Achieving Auditory Wellness for Downstream Improved Health Outcomes:

Evidence from the ACHIEVE Study

CANADIAN ACADEMY OF AUDIOLOGY | Moncton, NB
Friday, October 16, 2026; Time: 8:45 AM - 9:45 AM

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University of South Florida

USF Health

Disclosures (& Gratitude!)

Auditory Rehabilitation & Clinical Trials Laboratory

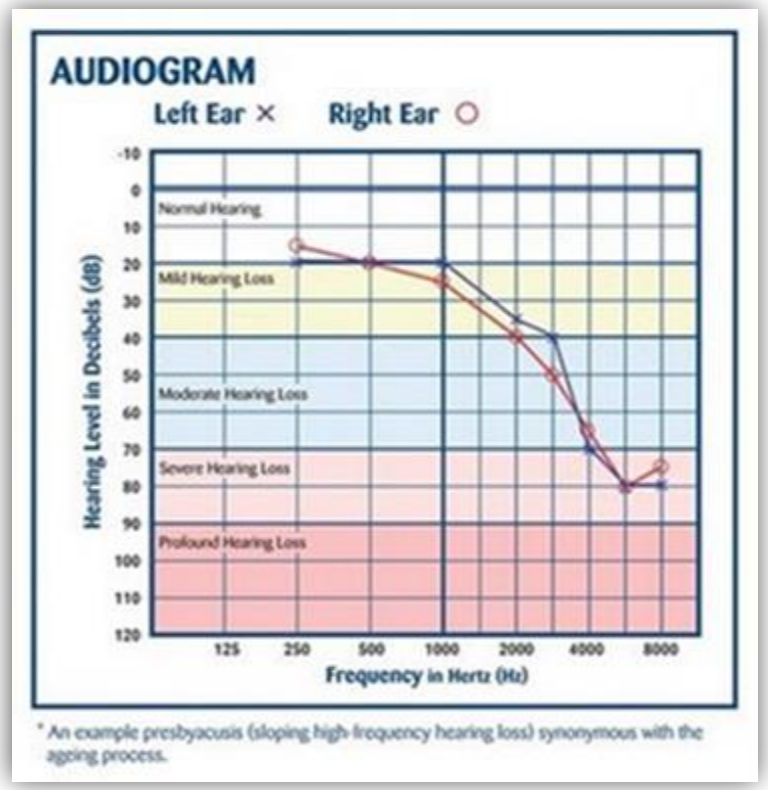


Please see the QR code for the full list of disclosures, acknowledgments, references, & MORE!

This work was partially funded by the NIH and through a generous donation of hearing devices from Sonova.

The University of Mississippi Medical Center · University of Pittsburgh · The University of North Carolina at Chapel Hill · Johns Hopkins University · Wake Forest University · University of Minnesota · University of South Florida

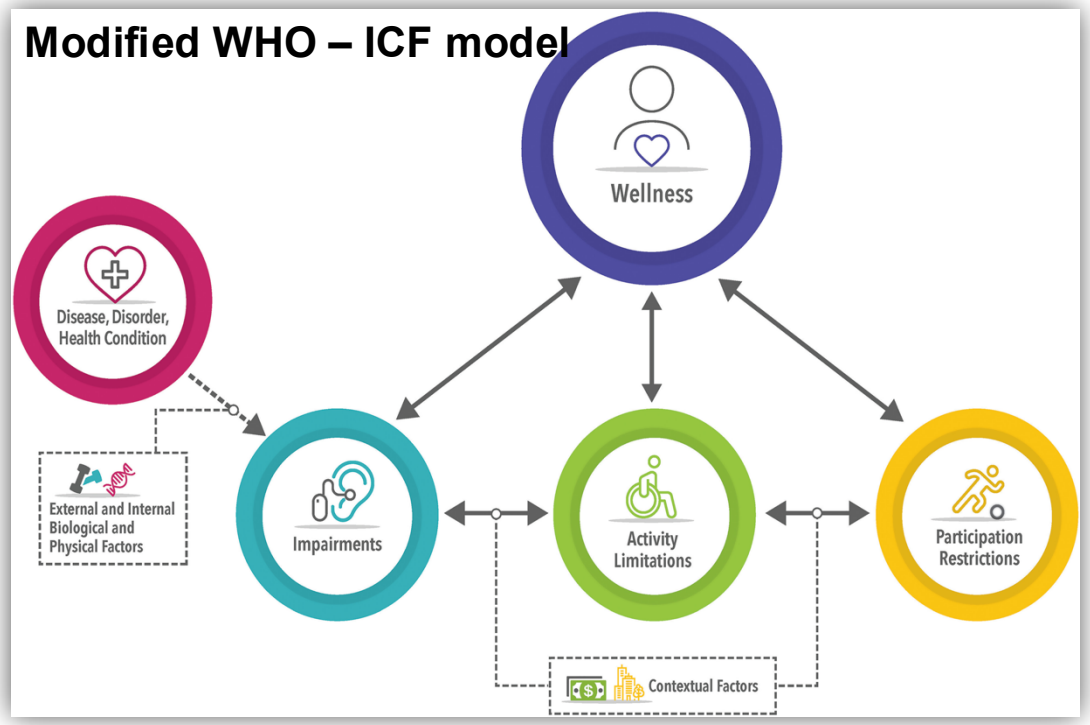




Auditory Wellness: *the effective processing of sound that enables the individual to fully participate in a wide range of daily listening activities without limitations or restrictions.*

Humes et al. (2024), *Trends in Hearing*





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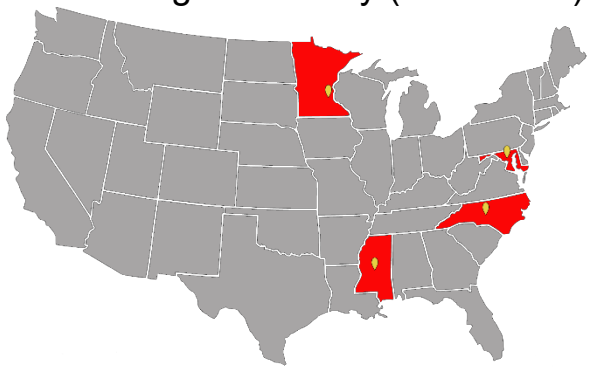
Humes et al., (2024) Trends in Hear

ACHIEVE RCT

Clinicaltrials.gov Identifier: NCT03243422; NIH-NIA: R34AG046548, R01AG055426; MPIs: Lin, Coresh

ARIC™

Atherosclerosis Risk in Communities-Neurocognitive Study (ARIC-NCS)





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Wake Forest University

University of Minnesota

The University of Mississippi Medical Center — Education • Research • Health Care

ACHIEVE Healthy Aging

The University of North Carolina at Chapel Hill

University of South Florida

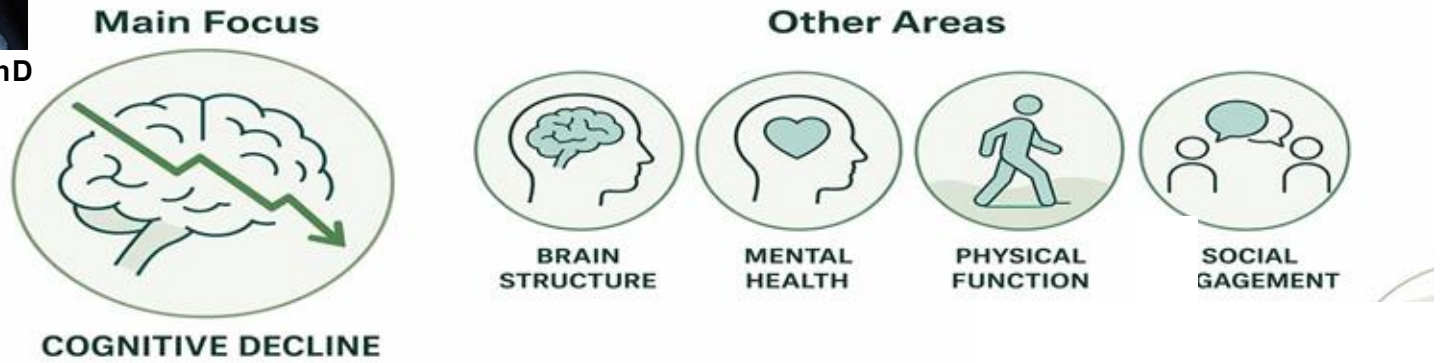
University of Pittsburgh




Frank Lin, MD, PhD Jennifer Deal, PhD

The Aging and Cognitive Health in Elders (ACHIEVE) Study

A landmark randomized controlled trial to determine how hearing intervention affects brain health in older adults.





Josef Coresh, MD, PhD

2014	2017	2018–2019	2018–2022	2022–2023	2023	2023–2026	2023–2026	Beyond?
Clinical trials planning grant (feasibility & pilot studies)	Study launched; recruitment began in January 2018	Screening of 3,004 participants; 977 eligible individuals were randomized [490 hearing intervention, 487 education control]	Ongoing follow-up every 6 months for 3 years; primary completion estimated in July 2022	Final analysis and results preparation; results published in The Lancet in September 2023	Main findings announced at the Alzheimer's Association International Conference and in peer-reviewed journal	NIDCD-funded extension to explore hybrid telehealth support for HI participants	NIA-funded extension to continue following all participants until 2026	Largest cohort of hearing aid users, can help answer questions about engagement and long-term benefit

ACHIEVE Study Design

Recruitment & Randomization

ARIC Cohort (n = 238)
Existing heart health study participants from field site communities

De Novo Cohort (n = 739)
New community volunteers responding to advertisements

977
Participants
Ages 70–84
Hearing loss
Normal cognition

Semi-annual follow-up visits

Intervention Sessions

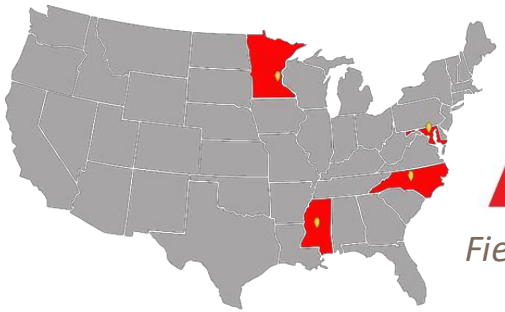
Hearing Intervention
Audiological evaluation, hearing aid fitting & ongoing support

Health Education Control
Successful Aging health education at same frequency

3-Year Outcomes

- **Cognitive Decline** — *Primary Outcome*
- **Brain Structure**
- **Mental Health**
- **Physical Function**
- **Social Engagement**

2018 – 2019 | **2019 – 2022** | **2021 – 2022**



ARIC™

Field sites: Baltimore, Minneapolis, Jackson & Forsyth County

ACHIEVE Study

A landmark randomized controlled trial to determine how hearing intervention affects brain health in older adults.

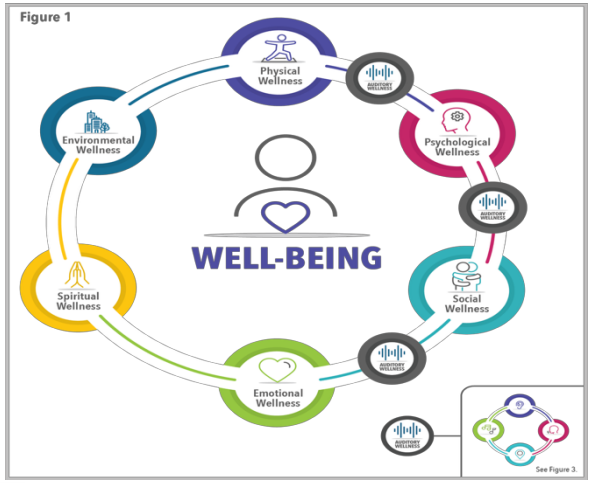
Main Focus



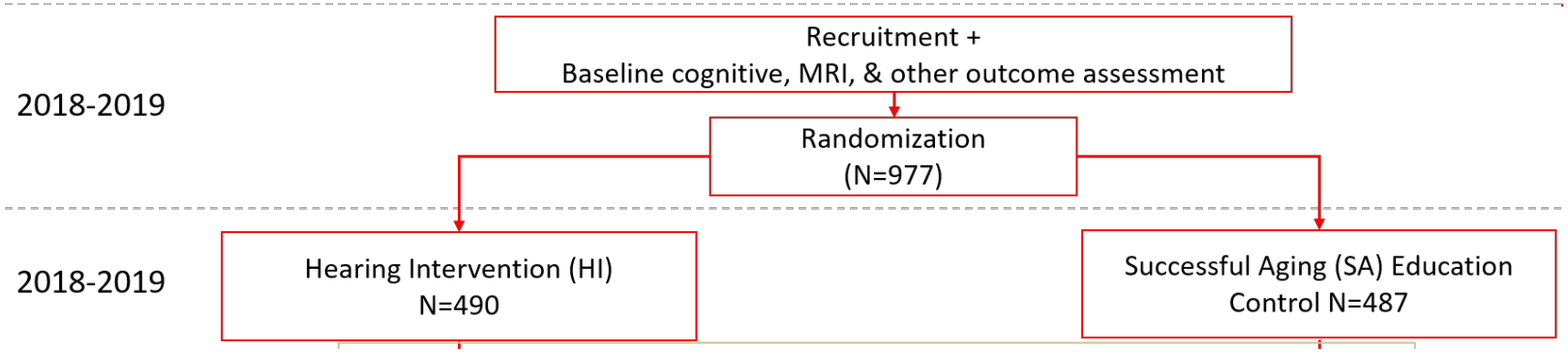
COGNITIVE DECLINE

Other Areas

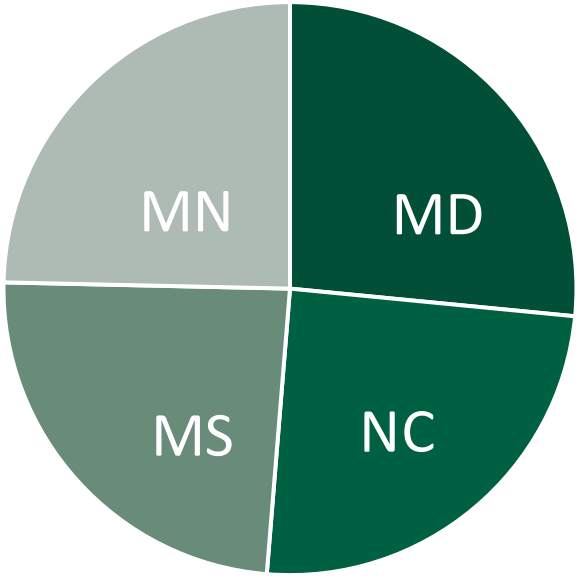


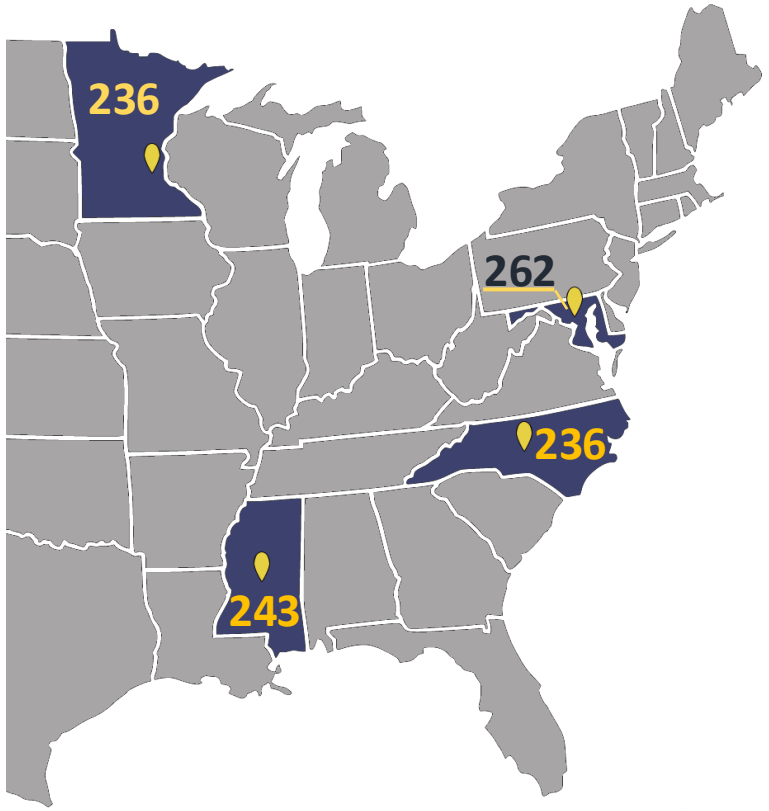


ACHIEVE Study Flow Diagram



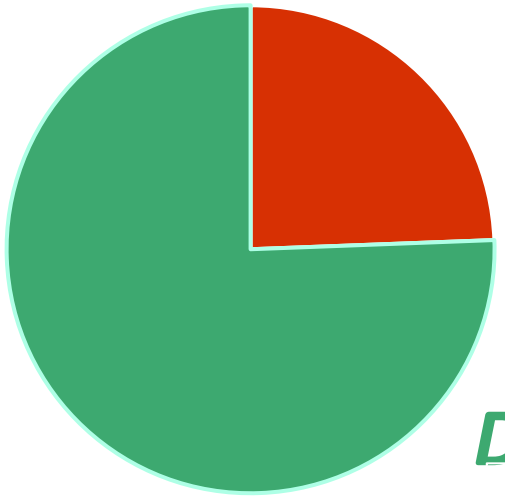
ACHIEVE Enrollment





ARIC™

(*n* = 238)



De Novo

(*n* = 739)

Baseline Characteristics by Recruitment Source

ARIC cohort has more risk factors for cognitive decline than De novo

Baseline characteristics	All Participants (N=977)	ARIC Cohort (N=238)	De novo Cohort (N=739)
*Age, mean (SD), y	76.8 (4.0)	78.9 (2.9)	76.1 (4.0)
*Female sex, No. (%)	523 (53.5)	147 (61.8)	376 (50.9)
*Black race, No. (%)	112 (11.5)	68 (28.6)	44 (6.0)
*Education, No. (%)			
Less than high school	37 (3.8)	22 (9.3)	15 (2.0)
High school, GED, or vocational school	418 (42.8)	96 (40.5)	322 (43.6)
College, graduate, or professional school	521 (53.4)	119 (50.2)	402 (54.4)
*Income, No. (%)			
Under $25,000	147 (15.5)	60 (26.7)	87 (12.0)
$25,000-$49,999	283 (29.8)	77 (34.2)	206 (28.4)
$50,000-$74,999	210 (22.1)	47 (20.9)	163 (22.5)
$75,000-$100,000	140 (14.7)	21 (9.3)	119 (16.4)
Over $100,000	170 (17.9)	20 (8.9)	150 (20.7)

