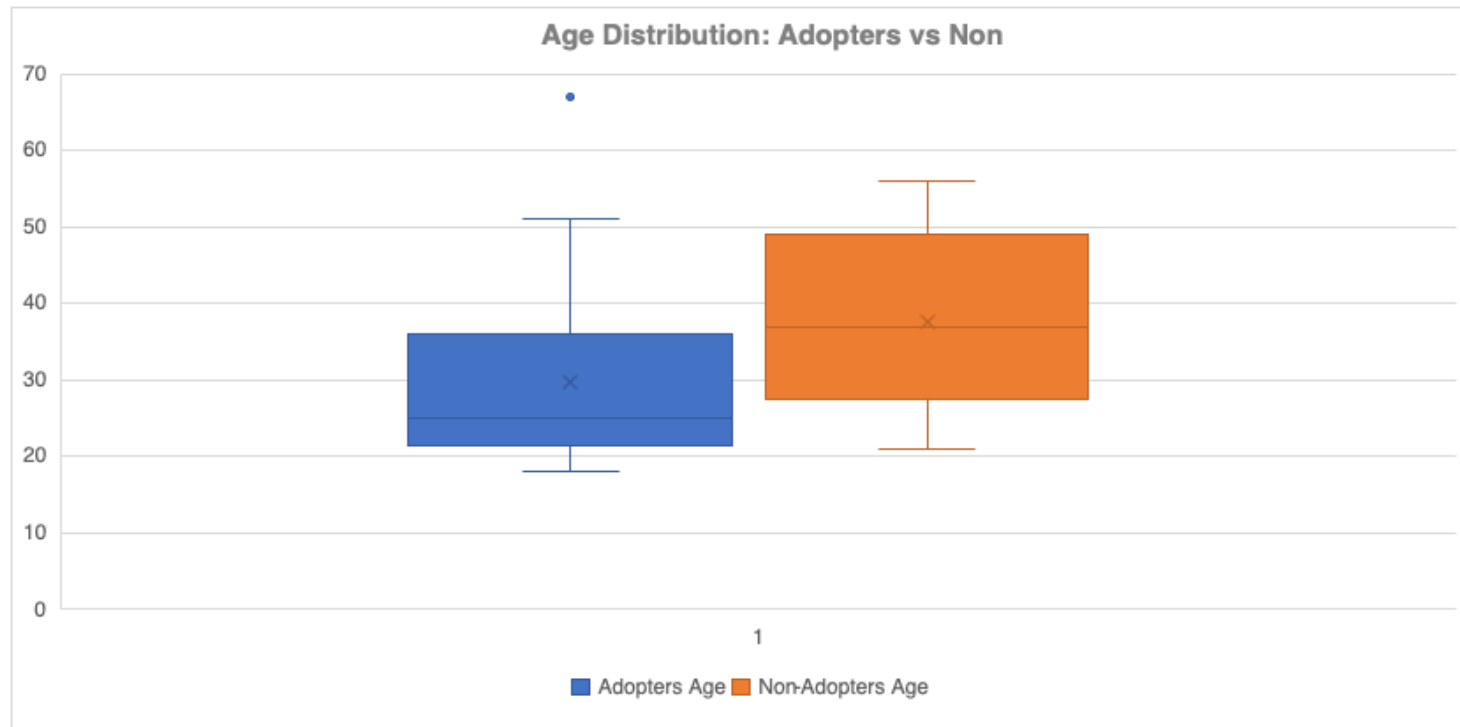
Employment Status	N	Percentage
Full Time	8	36%
Part Time	3	14%
Self-Employed	2	10%
Student	2	10%
Disabled	2	10%
Unemployed	4	18%
Retired	1	10%
Unknown	0	0%

Non-Adopters

Employment Status	N	Percentage
Full Time	8	40%
Part Time	3	15%
Self-Employed	2	10%
Student	0	0%
Disabled	0	0%
Unemployed	2	10%
Retired	1	5%
Unknown	4	20%