**indicates statistically significant difference between groups*

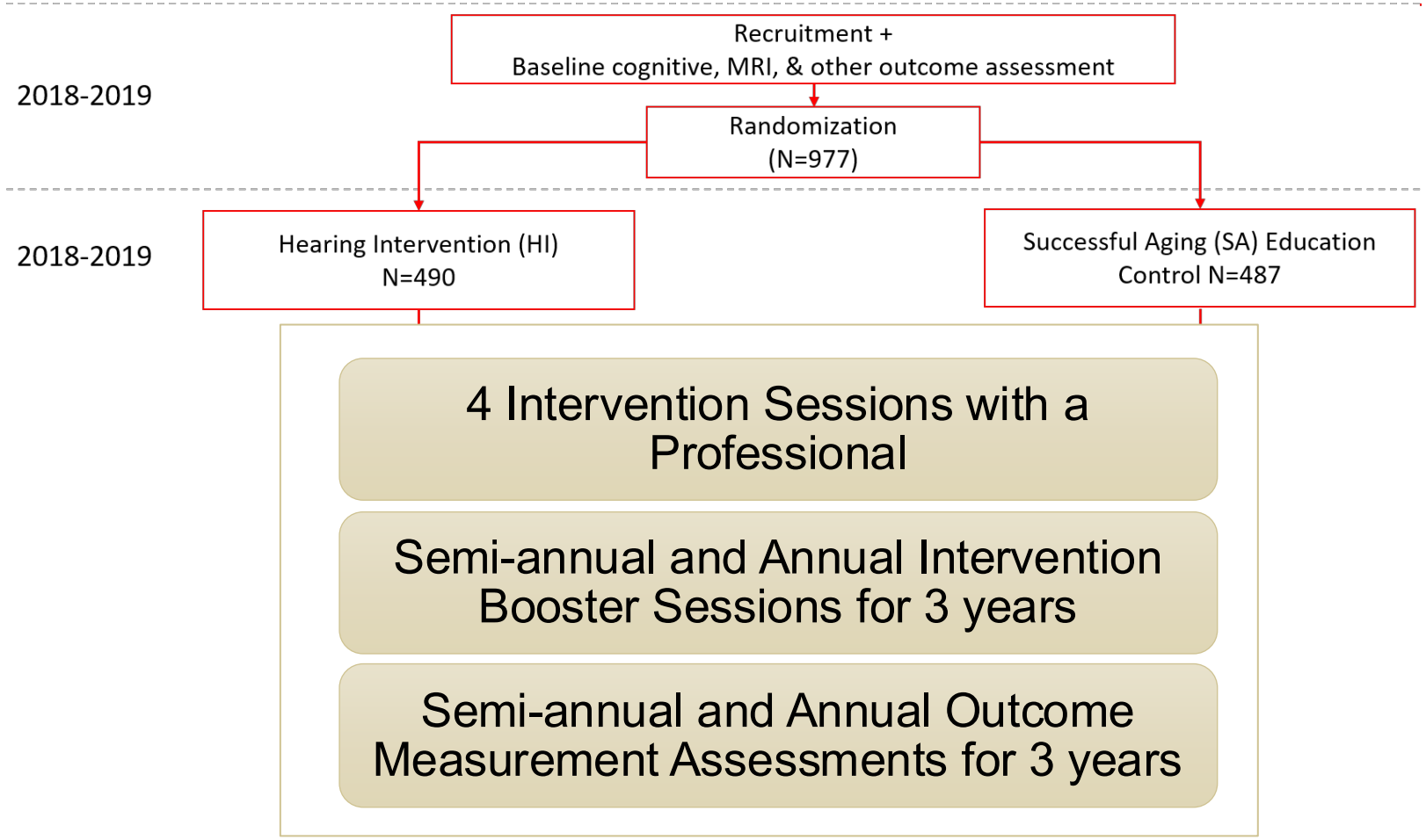
Baseline Characteristics by Recruitment Source (cont'd)

ARIC cohort has more risk factors for cognitive decline than De novo

Baseline characteristics	All Participants (N=977)	ARIC Cohort (N=238)	De novo Cohort (N=739)
One or more apolipoprotein E ε4 alleles, No. (%)	224 (24.7)	59 (25.7)	165 (24.3)
*Diabetes, No. (%)	195 (20.0)	68 (28.6)	127 (17.2)
Hypertension, No. (%)	651 (66.8)	169 (71.9)	482 (65.2)
*Living alone, No. (%)	290 (30.0)	83 (35.9)	207 (28.1)
Pure tone average, mean (SD), dB	39.4 (6.9)	39.1 (6.7)	39.5 (7.0)
*Hearing handicap inventory, mean (SD)	15.3 (9.8)	12.0 (9.5)	16.3 (9.6)
*Mini-mental state exam, mean (SD)	28.2 (1.6)	28.0 (1.8)	28.3 (1.6)
*Global cognition, mean (SD)	0.000 (0.926)	-0.379 (1.042)	0.123 (0.851)
*Executive function, mean (SD)	-0.001 (0.888)	-0.318 (0.999)	0.102 (0.824)
*Language, mean (SD)	0.000 (0.837)	-0.395 (0.924)	0.127 (0.765)
*Memory, mean (SD)	0.000 (0.909)	-0.191 (0.937)	0.061 (0.892)

**indicates statistically significant difference between groups*

ACHIEVE Study Flow Diagram



ACHIEVE Interventions

2018-2019

Recruitment +
Baseline cognitive, MRI, & other outcome assessment

Randomization
(N=977)

2018-2019

Hearing Intervention (HI)
N=490

Successful Aging (SA) Education
Control N=487

USF BULLS




Comprehensive Evaluation & Educational Counseling



Individualized Goal Setting, Educational Counseling, & Self-Management


Sensory Management: Hearing Aids, Educational Counseling, & Self-Management


Hearing Assistive Technologies, Educational Counseling, & Self-Management


Outcomes Assessment

The "10 Keys" ™
to Healthy Aging
Instructor Manual
Adapted for the Successful Aging intervention in the ACHIEVE trial



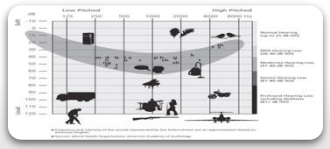
UNIVERSITY OF PITTSBURGH
VERITAS 1787 VIRTUS



Hearing Intervention is NOT one-size fits ALL!



ACHIEVE Hearing Intervention



Comprehensive Evaluation & Educational Counseling



Individualized Goal Setting, Educational Counseling, & Self-Management



Sensory Management: Hearing Aids, Educational Counseling, & Self-Management



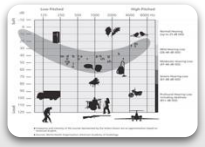
Hearing Assistive Technologies, Educational Counseling, & Self-Management



Outcomes Assessment

Sanchez et al., (2020) *Ear & Hearing*

ACHIEVE Hearing Intervention



Comprehensive Evaluation & Educational Counseling



Individualized Goal Setting, Educational Counseling, & Self-Management



Sensory Management: Hearing Aids, Educational Counseling, & Self-Management



Hearing Assistive Technologies, Educational Counseling, & Self-Management



Outcomes Assessment



AJA

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Description of the Baseline Audiologic Characteristics of the Participants Enrolled in the Aging and Cognitive Health Evaluation in Elders Study

Victoria A. Sanchez, Michelle L. Arnold, Joshua F. Betz, Nicholas S. Reed, Sarah Faucette, Elizabeth Anderson, Sheila Burgard, Josef Coresh, Jennifer A. Deal, Ann Clock Eddins, Adele M. Goman, Nancy W. Glynn, Lisa Gravens-Mueller, Jaime Hampton, Kathleen M. Hayden, Alison R. Huang, Kaila Liou, Christine M. Mitchell, Thomas H. Mosley Jr., Haley N. Neil, James S. Pankow, James R. Pike, Jennifer A. Schrack, Laura Sherry, Katherine H. Teece, Kerry Witherell, Frank R. Lin, and Theresa H. Chisolm, for the ACHIEVE Collaborative Study

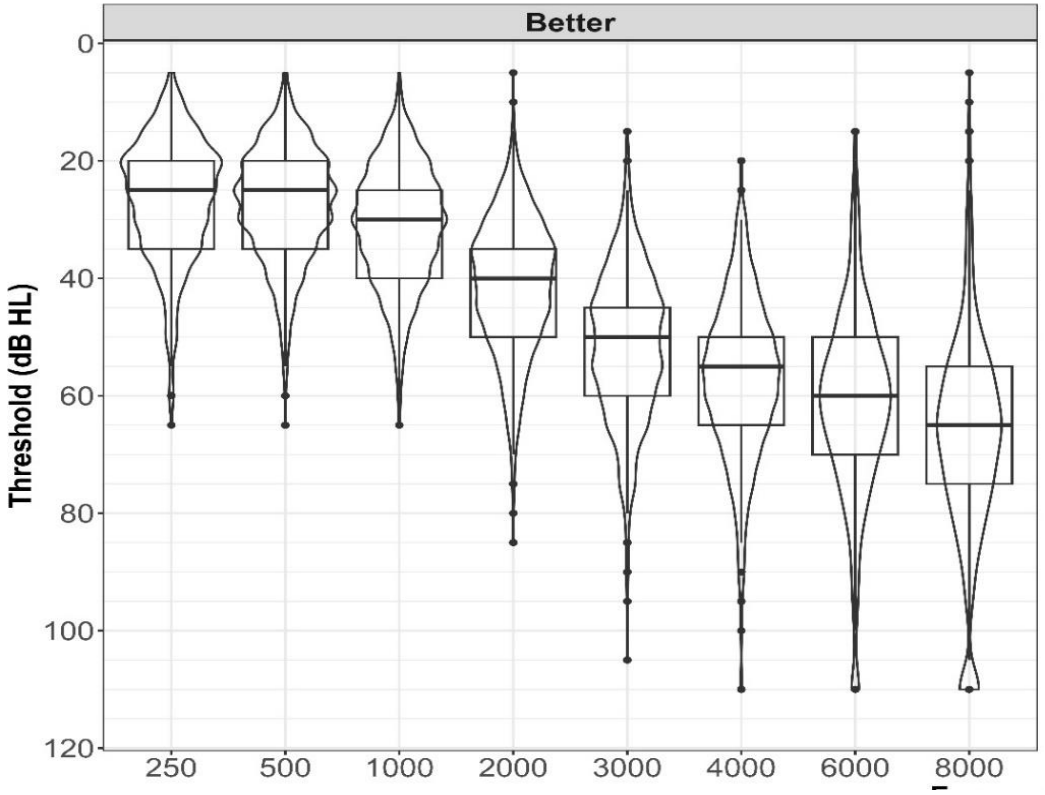
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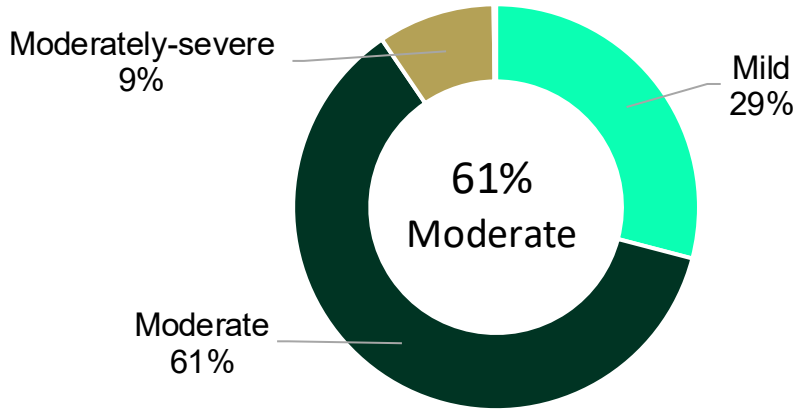
https://doi.org/10.1044/2023_AJA-23-00066

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Sanchez et al., (2020) *Ear & Hearing*
Sanchez et al., (2024) *American Journal of Audiology*

ACHIEVE Hearing Intervention





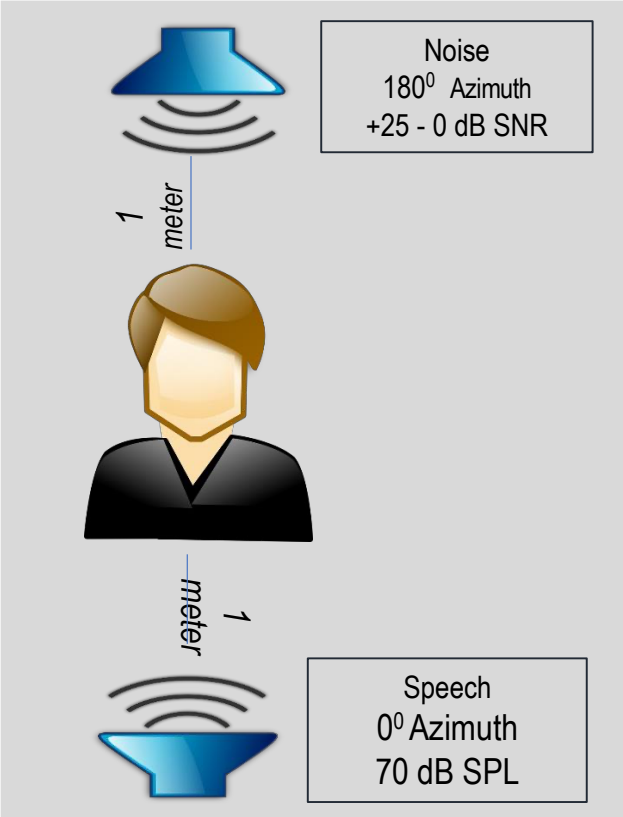
WHO Criteria (2021)

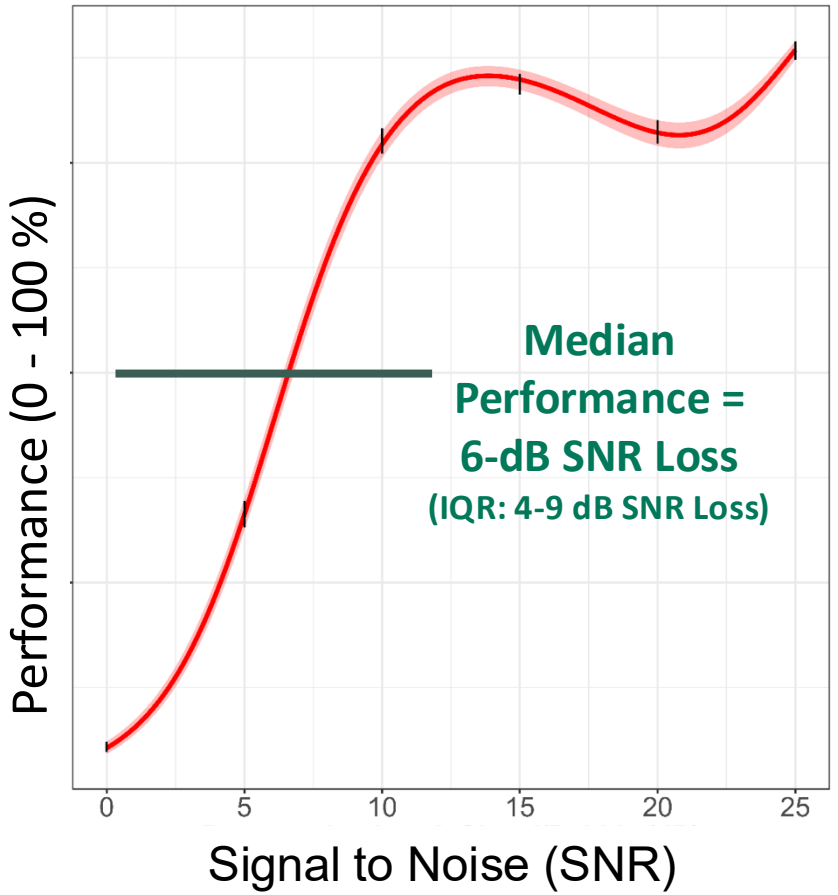
Better ear 4-freq PTA

Sanchez et al., (2020) *Ear & Hearing*
Sanchez et al., (2024) *American Journal of Audiology*

ACHIEVE Baseline Hearing Characteristics

- Soundfield Speech-in-Noise
  - QuickSIN Test
  - Practice list and two test lists

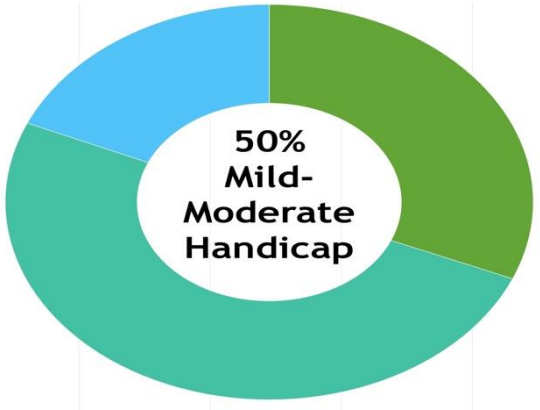


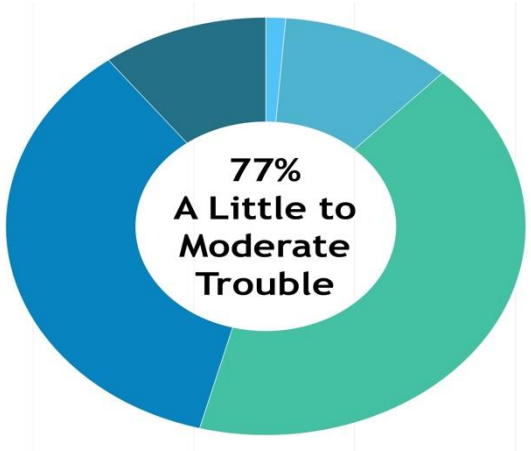


Sanchez et al., (2024) *American Journal of Audiology*

ACHIEVE Baseline Hearing Characteristics

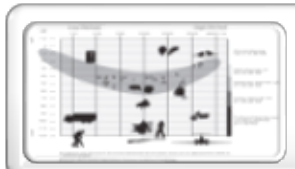
	Overall *(n = 977)*
HHIE-S (N, %)	
No Handicap	304 (31)
Mild-Moderate Handicap	487 (50)
Severe Handicap	179 (18)
Self-Reported Trouble Hearing (N, %)	
Excellent	12 (1)
Good	104 (11)
A Little Trouble	412 (42)
Moderate Trouble	347 (36)
A Lot of Trouble	99 (10)
Deaf	1 (0)





Sanchez et al., (2024) *American Journal of Audiology*

ACHIEVE Hearing Intervention



Comprehensive Evaluation & Educational Counseling



Individualized Goal Setting, Educational Counseling, & Self-Management

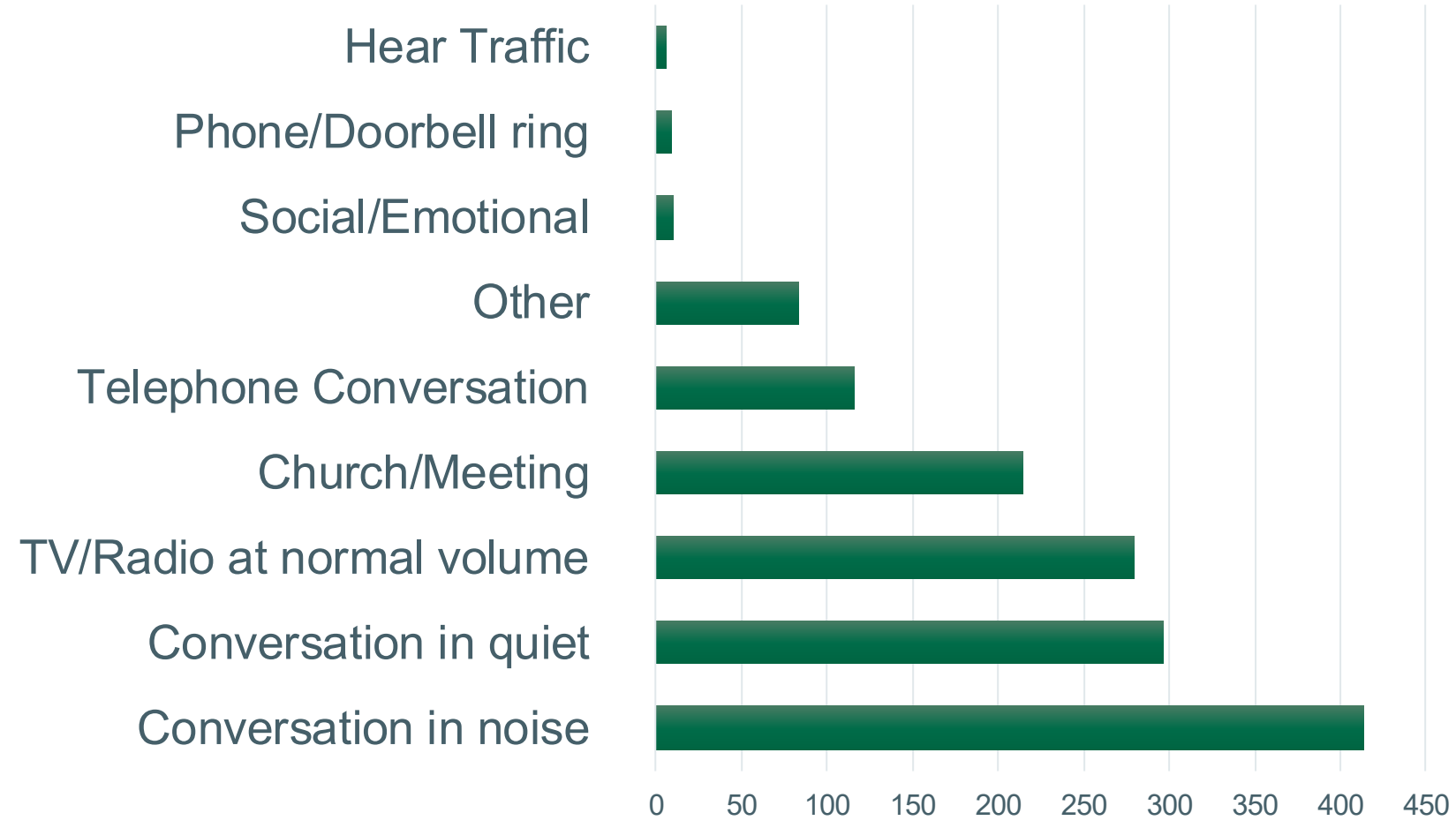
Purpose: Target participant-specific communication needs and foster realistic expectations