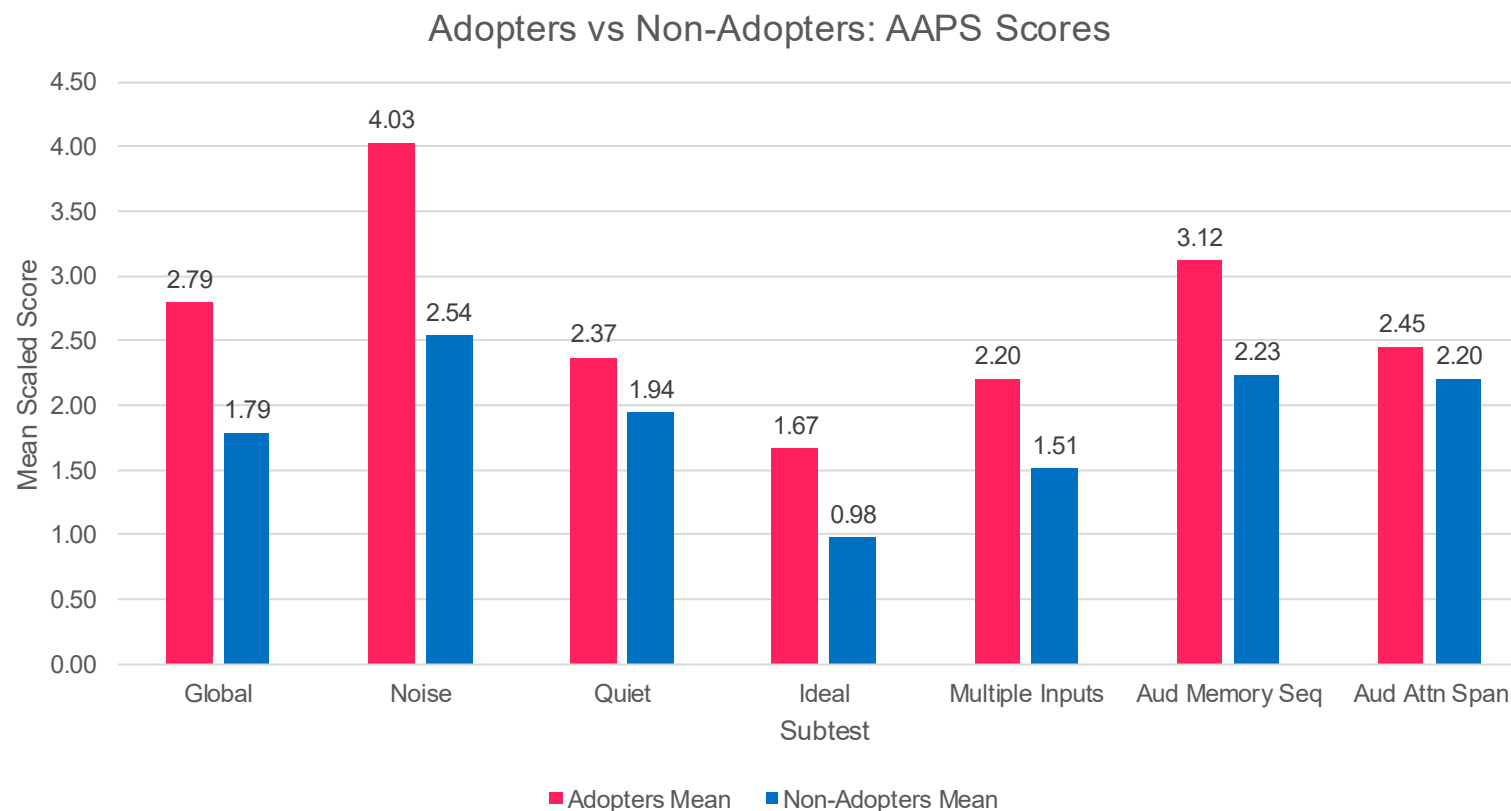
Age Comparison

- HA Adopters are younger
 - Adopters Mean = 30 years old
 - Adopters Median = 25 years old
 - Non Adopters Mean = 37.5 years old
 - Non Adopters Median = 37 years old