Client Oriented Scale of Improvement (COSI)

- Used to create **person-centered** goals for the hearing intervention
- Goals were **specific** and **prioritized**

Sanchez et al., (2020) *Ear & Hearing*
Dillion et al., (1997) JAAA

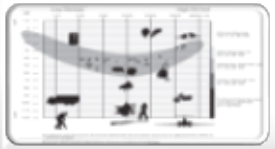
COSI Goal Categories





Sanchez et al., (2020) *Ear & Hearing*
Dillion et al., (1997) JAAA

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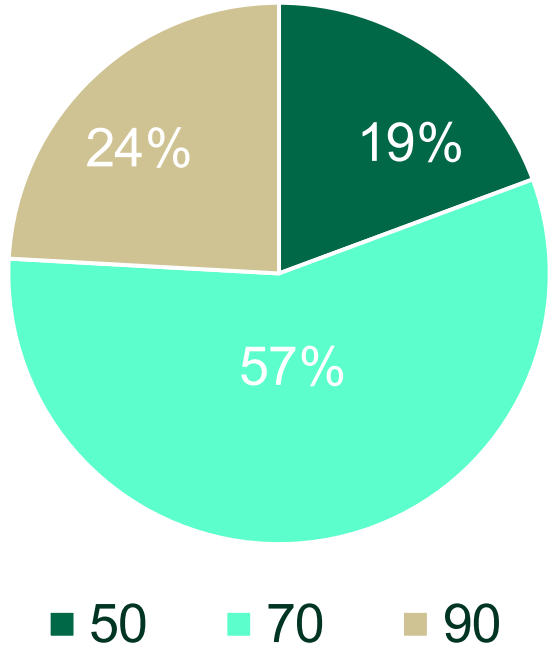


Sensory Management: Hearing Aids, Educational Counseling, & Self-Management



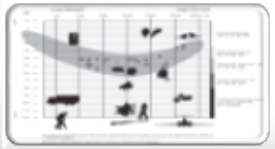


Centered around amplification with guided selection based COSI goals, audiometric configuration, and QuickSIN



Sanchez et al., (2020) *Ear & Hearing*
Sanchez et al., *(2026) AJA*

ACHIEVE Hearing Intervention



Comprehensive Evaluation & Educational Counseling



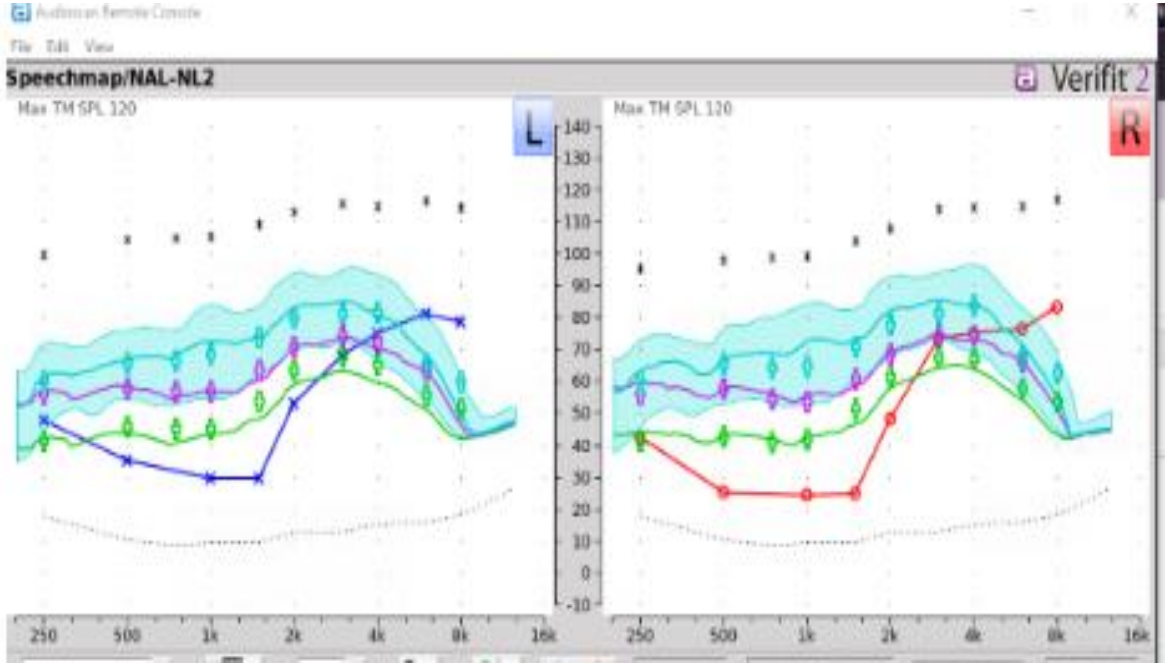
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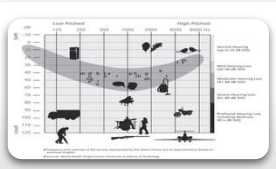
Centered around amplification:

- Electroacoustic analysis
- On-ear device verification



Sanchez et al., (2020) *Ear & Hearing*
Sanchez et al., (2026) *AJA*

ACHIEVE Hearing Intervention



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Individualized Goal Setting, Educational Counseling, & Self-Management



Sensory Management: Hearing Aids, Educational Counseling, & Self-Management



Hearing Assistive Technologies, Educational Counseling, & Self-Management





Hearing Assistive Technology

Selection of technology based on hearing loss, QuickSIN, and COSI goals

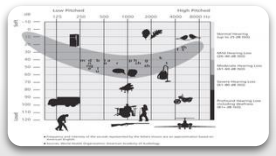






Sanchez et al., (2020) *Ear & Hearing*
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Hearing Assistive Technologies, Educational Counseling, & Self-Management

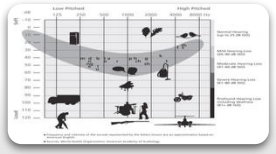


Outcomes Assessment

- Data Logging
- COSI Goal Assessment
- International Outcome Inventory (IOI)
- Aided Speech-in-Noise Assessment

Sanchez et al., (2020) *Ear & Hearing*
Sanchez et al., (2026) *AJA*

ACHIEVE Hearing Intervention



Comprehensive Evaluation & **Educational Counseling**



Individualized Goal Setting, **Educational Counseling, & Self-Management**



Sensory Management: Hearing Aids, **Educational Counseling, & Self-Management**



Hearing Assistive Technologies, **Educational Counseling, & Self-Management**



Outcomes Assessment


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Sanchez et al., Ear & Hearing 2020

ACHIEVE Hearing Intervention

Toolkit for Self-Management ©

- Teach adult hearing aid users about their hearing loss
- Customized to **a participant's specific goals** for intervention

- Topics include:
  - Understanding in noise
  - Communication strategies
  - Telephone and television
  - Meetings & crowds
  - Places of worship
  - Hearing Assistive Technology

- Be understood by persons from a variety of health literacy backgrounds and incorporate inclusive, racially-diverse images

Journal List > Semin Hear > v.40(1); 2019 Feb > PMC6363551

Semin Hear. 2019 Feb; 40(1): 49–67. PMCID: PMC6363551
Published online 2019 Feb 5. doi: 10.1055/s-0038-1676783 PMID: 30728649

Novel Approaches to Fostering Hearing Loss Self-Management in Adults

Guest Editor, Michelle L. Arnold, Au.D.

Semin Hear

Development and Formative Assessment of the Hearing Loss Toolkit for Self-Management

Michelle L. Arnold, Au.D.,[1,2] Preyanca Oree, B.A.,[1] Victoria Sanchez, Au.D., Ph.D.,[1] Nicholas Reed, Au.D.,[3,4] and Theresa Chisolm, Ph.D.[1]

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Arnold et al. (2019). *Seminars in Hearing*

ACHIEVE Hearing Intervention: C2Hear RLOs

C2Hear Reusable Learning Objects (RLOs)

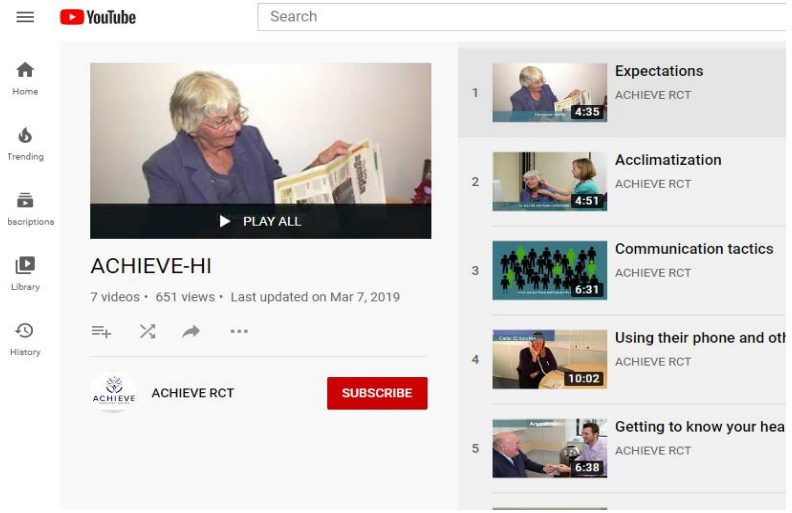
- Nottingham University Biomedical Research Unit
- Brief, 2-7 minute video clips
- Cover a variety of common topics and issues for hearing aid users



- C2Hear RLOs – Americanized

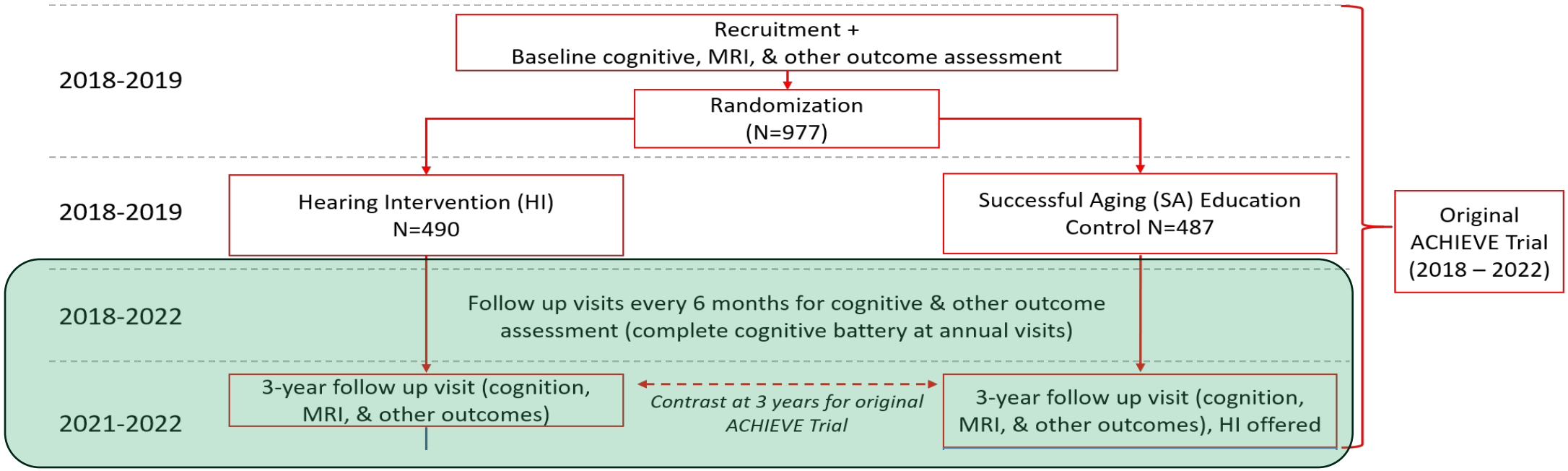
ACHIEVE-HI RCT YouTube

https://youtu.be/T85pTnv4614

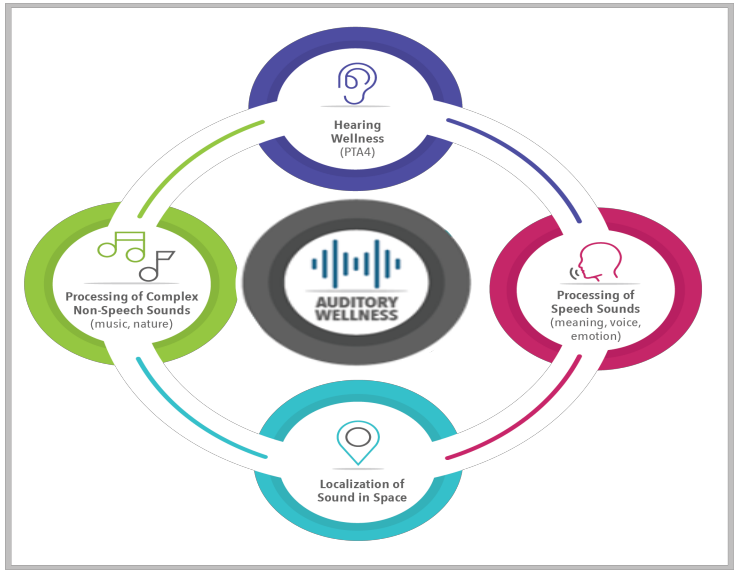


Ferguson et al., Ear & Hear 2016; Oree et al, AAS Presentation 2018

ACHIEVE RCT Flow Diagram

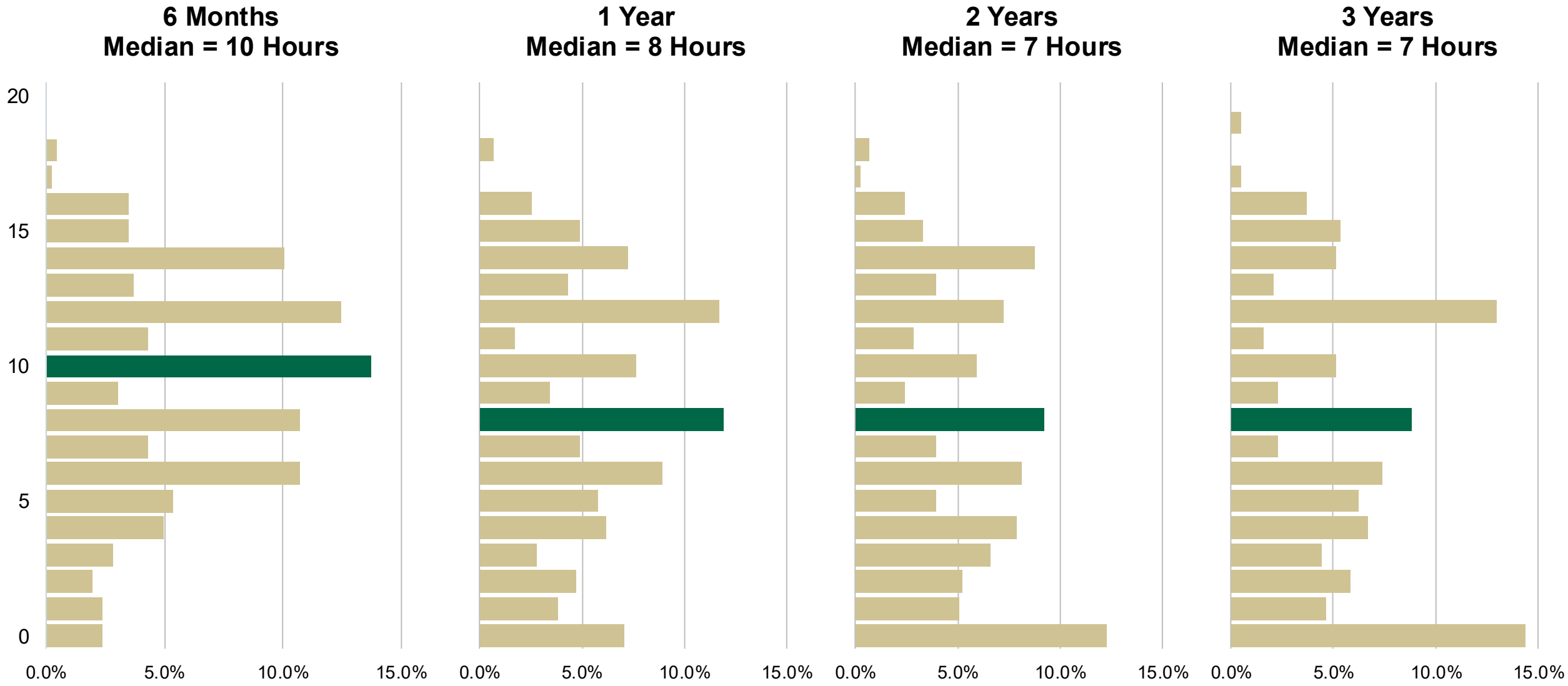


Evidence for ACHIEVing Auditory Wellness?

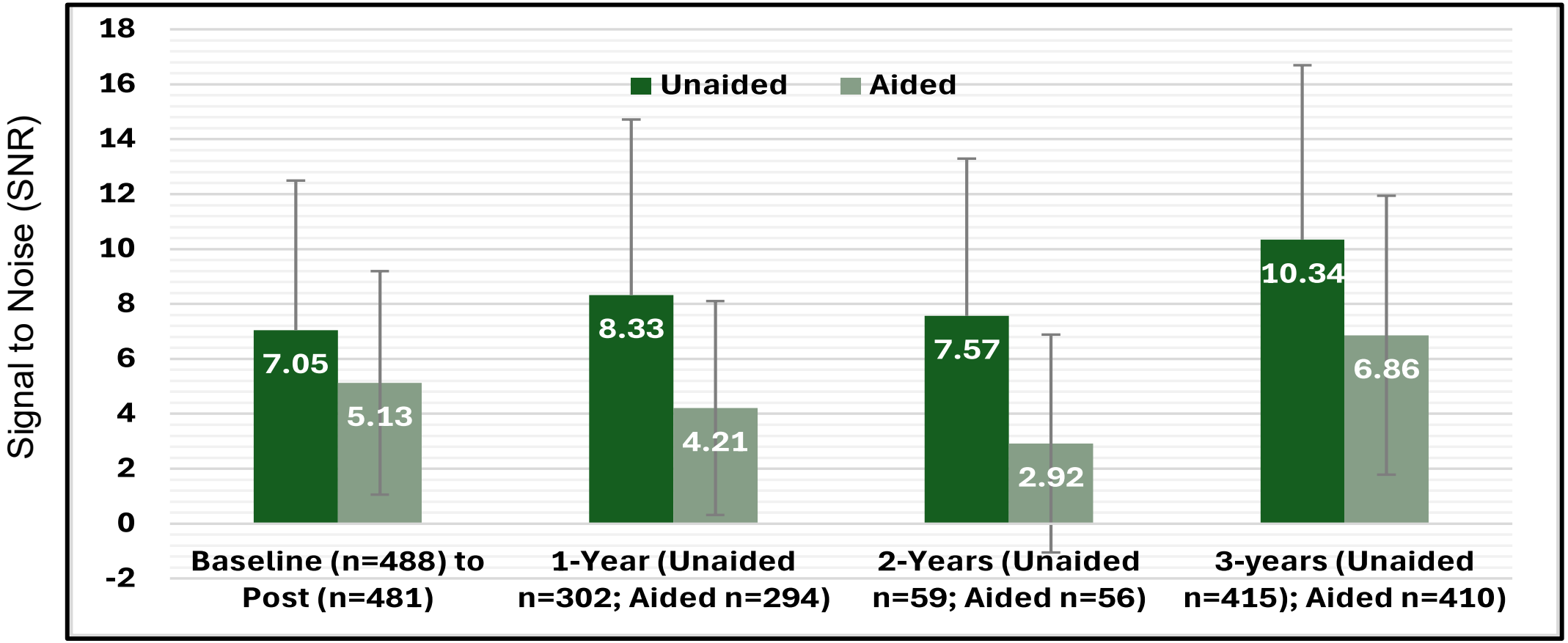


- Hours of hearing aid use
- Speech-in-Noise Performance
- Goal Attainment
- Satisfaction
- Participation without limitations & restrictions
- Self-reported communicative function

ACHIEVing Auditory Wellness: Self-Reported Hours of Hearing Aid Use Over 3

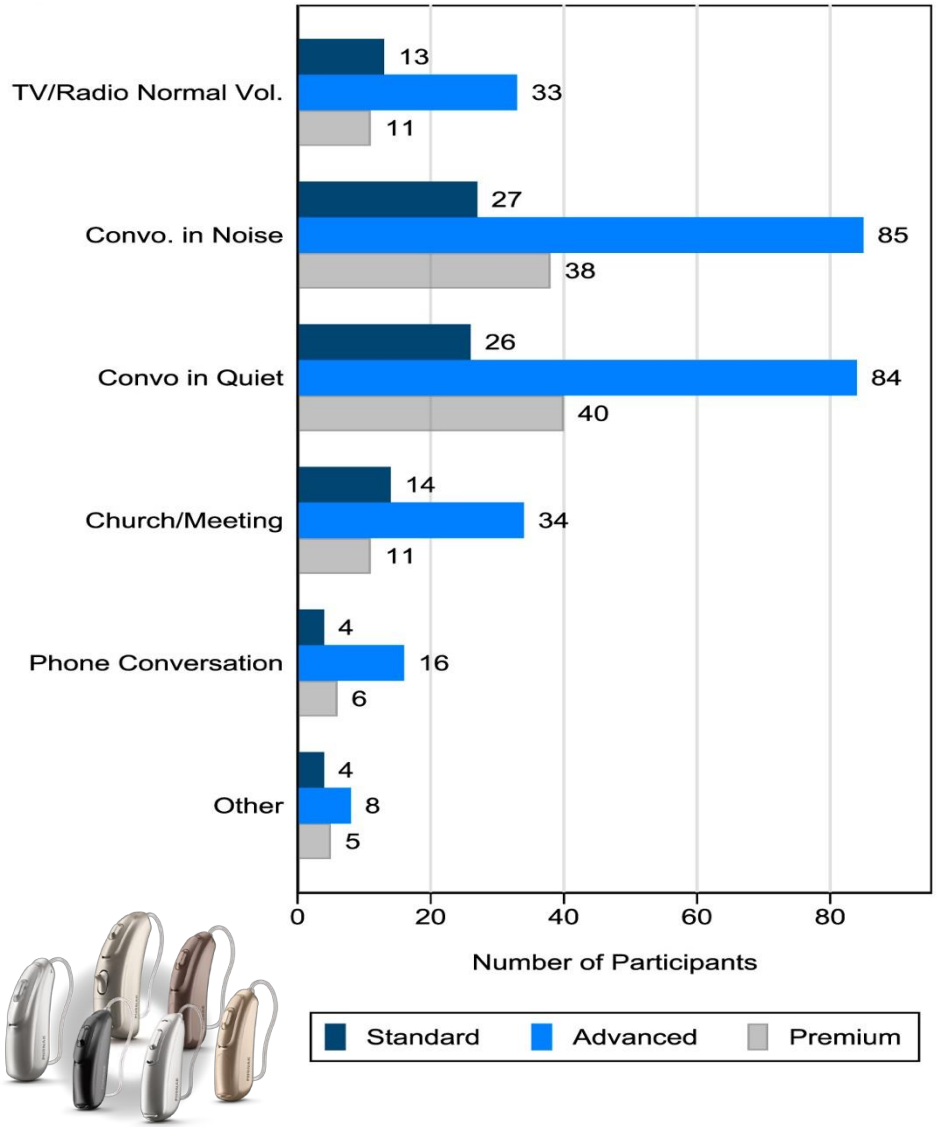


ACHIEVING Auditory Wellness:
QuickSIN Unaided vs. Unaided



ACHIEVing Auditory Wellness: COSI Goal Attainment

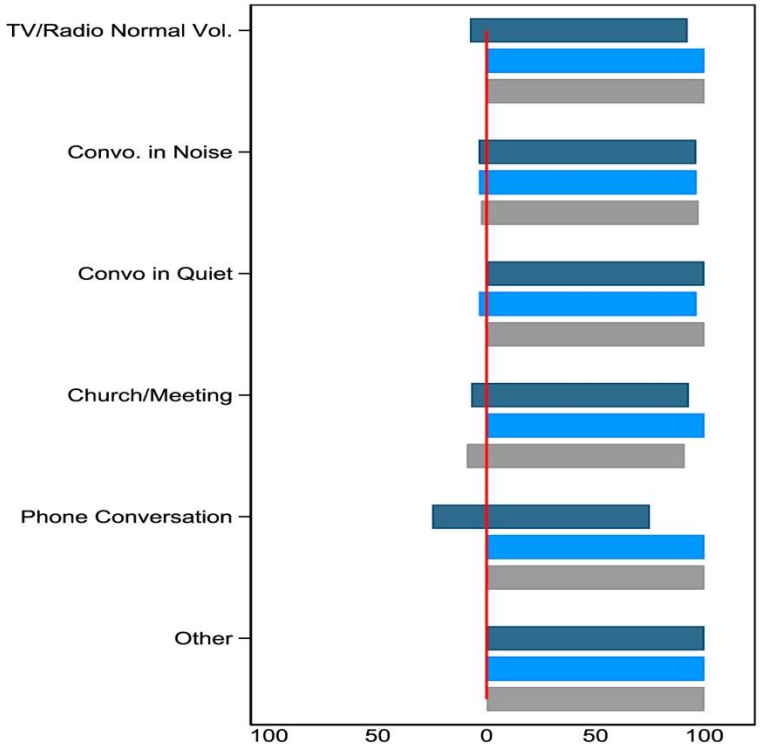


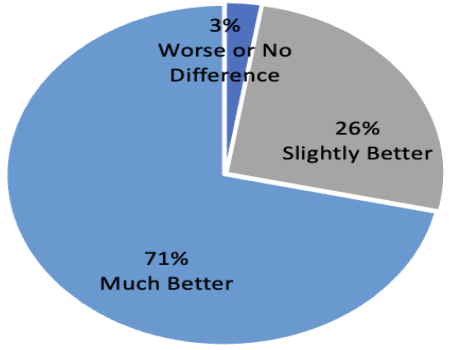


Sanchez et al., (2026) *AJA*

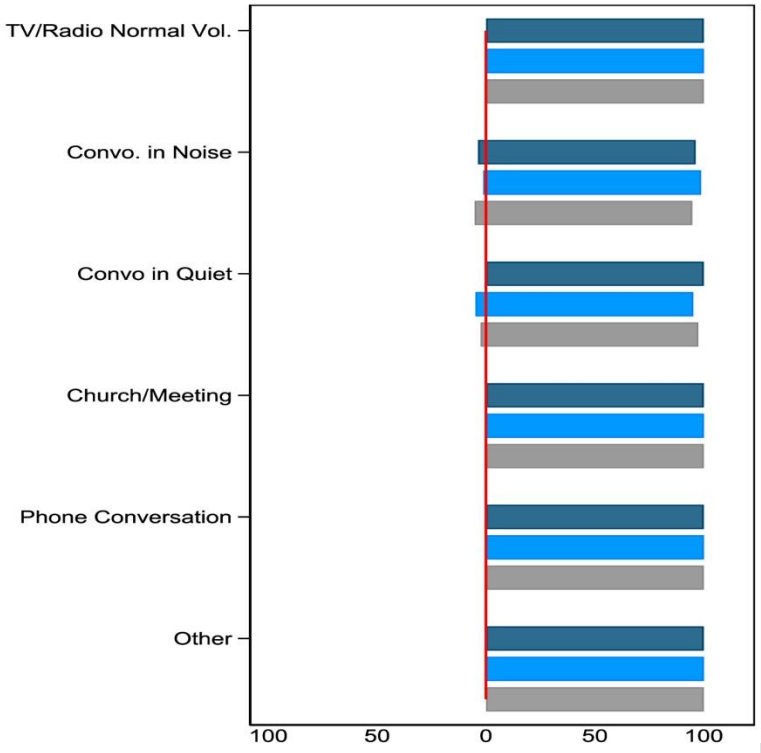
ACHIEVing Auditory Wellness: COSI Goal Attainment

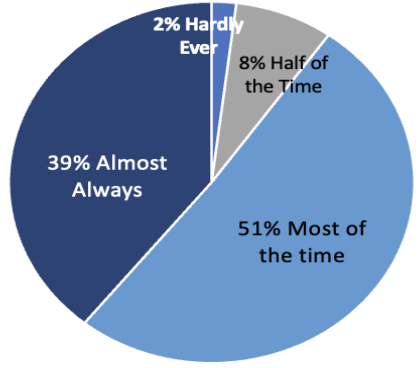
"Rate the degree of change in hearing ability in this situation"





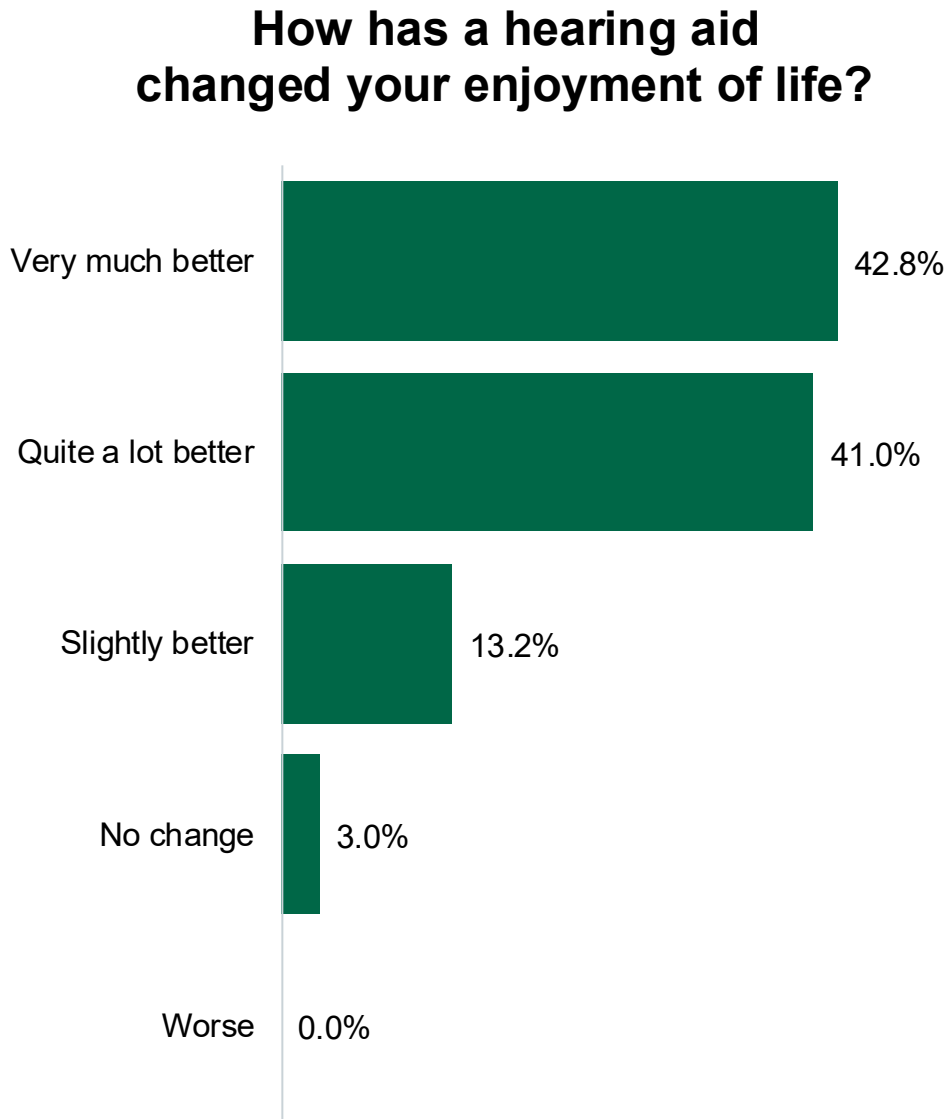
"Rate your ability to hear now in this situation"





Sanchez et al., (2026) *AJA*

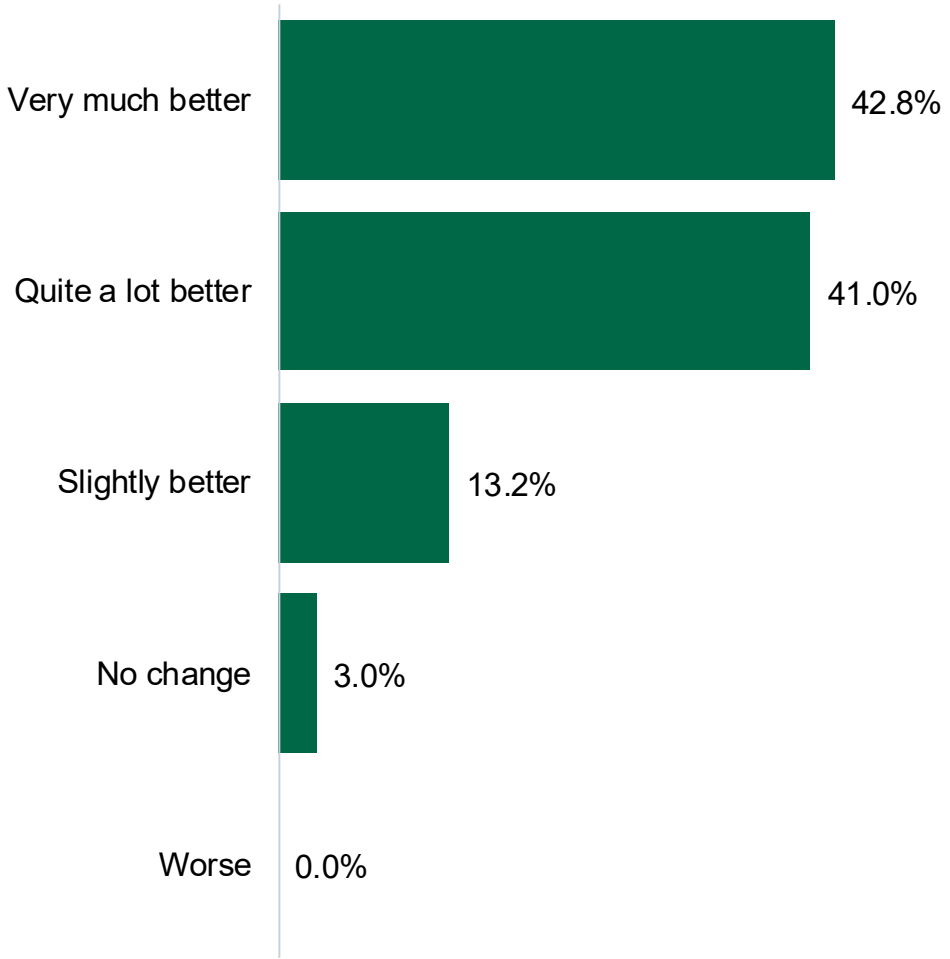
ACHIEVing Auditory Wellness: Self-reported Satisfaction



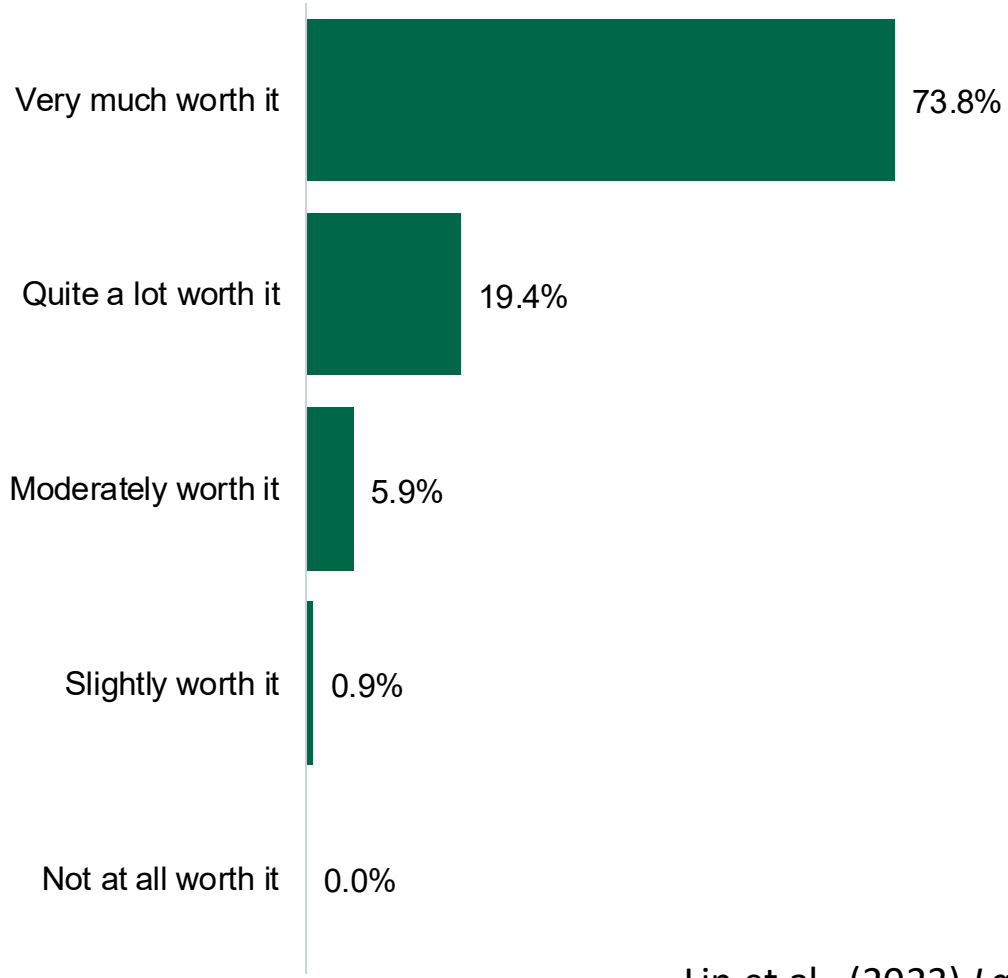
Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness: Self-reported Satisfaction

How has a hearing aid changed your enjoyment of life?

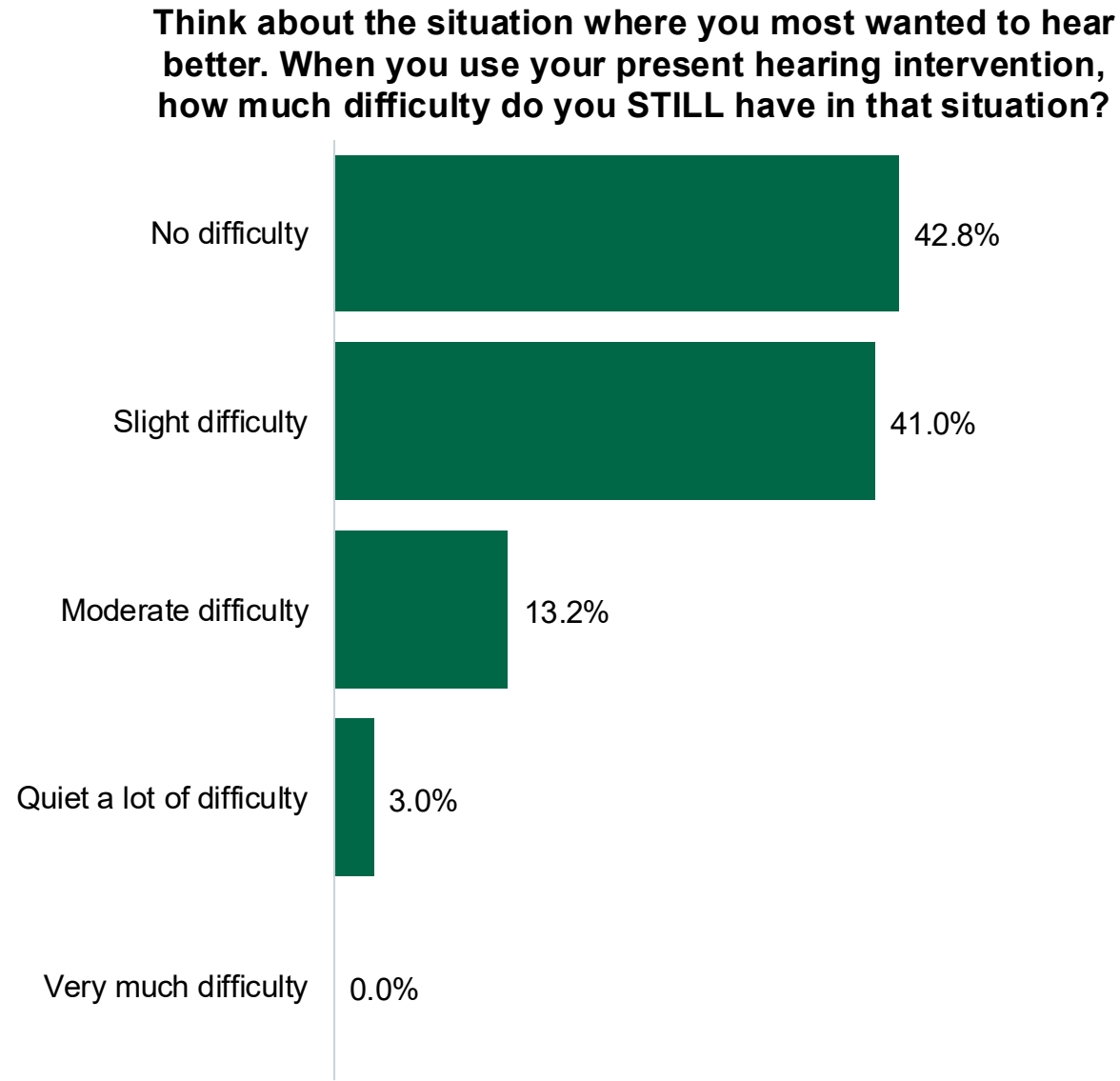


Do you think a hearing aid is worth the trouble?