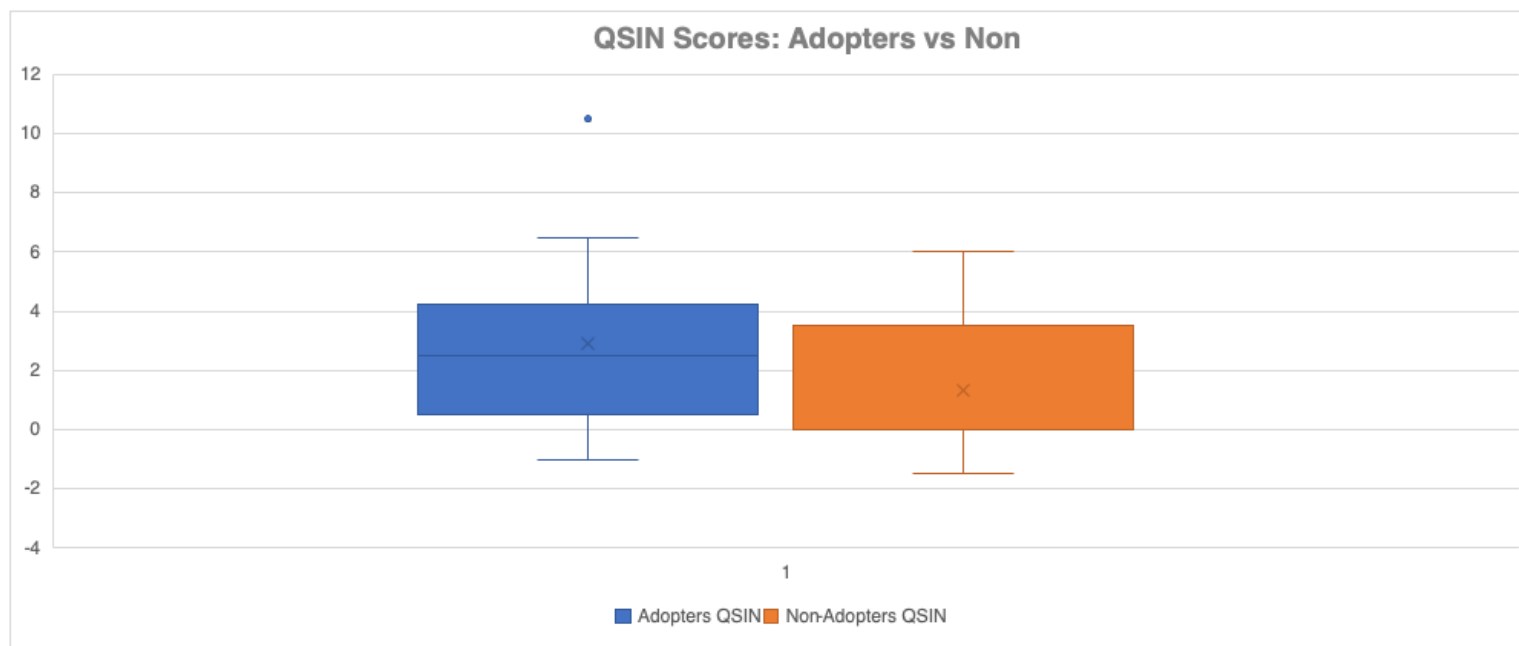


AAPS Comparison

- Adopters had higher scores on all subtests of the AAPs
- Largest difference noted in the Global score and the Noise scores