Lin et al., (2023) *Lancet*

ACHIEVING Auditory Wellness: Participation without limitations & restrictions



Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness: Self-reported Communicative Function w/ Hearing Handicap Inventory (HHIE-S)

Received: 3 May 2024 | Revised: 6 August 2024 | Accepted: 11 August 2024
DOI: 10.1111/jgs.19185

CLINICAL INVESTIGATION

Journal of the American Geriatrics Society

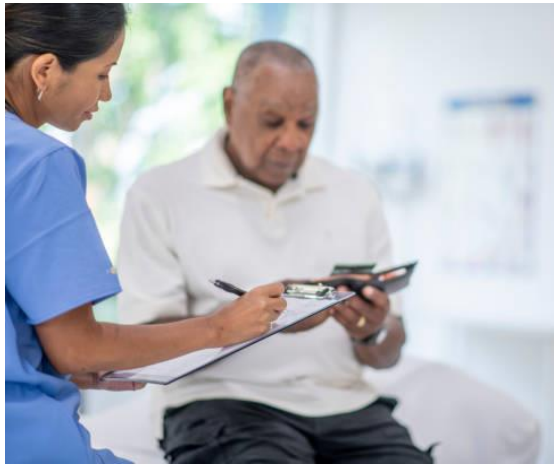
Effect of hearing intervention on communicative function: A secondary analysis of the ACHIEVE randomized controlled trial

Victoria A. Sanchez AuD, PhD[1,2] | Michelle L. Arnold AuD, PhD[2] | Emmanuel E. Garcia Morales PhD[3,4,5] | Nicholas S. Reed AuD, PhD[3,5,6] | Sarah Faucette AuD, PhD[7,8] | Sheila Burgard MS[9] | Haley N. Calloway AuD[1] | Josef Coresh MD, PhD[3,5,6] | Jennifer A. Deal PhD[3,4,5] | Adele M. Goman PhD[4,5] | Lisa Gravens-Mueller MS[9] | Kathleen M. Hayden PhD[10] | Alison R. Huang PhD[3,4,5] | Christine M. Mitchell ScM[4,5] | Thomas H. Mosley Jr PhD[7] | James S. Pankow PhD[11] | James R. Pike MBA[6] | Jennifer A. Schrack PhD[4,12] | Laura Sherry AuD[5] | Jacqueline M. Weycker AuD[11] | Frank R. Lin MD, PhD[4,5] | Theresa H. Chisolm PhD[2] | For the ACHIEVE Collaborative Study

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Victoria A. Sanchez, Department of Otolaryngology—Head & Neck Surgery, University of South Florida, 12901 Bruce B. Downs Boulevard, MDC 73, Tampa, FL 33612, USA.
Email: vasanchez@usf.edu

Abstract

Background: The Aging and Cognitive Health Evaluation in Elders (ACHIEVE) Study was designed to determine the effects of a best-practice hearing intervention on cognitive decline among community-dwelling older adults. Here, we conducted a secondary analysis of the ACHIEVE Study to

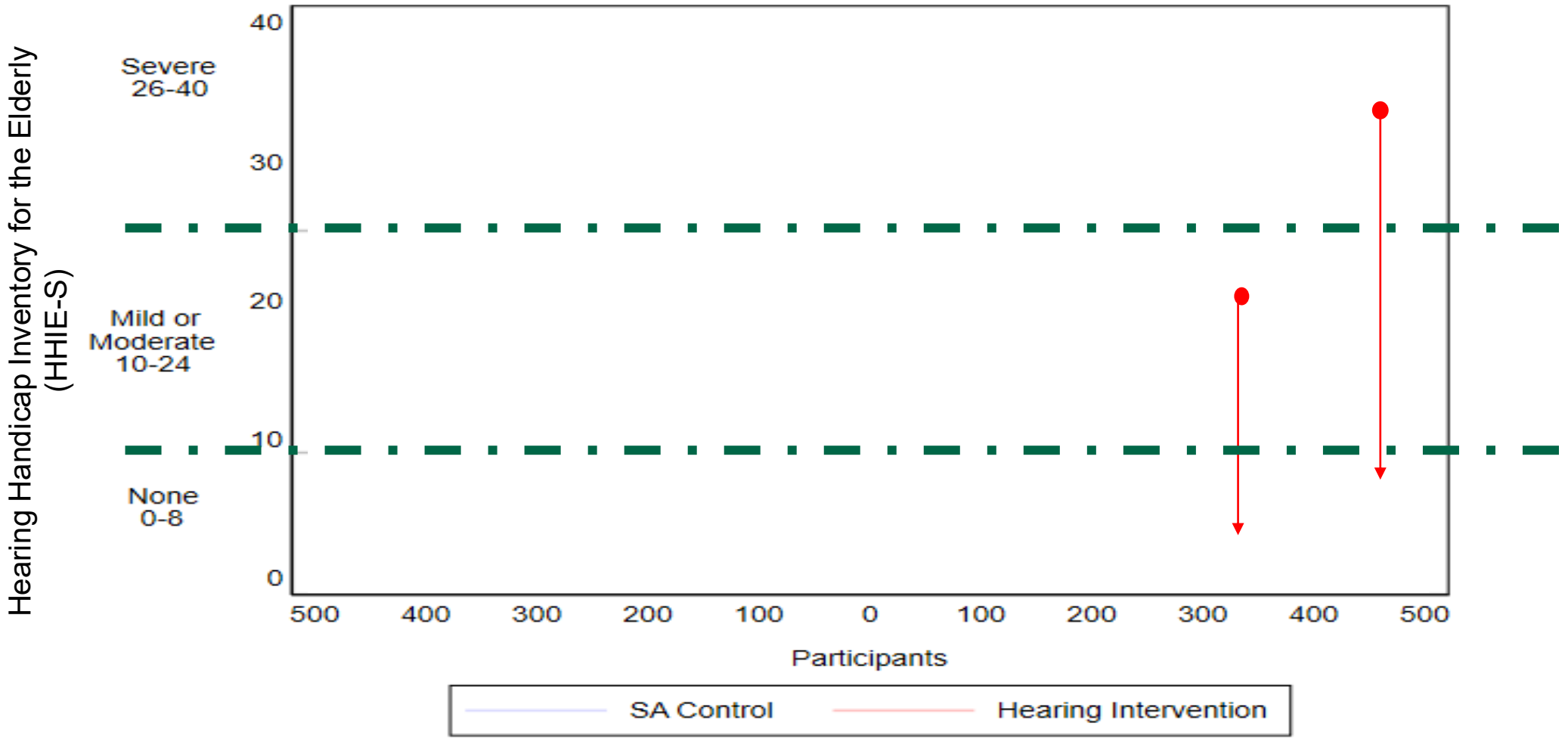


Hearing Handicap Inventory for the Elderly (HHIE-S)

Ventry, I. M., & Weinstein, B. E. (1983). Identification of elderly people with hearing problems. ASHA, 25(7), 37–42.

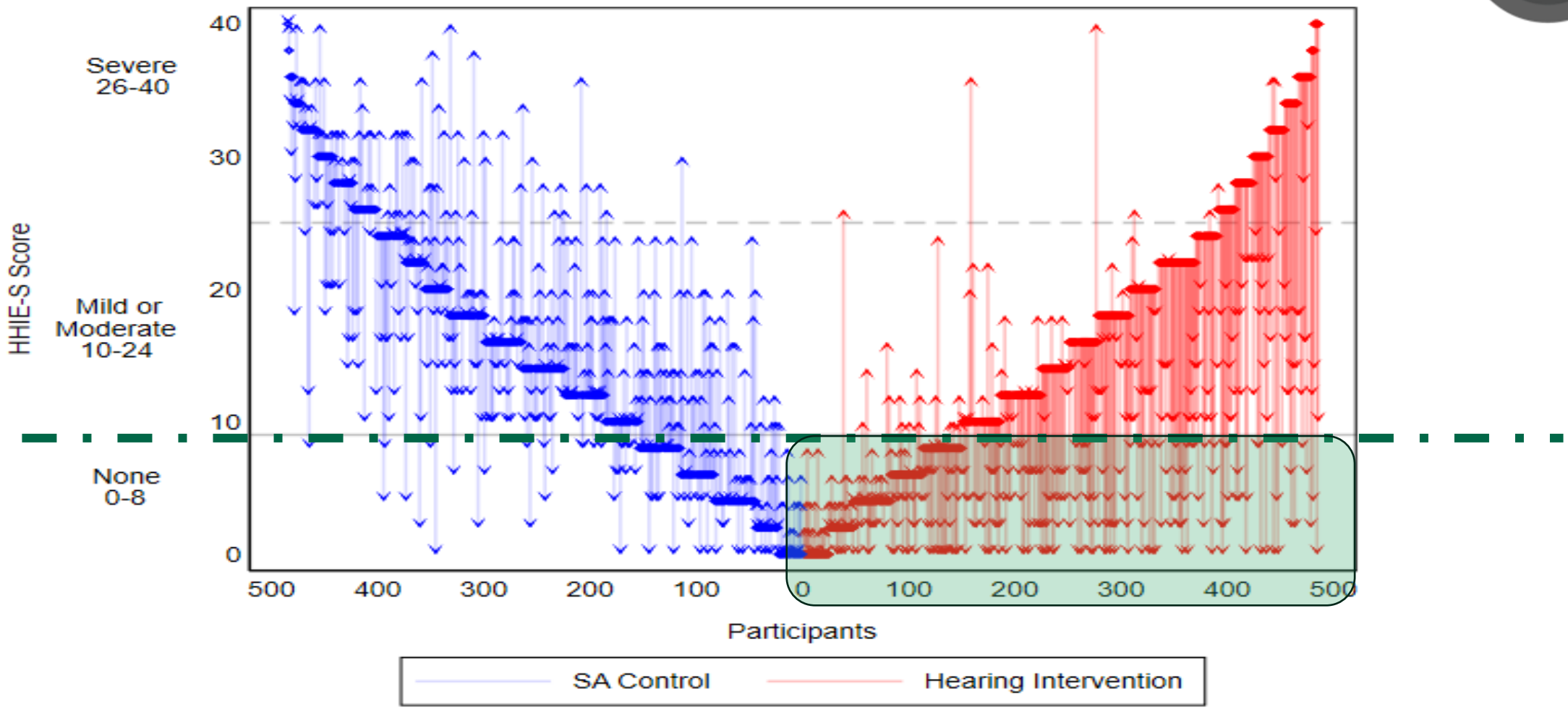
Sanchez et al., (2024) *JAGS*
Ventry & Weinstein (1983*) ASHA*

ACHIEVing Auditory Wellness: Hearing Handicap Inventory (HHIE-S)



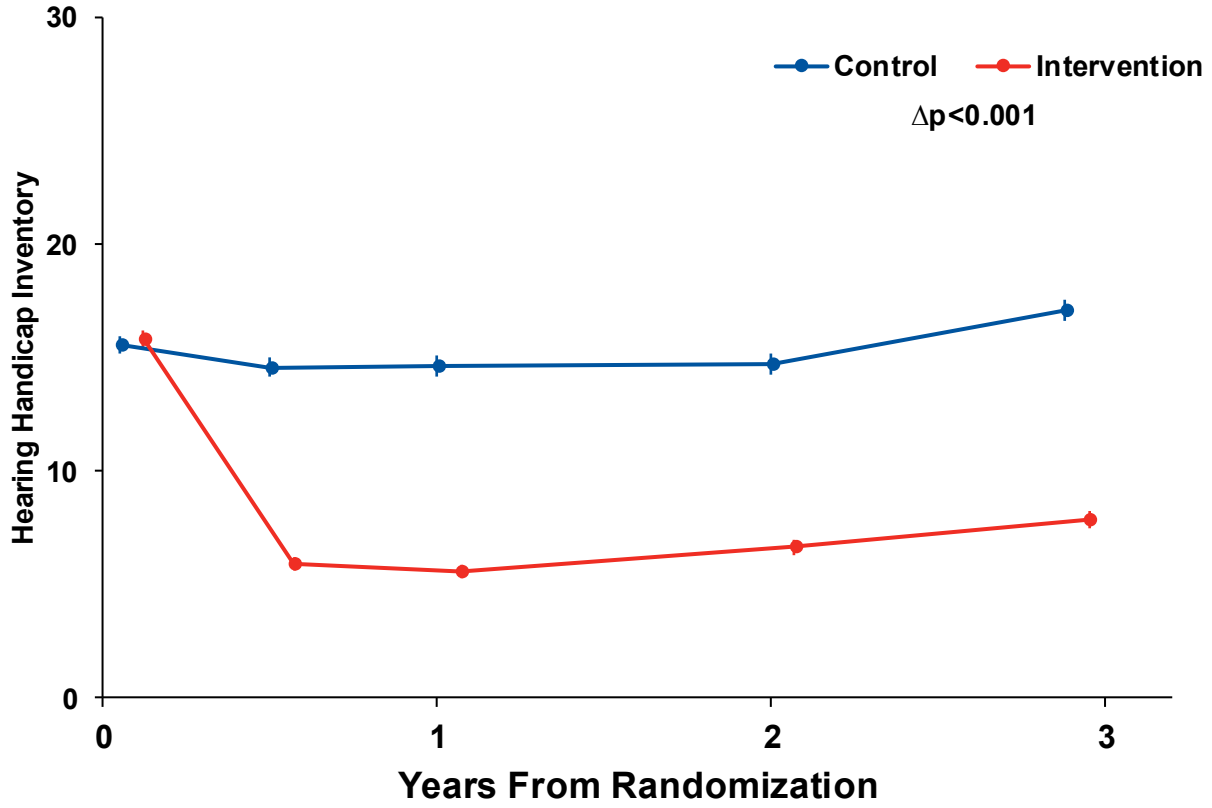
Sanchez et al., (2024) *JAGS*

ACHIEVing Auditory Wellness: Hearing Handicap Inventory (HHIE-S)



Sanchez et al., (2024) *JAGS*

ACHIEVing Auditory Wellness: Hearing Handicap Inventory (HHIE-S)



Sanchez et al., (2024) *JAGS*

ACHIEVing Auditory Wellness: Influence on Overall Well-being?







Psychological Wellness

Standardized Neurocognitive Assessment

Emotional Wellness

Short Form Health Survey (RAND-36)

Patient-Reported Outcomes Measurement Information System (PROMIS)

Social Wellness

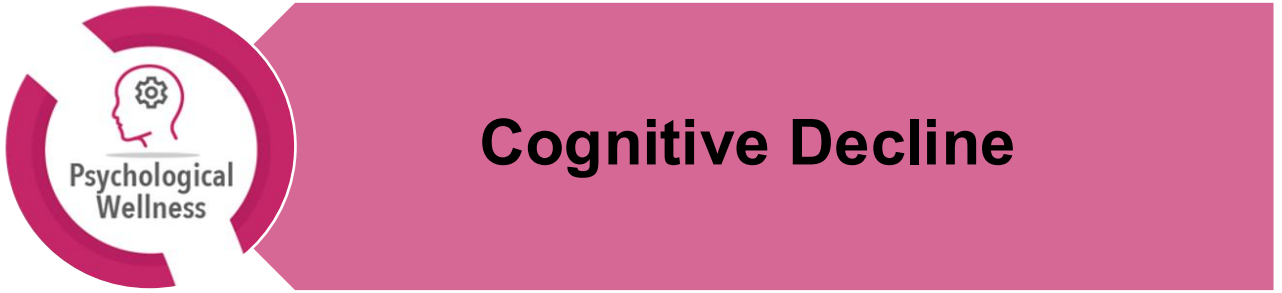
Social Network Index

UCLA Loneliness Scale

Physical Wellness

Self reported Falls


Physical Wellness
AUDITORY WELLNESS
Psychological Wellness
AUDITORY WELLNESS
Social Wellness
AUDITORY WELLNESS
Emotional Wellness
AUDITORY WELLNESS
Spiritual Wellness
Environmental Wellness
WELL-BEING
AUDITORY WELLNESS
See Figure 3.


Psychological Wellness
Cognitive Decline


Emotional Wellness
Fatigue

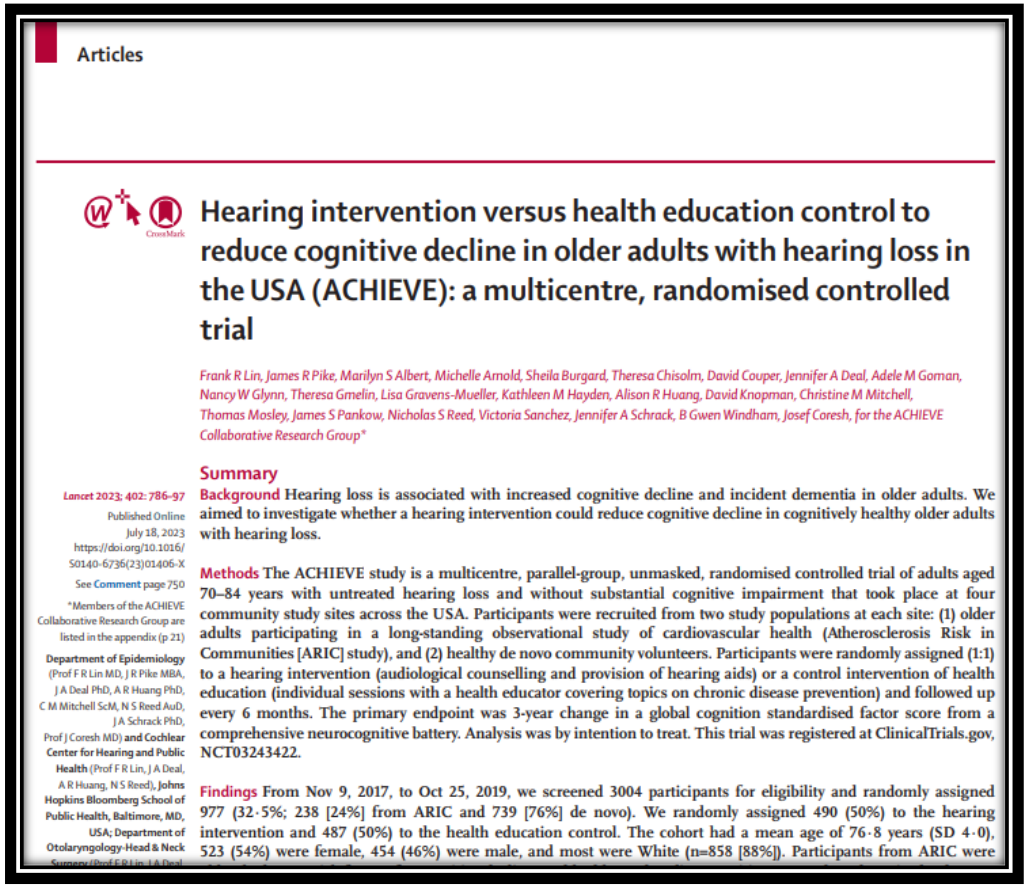

Social Wellness
Social Engagement


Physical Wellness
Falls

ACHIEVing Auditory Wellness for Cognitive Health & Well-being

Psychological Wellness





Articles

Hearing intervention versus health education control to reduce cognitive decline in older adults with hearing loss in the USA (ACHIEVE): a multicentre, randomised controlled trial

*Frank R Lin, James R Pike, Marilyn S Albert, Michelle Arnold, Sheila Burgard, Theresa Chisolm, David Couper, Jennifer A Deal, Adele M Goman, Nancy W Glynn, Theresa Gmelin, Lisa Gravens-Mueller, Kathleen M Hayden, Alison R Huang, David Knopman, Christine M Mitchell, Thomas Mosley, James S Pankow, Nicholas S Reed, Victoria Sanchez, Jennifer A Schrack, B Gwen Windham, Josef Coresh, for the ACHIEVE Collaborative Research Group**

Lancet 2023; 402: 786–97
Published Online July 18, 2023 https://doi.org/10.1016/S0140-6736(23)01406-X

See Comment page 750

*Members of the ACHIEVE Collaborative Research Group are listed in the appendix (p 21)

Department of Epidemiology (Prof F R Lin MD, J R Pike MBA, J A Deal PhD, A R Huang PhD, C M Mitchell ScM, N S Reed AuD, J A Schrack PhD, Prof J Coresh MD) **and Cochlear Center for Hearing and Public Health** (Prof F R Lin, J A Deal, A R Huang, N S Reed), **Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA; Department of Otolaryngology-Head & Neck**

Summary

Background Hearing loss is associated with increased cognitive decline and incident dementia in older adults. We aimed to investigate whether a hearing intervention could reduce cognitive decline in cognitively healthy older adults with hearing loss.

Methods The ACHIEVE study is a multicentre, parallel-group, unmasked, randomised controlled trial of adults aged 70–84 years with untreated hearing loss and without substantial cognitive impairment that took place at four community study sites across the USA. Participants were recruited from two study populations at each site: (1) older adults participating in a long-standing observational study of cardiovascular health (Atherosclerosis Risk in Communities [ARIC] study), and (2) healthy de novo community volunteers. Participants were randomly assigned (1:1) to a hearing intervention (audiological counselling and provision of hearing aids) or a control intervention of health education (individual sessions with a health educator covering topics on chronic disease prevention) and followed up every 6 months. The primary endpoint was 3-year change in a global cognition standardised factor score from a comprehensive neurocognitive battery. Analysis was by intention to treat. This trial was registered at ClinicalTrials.gov, NCT03243422.

Findings From Nov 9, 2017, to Oct 25, 2019, we screened 3004 participants for eligibility and randomly assigned 977 (32·5%; 238 [24%] from ARIC and 739 [76%] de novo). We randomly assigned 490 (50%) to the hearing intervention and 487 (50%) to the health education control. The cohort had a mean age of 76·8 years (SD 4·0), 523 (54%) were female, 454 (46%) were male, and most were White (n=858 [88%]). Participants from ARIC were

Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness for Cognitive Health & Well-being

Psychological Wellness

Primary Study Endpoint:

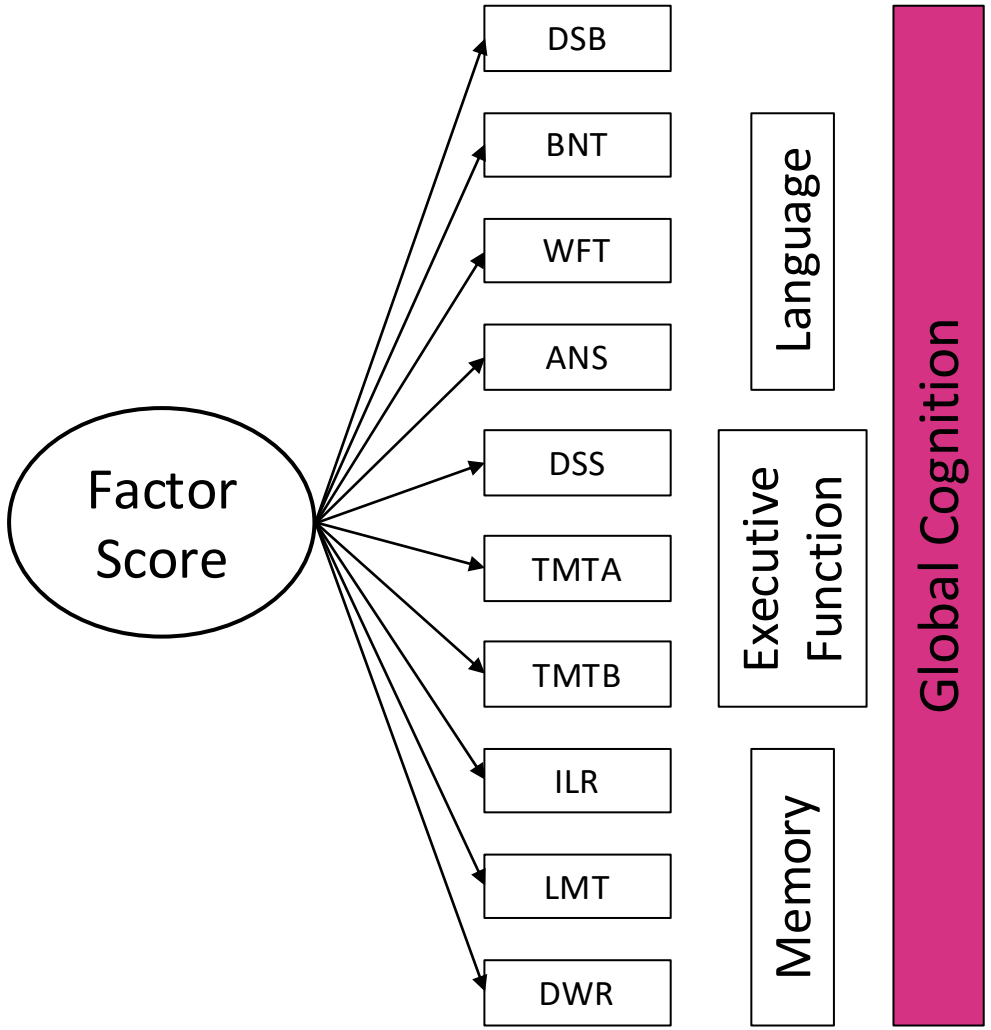
Change from baseline to Year 3 in a global cognition standardized factor score derived from a **comprehensive neurocognitive battery** administered annually

- *Digit Span Backwards (DSB)
- Boston Naming Test (BNT)
- Word Fluency Test (WFT)
- Animal Naming Score (ANS)
- Digit Symbol Substitution (DSS)
- Trail Making Test A (TMTA)
- Trail Making Test B (TMTB)
- Incidental Learning (ILR)
- *Logical Memory Test (LMT)
- Delayed Word Recall (DWR)

*Indicates tests with only auditory stimuli; Verification of speech understanding conducted before cognitive test administration

Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness for Cognitive Health & Well-being



ACHIEVE Cognitive Factor Scores

All 10 tests are used to compute a factor score of global cognition (Primary outcome)

Latent factors are standardized to the ACHIEVE baseline.

Change over time is in standard deviation units relative to baseline.

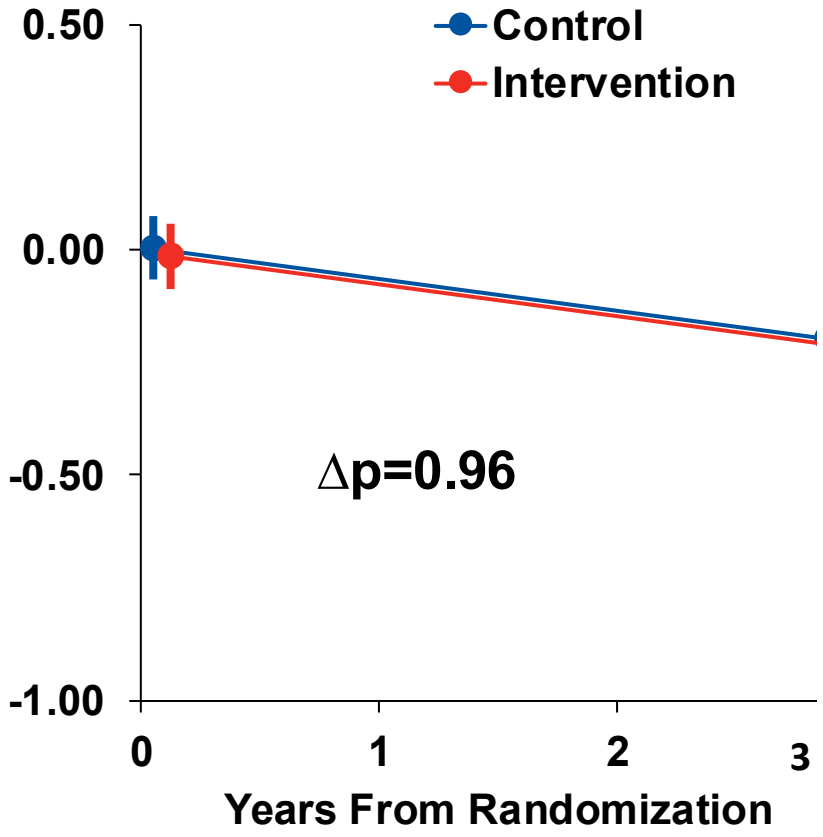
ACHIEVE study

Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness for Cognitive Health & Well-being

Psychological Wellness

Total Cohort (N=977)



ACHIEVE study

Effect of Hearing Intervention on
Global Cognition Factor Score (Primary Outcome)

In the total combined cohort, hearing intervention had no effect on reducing cognitive decline within 3 years

Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness for Cognitive Health & Well-being

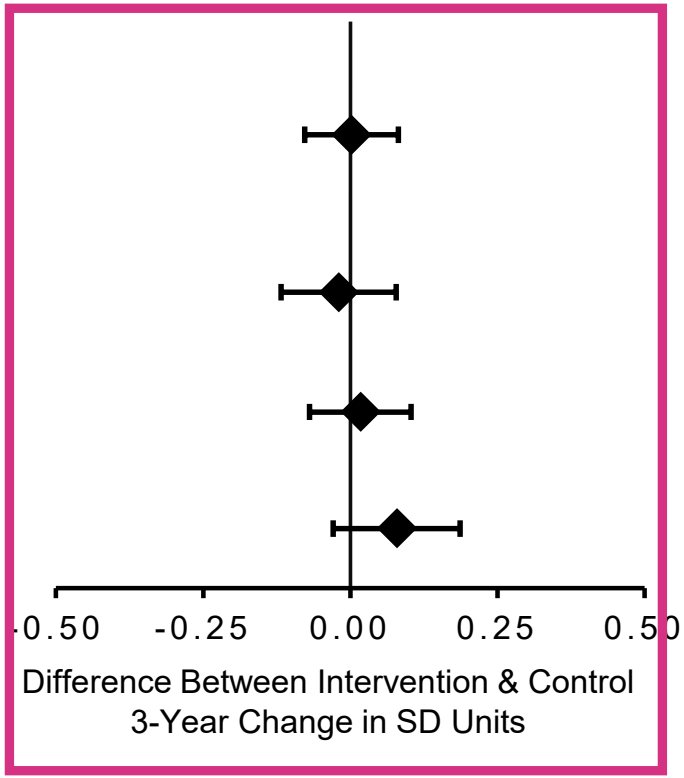
Psychological Wellness

Main Analysis of the Total Cohort (ARIC & De novo)

Primary & Secondary Outcomes

Total (N = 977^)

	3-Year Change in SD Units β (95% CI)	Difference Between Intervention & Control 3-Year Change in SD Units β (95% CI)
Primary Outcome:		
Global Cognition		
Control	-0·202 (-0·258, -0·145)	0·002 (-0·077, 0·081)
Intervention	-0·200 (-0·256, -0·144)	p=0·96
Secondary Outcomes:		
Executive Function		
Control	-0·248 (-0·315, -0·181)	-0·020 (-0·118, 0·078)
Intervention	-0·268 (-0·339, -0·197)	p=0·69
Language		
Control	-0·155 (-0·214, -0·096)	0·017 (-0·070, 0·104)
Intervention	-0·138 (-0·199, -0·077)	p=0·70
Memory		
Control	-0·054 (-0·128, 0·020)	0·079 (-0·029, 0·187)
Intervention	0·025 (-0·053, 0·103)	p=0·15



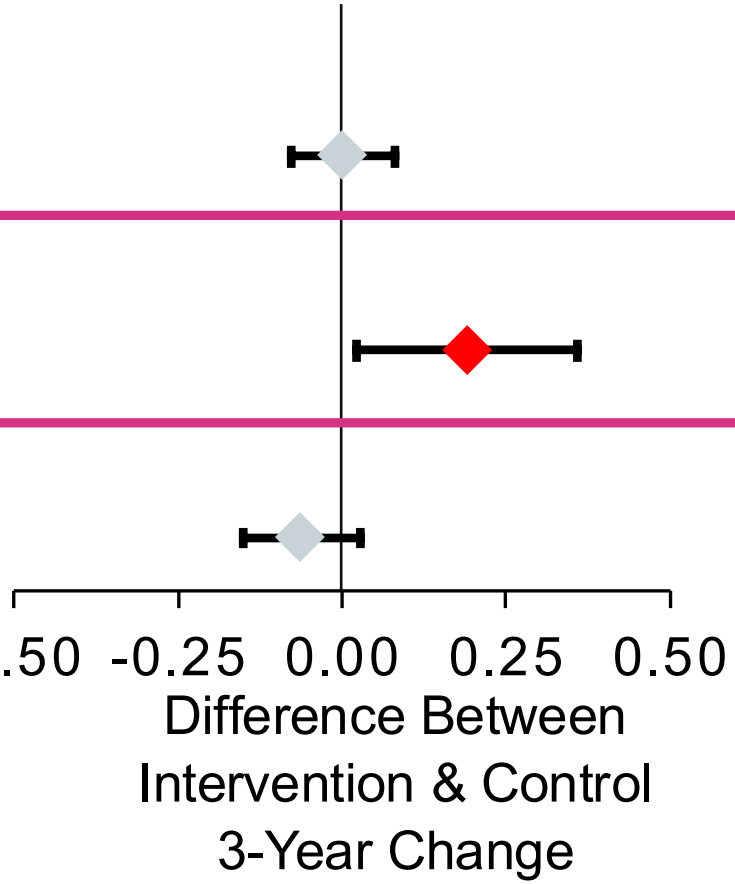
ACHIEVE study

Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness for Cognitive Health & Well-being

ACHIEVE 3-Year Change in Cognitive Function

	3-Year Change β (95% CI)
Total (N = 977)	
Control	-0.202 (-0.258, -0.145)
Intervention	-0.200 (-0.256, -0.144)
ARIC (N=238)	
Control	-0.402 (-0.536, -0.267)
Intervention	-0.211 (-0.349, -0.073)
De Novo (N=739)	
Control	-0.151 (-0.215, -0.087)
Intervention	-0.213 (-0.277, -0.148)



In the ARIC cohort, hearing intervention reduced 3-year global cognitive decline by 48%

3-way interaction: p = 0.010

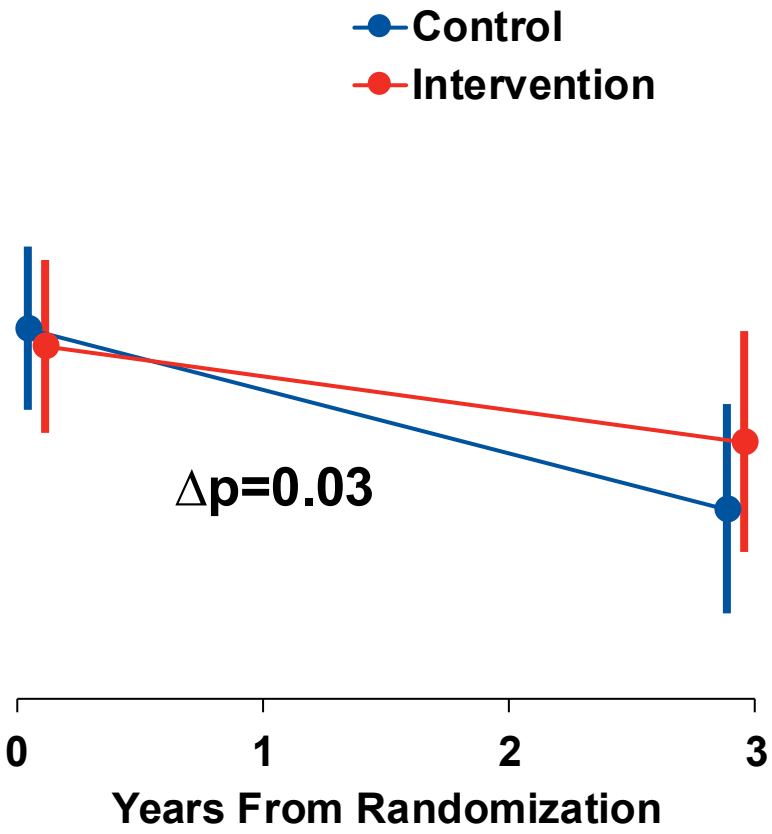
Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness for Cognitive Health & Well-being

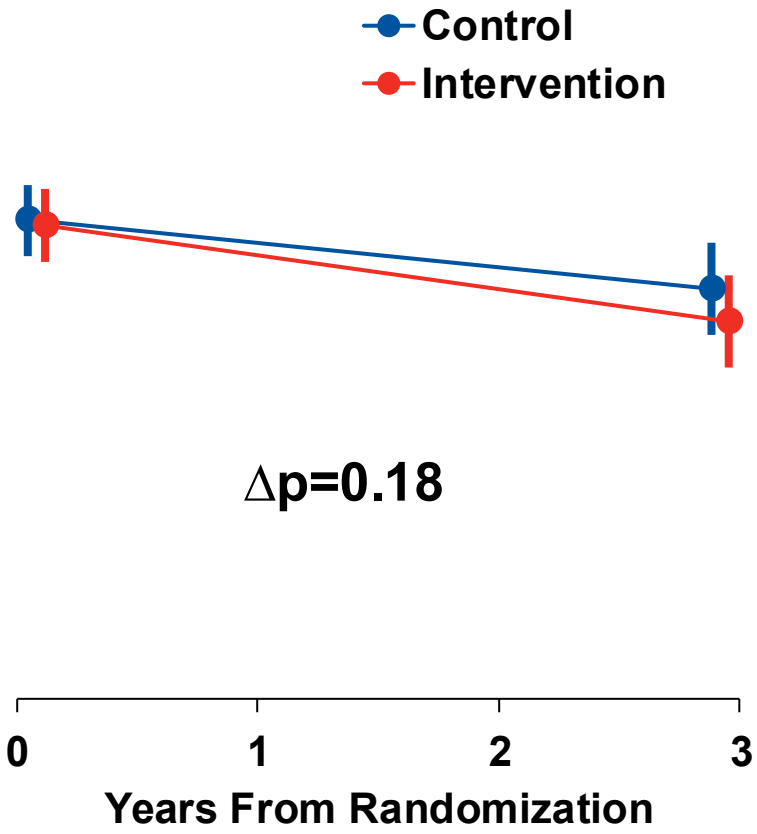
Psychological Wellness

In the ARIC cohort, hearing intervention reduced 3-year global cognitive decline by 48%

ARIC (N=238)



De Novo (N=739)