Quick SIN Comparison

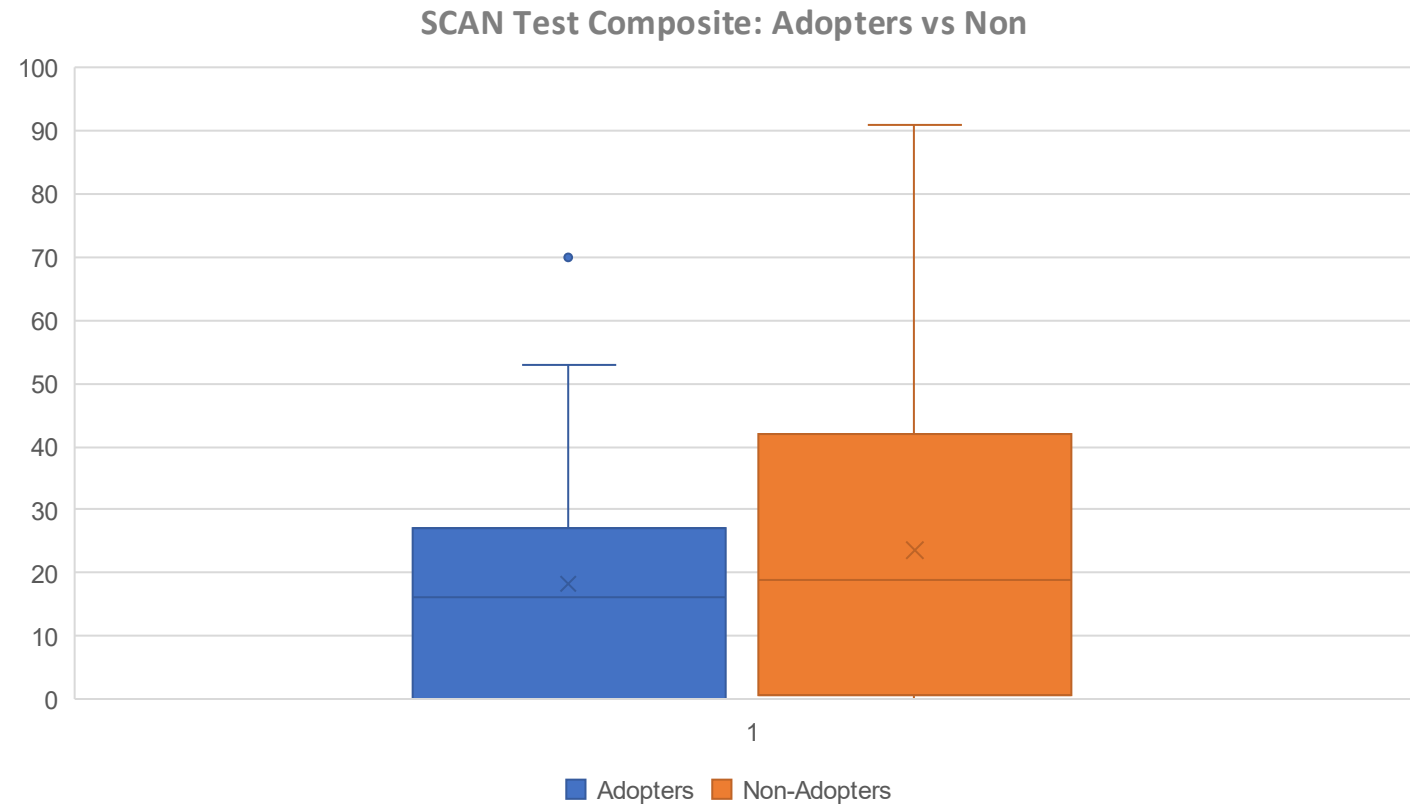


- Slightly higher QSIN scores (not statistically significant)
- Adopters:
 - Mean: 2.89
 - Median: 3.5
 - Range: -1 to 10.5
- Non-Adopters
 - Mean: 1.33
 - Median = 0
 - Range: -1.5 – 6



Outcomes with Low-Gain Hearing Aids

SCAN Total Composite Score Comparison



Revised Speech in Noise Test

- Patients who adopted hearing aids had:
 - **Poorer unaided scores for low probability sentences**
 - **Greater improvement in unaided to aided condition in low probability RSPIN scores**

	High Probability		Low Probability		
	Unaided	Aided	Unaided	Aided	Degree of Change
All	94%	99%	58%	79%	20%
Non Adopters	98%	100%	77%	85%	8%
Adopters	92%	98%	51%	76%	25%

Additional Tools to Consider:

Patient Reported Outcome Measures (PROMS)

- Vanderbilt Fatigue Scale for Adults or VFS-10 (*Hornsby et al., 2020*)
- Client Oriented Scale of Improvement (COSI) (*Dillon et al., 1999*)
- Revised Hearing Handicap Inventory (RHHI) (*Cassarly et al., 2020*)

Assessment Tools:

- Gaps-in-Noise (GIN) (*Musiek et al., 2005*)
- Dichotic Digits (1, 2, and 3 pair on VA CD) (*Strouse & Wilson, 1999*)
- 500 Hz Masking Level Difference* (*Wilson et al., 2003*)

Patient Profiles Associated with FHD

Demographics

- Majority of patients are:
 - 18-40 years of age
 - Female
 - Have some post-high school education

Top Co-Morbidities

- Anxiety/depression and tinnitus
- Followed by:
 - hx of ear infections,
 - noise exposure,
 - dizziness,
 - head injury

Top Patient Concerns

- Difficulty understanding speech, especially in noise

Audiologic Assessment Patterns Associated with FHD

Pure-Tone Thresholds

- Patient thresholds are within the clinically normal range
- Including through the extended high-frequencies

Speech-in-noise and Auditory Processing Testing

- A minority of patients perform outside of normal limits
- QuickSIN & SCAN-3:A may not be sensitive to self-perceived hearing difficulties

Hearing Aid Outcomes

Majority of FHD patients choose to demo low-gain hearing aids

- Majority perceive benefit
- About half purchase after demo period
- 30% of the entire group purchased

Non-Adoption of Low-Gain Hearing Aids

- Barriers to uptake
- Less education
- Less speech-in-noise benefit from hearing aids

Clinical Takeaways

- AAPS
 - Mean score for AAPS global score and noise score were higher for those who adopted hearing aids compared to those who did not
 - This was the only clinical indicator that predicted benefit and who would be more likely to adopt hearing aids
- Patients with FHD benefit from hearing aids
- Outcomes observed can be used to inform counseling on potential benefits and limitations

Thank You! Questions?

Jodi Baxter, AuD

Christina M. Roup, PhD





Congratulations!

- You've completed the course and can move on to the exam!
- From your account:
 - Go to pending Courses
 - Choose take exam