ACHIEVE study

Lin et al., (2023) *Lancet*

ACHIEVing Auditory Wellness for Cognitive Health & Well-being

Psychological Wellness

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DOI: 10.1002/alz.70156

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RESEARCH ARTICLE

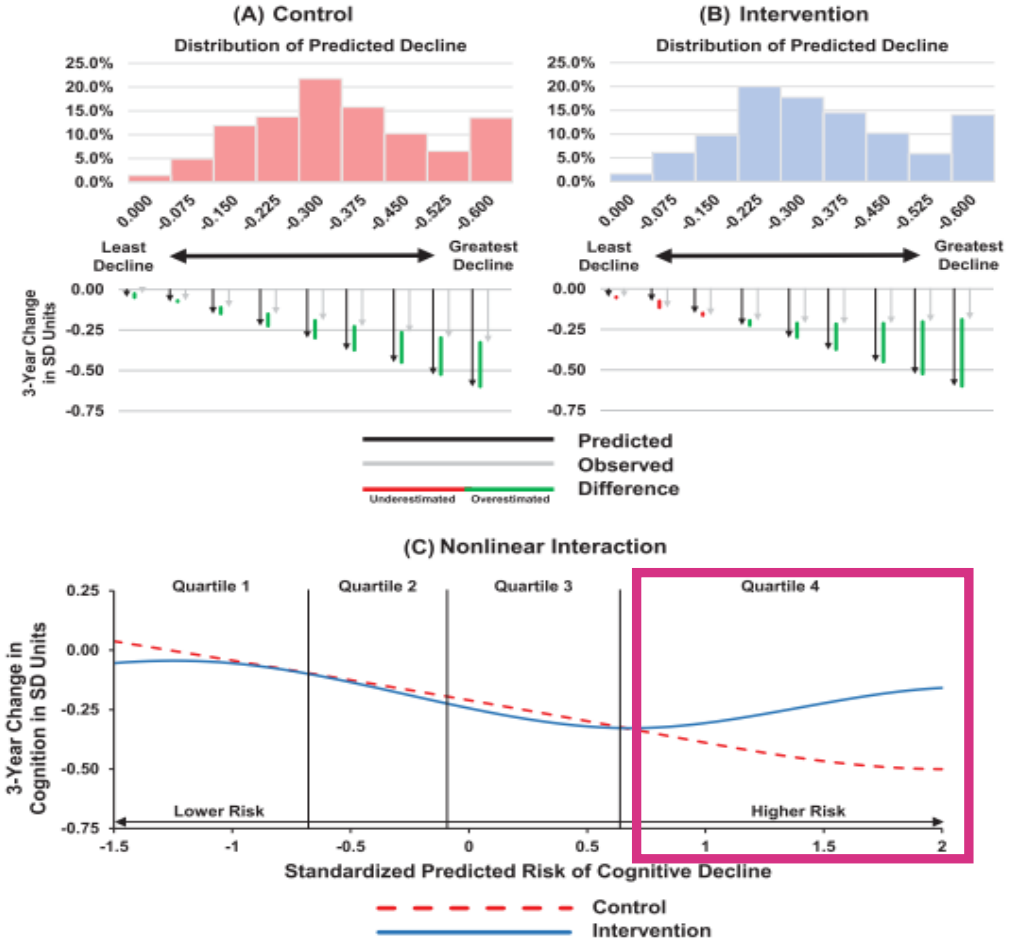
Cognitive benefits of hearing intervention vary by risk of cognitive decline: A secondary analysis of the ACHIEVE trial

James Russell Pike[1] | Alison R. Huang[2,3] | Nicholas S. Reed[1] | Michelle Arnold[4] | Theresa Chisolm[4] | David Couper[5] | Jennifer A. Deal[2,3,6] | Nancy W. Glynn[7] | Adele M. Goman[8] | Kathleen M. Hayden[9] | Christine M. Mitchell[2] | James S Pankow[10] | Victoria Sanchez[11] | Kevin J. Sullivan[12] | Nasya S. Tan[13] | Josef Coresh[1] | Frank R. Lin[2,3,6,14] | ACHIEVE Collaborative Research Group

[1]Optimal Aging Institute, New York University Grossman School of Medicine, New York, New York, USA

[2]Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA

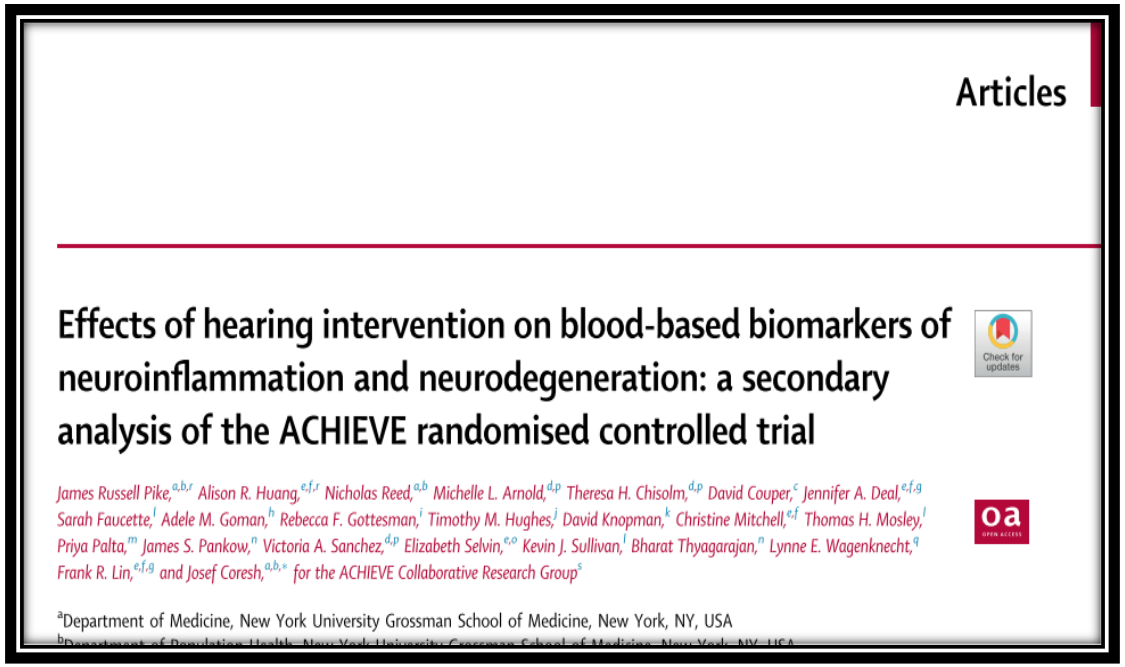
Among the participants with the most predicted risk of cognitive decline, **hearing intervention slowed cognitive decline by 62%**



Pike et al., (2025) *Alzheimer's & Dementia*

ACHIEVing Auditory Wellness for Cognitive Health & Well-being

Psychological Wellness

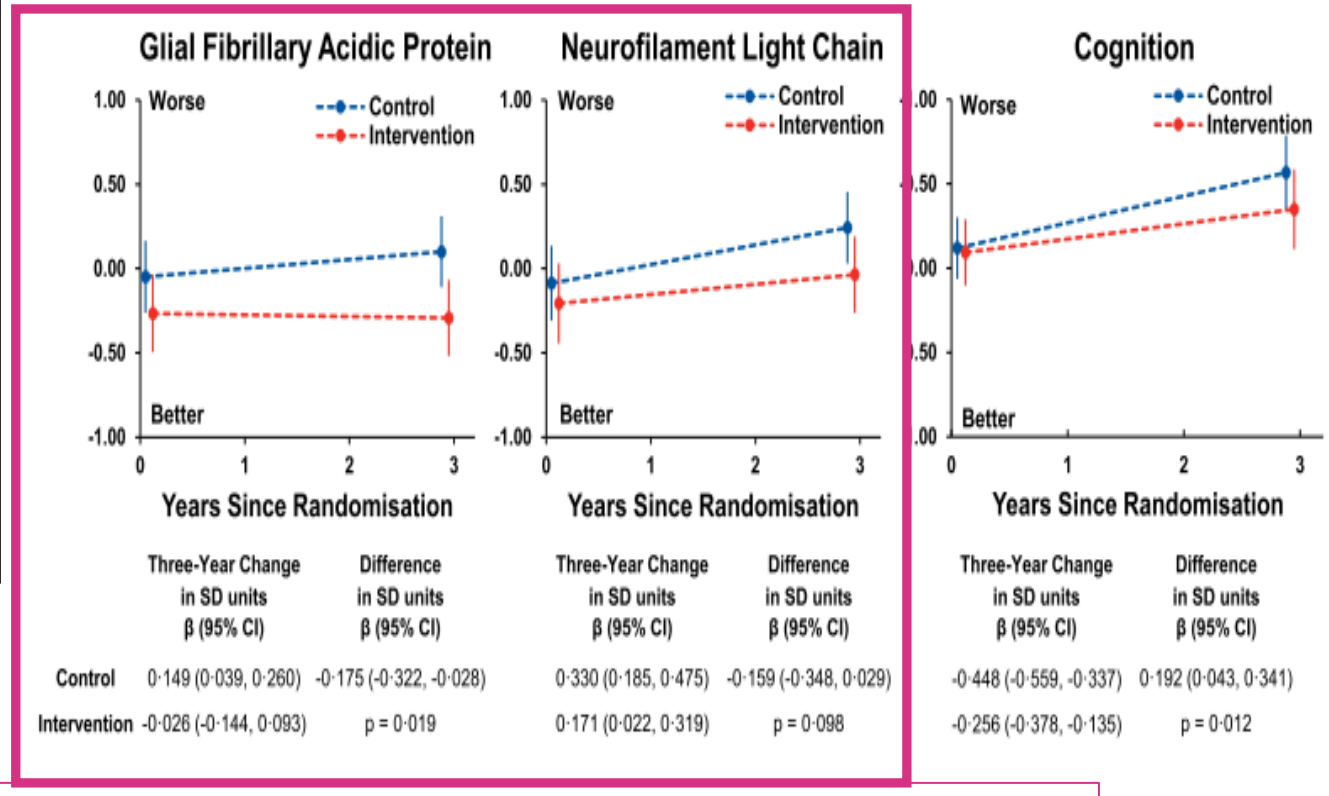


Articles

Effects of hearing intervention on blood-based biomarkers of neuroinflammation and neurodegeneration: a secondary analysis of the ACHIEVE randomised controlled trial

James Russell Pike,[a,b,r] Alison R. Huang,[e,f,r] Nicholas Reed,[a,b] Michelle L. Arnold,[d,p] Theresa H. Chisolm,[d,p] David Couper,[c] Jennifer A. Deal,[e,f,g] Sarah Faucette,[i] Adele M. Goman,[h] Rebecca F. Gottesman,[i] Timothy M. Hughes,[j] David Knopman,[k] Christine Mitchell,[e,f] Thomas H. Mosley,[l] Priya Palta,[m] James S. Pankow,[n] Victoria A. Sanchez,[d,p] Elizabeth Selvin,[e,o] Kevin J. Sullivan,[l] Bharat Thyagarajan,[n] Lynne E. Wagenknecht,[q] Frank R. Lin,[e,f,g] and Josef Coresh,[a,b,*] for the ACHIEVE Collaborative Research Group[s]

[a]Department of Medicine, New York University Grossman School of Medicine, New York, NY, USA



	Three-Year Change in SD units β (95% CI)	Difference in SD units β (95% CI)	Three-Year Change in SD units β (95% CI)	Difference in SD units β (95% CI)	Three-Year Change in SD units β (95% CI)	Difference in SD units β (95% CI)
Control	0·149 (0·039, 0·260)	-0·175 (-0·322, -0·028)	0·330 (0·185, 0·475)	-0·159 (-0·348, 0·029)	-0·448 (-0·559, -0·337)	0·192 (0·043, 0·341)
Intervention	-0·026 (-0·144, 0·093)	p = 0·019	0·171 (0·022, 0·319)	p = 0·098	-0·256 (-0·378, -0·135)	p = 0·012

Among the participants at-risk of cognitive decline, **hearing intervention reduced the progression of non-specific biomarkers of neuroinflammation.**

Pike et al., (2026) *eClinical Medicine Lancet*





Reduce cognitive decline (in some)



Fatigue?





ACHIEVing Auditory Wellness for Fatigue & Well-being



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https://doi.org/10.1093/gerona/glae193
Advance access publication 2 August 2024
Research Article

Effect of Hearing Intervention Versus Health Education Control on Fatigue: A Secondary Analysis of the ACHIEVE Study

Sarah Y. Bessen, MD, MPH,[1,2] Wuyang Zhang, MHS,[2,3] Alison R. Huang, PhD,[2,3] Michelle Arnold, AuD, PhD,[4] Sheila Burgard, MS,[5] Theresa H. Chisolm, PhD,[4] David Couper, PhD,[5] Jennifer A. Deal, PhD,[2,3] Sarah P. Faucette, AuD, PhD,[6] Adele M. Goman, PhD,[7] Nancy W. Glynn, PhD,[8] Theresa Gmelin, MSW, MPH,[8] Lisa Gravens-Mueller, MS,[5] Kathleen M. Hayden, PhD,[9] Christine M. Mitchell, ScM,[2] James S. Pankow, PhD,[10] James R. Pike, MBA,[11] Nicholas S. Reed, AuD, PhD,[2,11] Victoria A. Sanchez, AuD, PhD,[12] Jennifer A. Schrack, PhD,[2] Kevin J. Sullivan, PhD,[6] Josef Coresh, MD, PhD,[11] Frank R. Lin, MD, PhD,[1,3] and Pablo Martinez-Amezcua, MD, PhD, MHS[2,3,*]; for the ACHIEVE Collaborative Research Group

Bessen et al., (2024) *J. of Gerontology*

ACHIEVing Auditory Wellness for Fatigue & Well-being

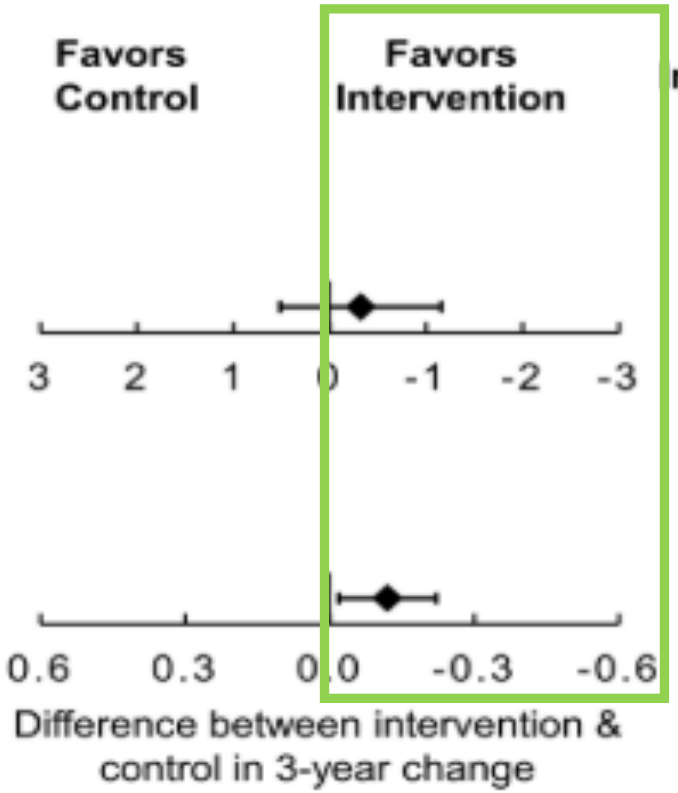


Instrument	Items	Response categories	Scoring
PROMIS	"In the past 7 days, how often…" a) "did you feel tired?" b) "did you experience extreme exhaustion?" c) "did you run out of energy?" d) "were you too tired to think clearly?" e) "were you too tired to take a bath or shower?"	1. Never 2. Rarely 3. Sometimes 4. Often 5. Always	T-score
RAND-36	"How much of the time during the past 4 weeks…" a) "Did you have a lot of energy?" b) "Did you feel full of pep?"	1. All of the time 2. Most of the time 3. A good bit of the time 4. Some of the time 5. A little of the time 6. None of the time	0 20 40 60 80 100
	"How much of the time during the past 4 weeks…" a) "Did you feel worn out?" b) "Did you feel tired?"	1. All of the time 2. Most of the time 3. A good bit of the time 4. Some of the time 5. A little of the time 6. None of the time	100 80 60 40 20 0

ACHIEVing Auditory Wellness for Fatigue & Well-being



Analysis with Imputed Data	3-Year Change	Difference Between Intervention & Control in 3-Year Change
PROMIS-fatigue score	**β (95% CI)**	**β (95% CI)**
Total study sample (N=977)		
Control	3.54 (2.32, 4.75)	
Intervention	3.22 (1.99, 4.45)	-0.32 (-1.15, 0.51)
RAND-fatigue score		
Total study sample (N=977)		
Control	0.32 (0.18, 0.47)	
Intervention	0.21 (0.06, 0.36)	-0.12 (-0.22, -0.02)



Bessen et al., (2024) *J. of Gerontology*


Physical Wellness
AUDITORY WELLNESS
Psychological Wellness
AUDITORY WELLNESS
Social Wellness
AUDITORY WELLNESS
Emotional Wellness
AUDITORY WELLNESS
Spiritual Wellness
Environmental Wellness
WELL-BEING
AUDITORY WELLNESS
See Figure 3.


Psychological Wellness
Reduce Cognitive Decline (in some)


Emotional Wellness
Decrease Fatigue


Social Wellness
Social Engagement?


Physical Wellness

ACHIEVing Auditory Wellness for Social Engagement & Well-being



Research

JAMA Internal Medicine | Original Investigation

Hearing Intervention, Social Isolation, and Loneliness
A Secondary Analysis of the ACHIEVE Randomized Clinical Trial

Nicholas S. Reed, AuD, PhD; Jinyu Chen, MS; Alison R. Huang, PhD, MPH; James R. Pike, MBA; Michelle Arnold, AuD, PhD; Sheila Burgard, MS; Ziheng Chen, BS; Theresa Chisolm, PhD; David Couper, PhD; Thomas K. M. Cudjoe, MD, MPH, MA; Jennifer A. Deal, PhD; Adele M. Goman, PhD; Nancy W. Glynn, PhD; Theresa Gmelin, MSW, MPH; Lisa Gravens-Mueller, MS; Kathleen M. Hayden, PhD; Christine M. Mitchell, ScM; Thomas Mosley, PhD; Esther S. Oh, MD, PhD; James S. Pankow, PhD; Victoria A. Sanchez, AuD, PhD; Jennifer A. Schrack, PhD; Josef Coresh, MD, PhD; Frank R. Lin, MD, PhD; for the ACHIEVE Collaborative Research Group

IMPORTANCE Promoting social connection among older adults is a public health priority. Addressing hearing loss may reduce social isolation and loneliness among older adults.

OBJECTIVE To describe the effect of a best-practice hearing intervention vs health education control on social isolation and loneliness over a 3-year period in the Aging and Cognitive Health Evaluation in Elders (ACHIEVE) study.

DESIGN, SETTING, AND PARTICIPANTS This secondary analysis of a multicenter randomized controlled trial with 3-year follow-up was completed in 2022 and conducted at 4 field sites in the US (Forsyth County, North Carolina; Jackson, Mississippi; Minneapolis, Minnesota; Washington County, Maryland). Data were analyzed in 2024. Participants included 977 adults

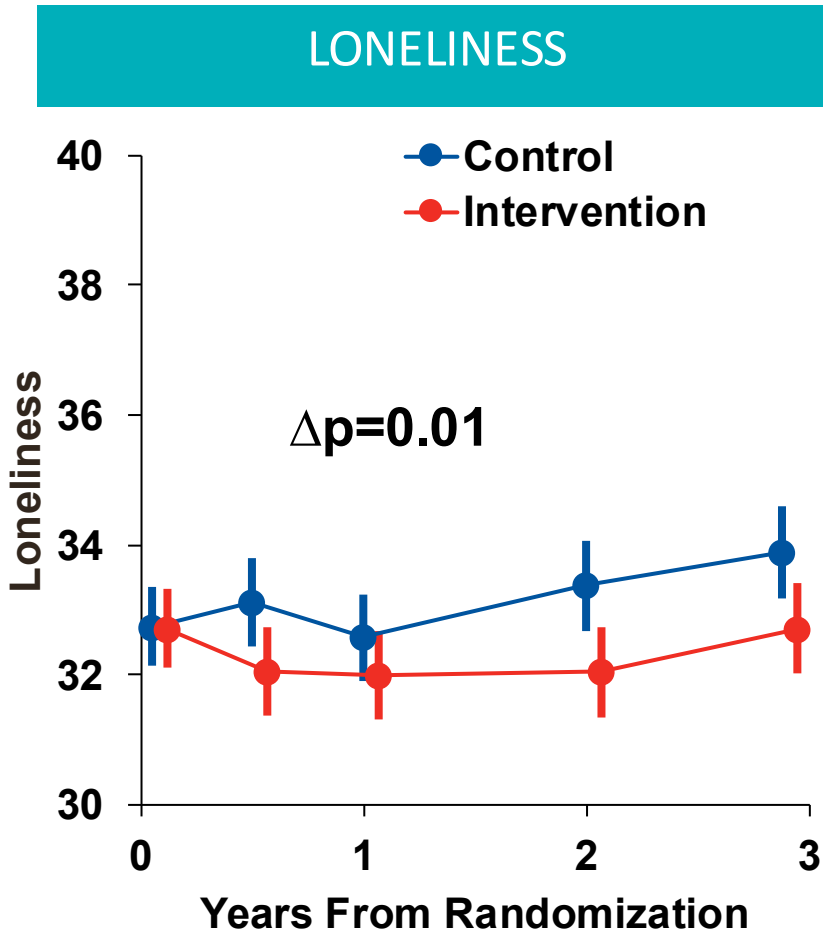
Invited Commentary

Supplemental content

ACHIEVE study

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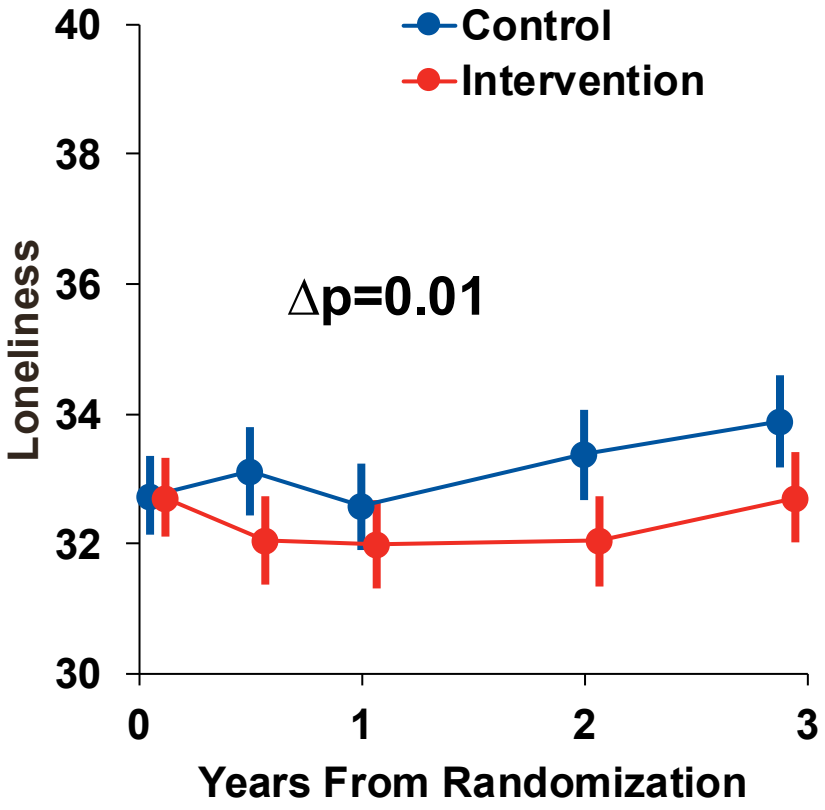


ACHIEVE study

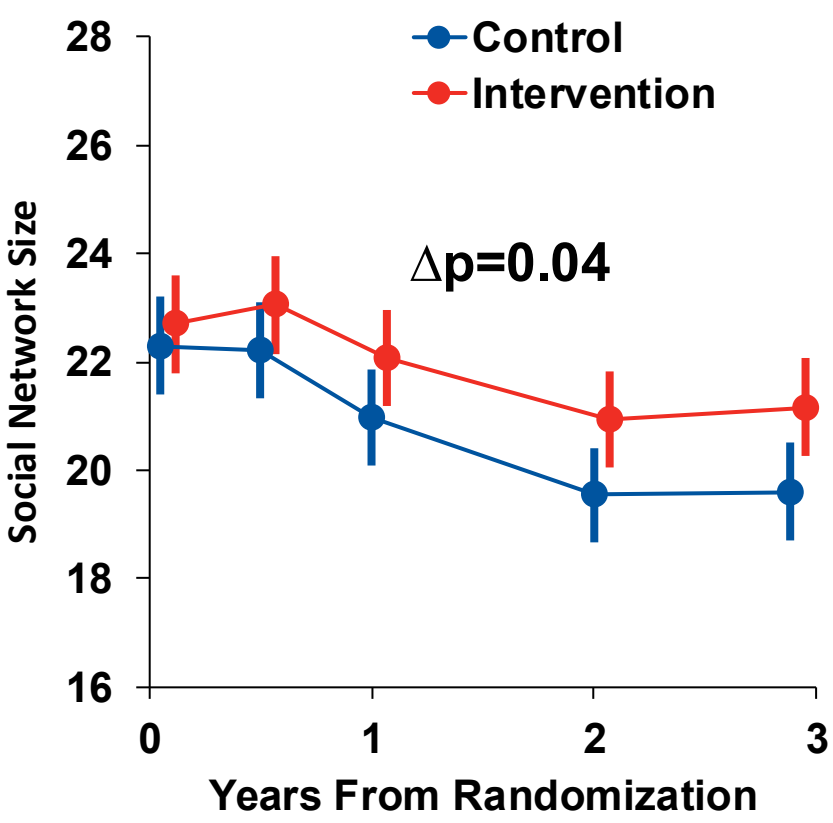
Reed et al., (2025) *JAMA Internal Medicine*

ACHIEVing Auditory Wellness for Social Engagement & Well-being

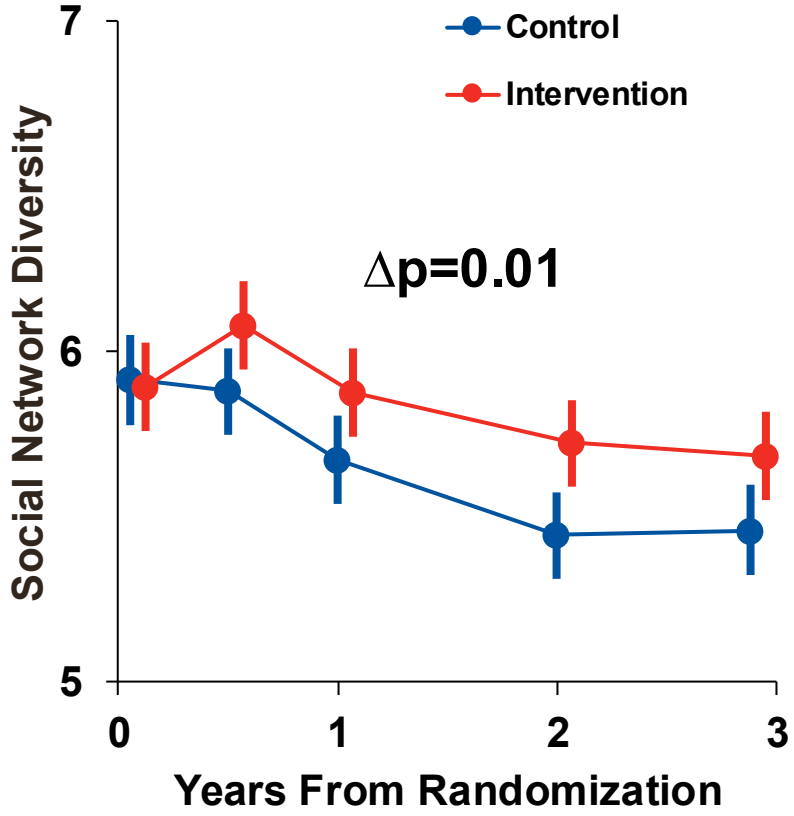
LONELINESS



SOCIAL NETWORK SIZE



SOCIAL NETWORK DIVERSITY



ACHIEVE study

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ACHIEVing Auditory Wellness for Social Engagement & Well-being

Figure 3. Covariate-Adjusted Analysis of 3-Year Change in Social Network Characteristics and Loneliness by Randomly Assigned Treatment Among the Total Cohort of 977 Participants

A Social network size score (range, 0-84)

Outcome	3-y Change, β (95% CI)	Difference (95% CI)
Control	−1.02 (−2.07 to −0.02)	1.05 (0.01 to 2.09)
Intervention	0.03 (−1.01 to 1.06)	

B Social network diversity score (range, 0-12)

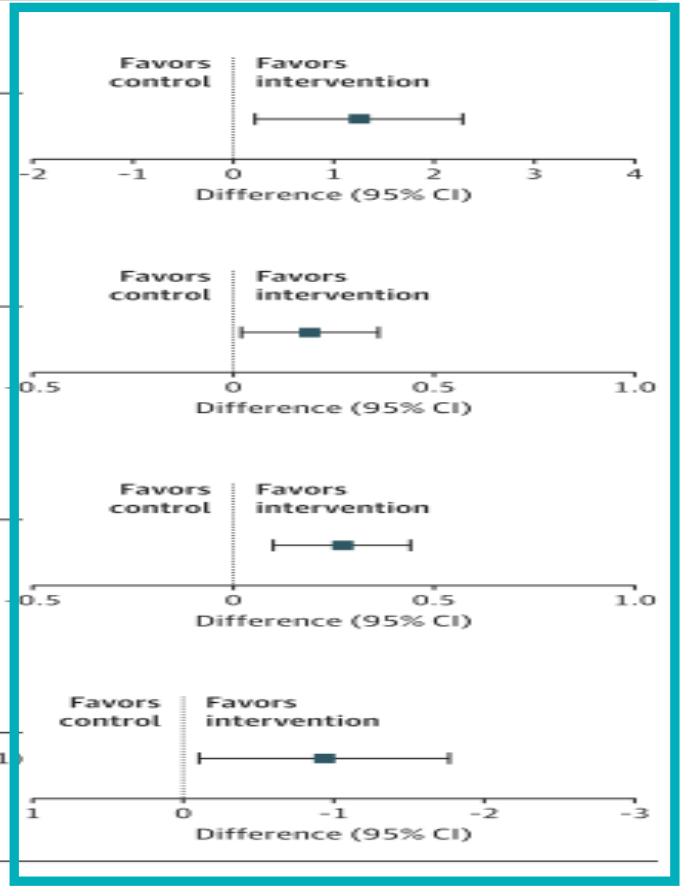
Outcome	3-y Change, β (95% CI)	Difference (95% CI)
Control	−0.16 (−0.33 to −0.02)	0.19 (0.02 to 0.36)
Intervention	0.04 (−0.14 to 0.21)	

C Social network embeddedness score (range, 0-8)

Outcome	3-y Change, β (95% CI)	Difference (95% CI)
Control	−0.18 (−0.37 to 0)	0.27 (0.09 to 0.44)
Intervention	0.08 (−0.09 to 0.26)	

D UCLA Loneliness Scale score (range, 20-80)

Outcome	3-y Change, β (95% CI)	Difference (95% CI)
Control	1.43 (0.59 to 2.27)	−0.94 (−1.78 to −0.11)
Intervention	0.49 (−0.34 to 1.32)	



ACHIEVE study

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Reduce cognitive decline (in some)



Decrease Fatigue



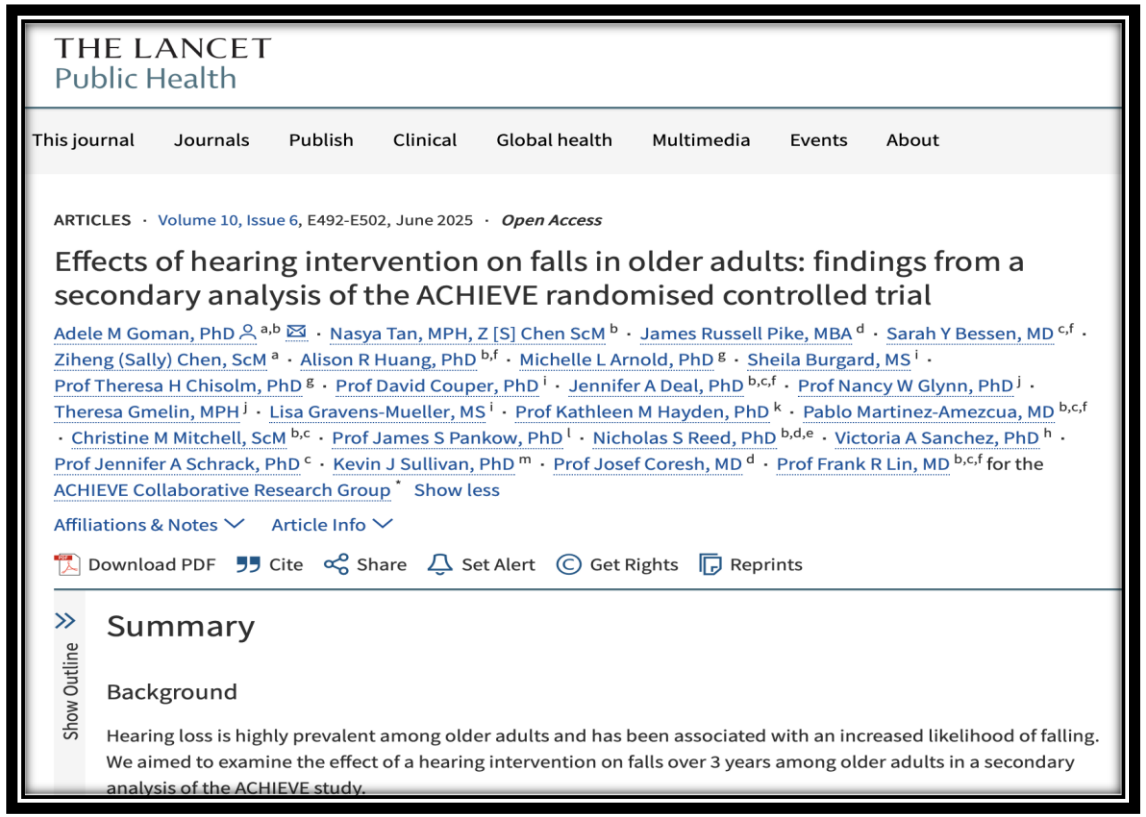
Increase Social Engagement & Decrease Loneliness



Falls?

ACHIEVing Auditory Wellness for Fall Prevention & Well-being





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ARTICLES · Volume 10, Issue 6, E492-E502, June 2025 · *Open Access*

Effects of hearing intervention on falls in older adults: findings from a secondary analysis of the ACHIEVE randomised controlled trial

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Show Outline

Summary

Background

Hearing loss is highly prevalent among older adults and has been associated with an increased likelihood of falling. We aimed to examine the effect of a hearing intervention on falls over 3 years among older adults in a secondary analysis of the ACHIEVE study.

ACHIEVE study

Goman et al., (2025) *Lancet Public Health*

ACHIEVing Auditory Wellness for Fall Prevention & Well-being

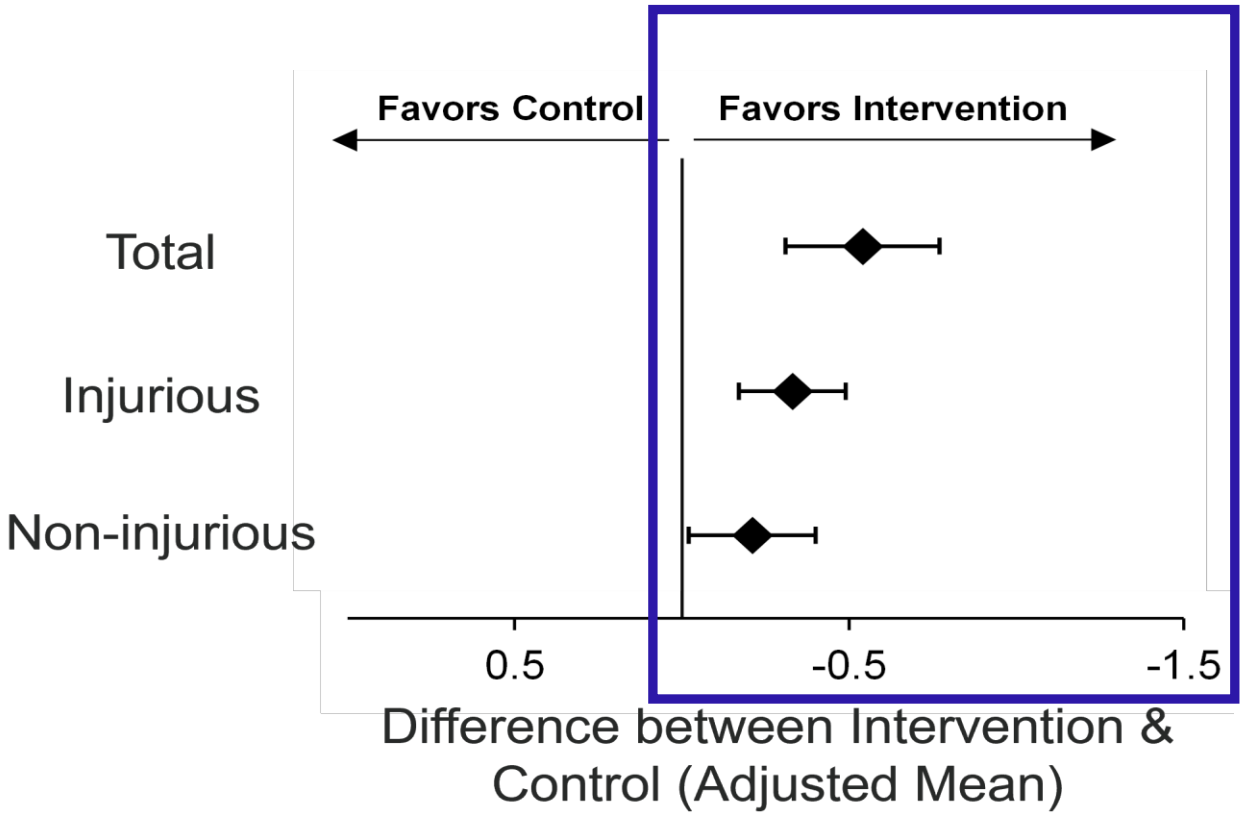


Fall outcomes

- Fall occurrence (participant had a fall)
- Fall recurrence (participant fell more than once)
- Injurious falls (participant had a fall that resulted in an injury)

Goman et al., (2025) *Lancet Public Health*

ACHIEVing Auditory Wellness for Fall Prevention & Well-being



There is a protective effect of the hearing intervention corresponding to a 27% reduction in the mean number of falls in the intervention group compared with the control group

Goman et al., (2025) *Lancet Public Health*



Psychological Wellness

Reduce cognitive decline (in some)

Emotional Wellness

Decrease Fatigue

Social Wellness

Increase Social Engagement & Decrease Loneliness

Physical Wellness

Reduced Falls

Evidence ACHIEVing Auditory Wellness Influences other domains of Well-Being

Hearing intervention over 3 years…

IMPROVED
Communication function*

REDUCED
Fatigue*

REDUCED
Falls *

REDUCED
Social isolation
Loneliness*

REDUCED
Cognitive Decline by 62% in those at greatest risk *

48% REDUCTION
in Cognitive Decline
ARIC Cohort *













*Published
https://www.achievestudy.org/publications

Hearing intervention over 3 years…



IMPROVED
Communication function*



REDUCED
Fatigue*



REDUCED
Falls *



NO EFFECT
Physical Function *
Physical Activity *



REDUCED
Social isolation
Loneliness *



NO EFFECT
Depression
Generic Health-related Quality of Life *



REDUCED
Cognitive Decline by 62% in those at greatest risk *



48% REDUCTION
in Cognitive Decline
ARIC Cohort *

- Published

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Evidence of ACHIEVing Auditory Wellness for Overall Well-being

- Negative health consequences related to untreated hearing loss (poor auditory wellness).
  - Auditory Wellness impacts processing of speech sounds, complex sounds, and sound in space, all of which enable an individual to fully participate in a wide range of desired daily listening activities without limitations or restrictions.
  - Growing evidence that improving Auditory Wellness with hearing intervention leads to improved health outcomes.
- Auditory Wellness is critical to physical, emotional, cognitive, and social wellness, as well as **overall well-being.**



- As we consider the influence of hearing intervention on a wide-range of health outcomes, let's make sure evidenced-based, patient-centered, holistic, hearing interventions are provided. **Interventions which are likely to improve Auditory Wellness and influence overall Well-Being.**

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We are incredibly grateful to the ACHIEVE/ARIC participants & the ACHIEVE collaborative research group:

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ACHIEVE
HEALTHY AGING

Thank you!