Hearing Intervention & Cognition: Review of the Evidence and Current Trials

Audiology Online - July 14th, 2020

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https://www.usf.edu/cbcs/csd/labs/arct/

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Learning Outcomes

After this course learners will be able to…

- Summarize the observed associations between hearing loss and cognition from available epidemiology research.
- Describe the need for the current clinical trials underway to determine if hearing intervention can mediate cognitive decline.
- Identify at least two (2) outcomes that can be utilized to assess the perceived benefits of hearing intervention in audiological clinical practice.

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Presentation Outline

1. Prevalence of Dementia
2. Review of epidemiological research indicating the association between hearing loss, poor health outcomes, and cognitive decline
3. Review of clinical trials evaluating the influence of hearing intervention on cognition and quality of life
4. Summary of what is known and what implications current studies will have on the landscape of hearing healthcare
5. Discussion and Questions?

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Dementia Prevalence

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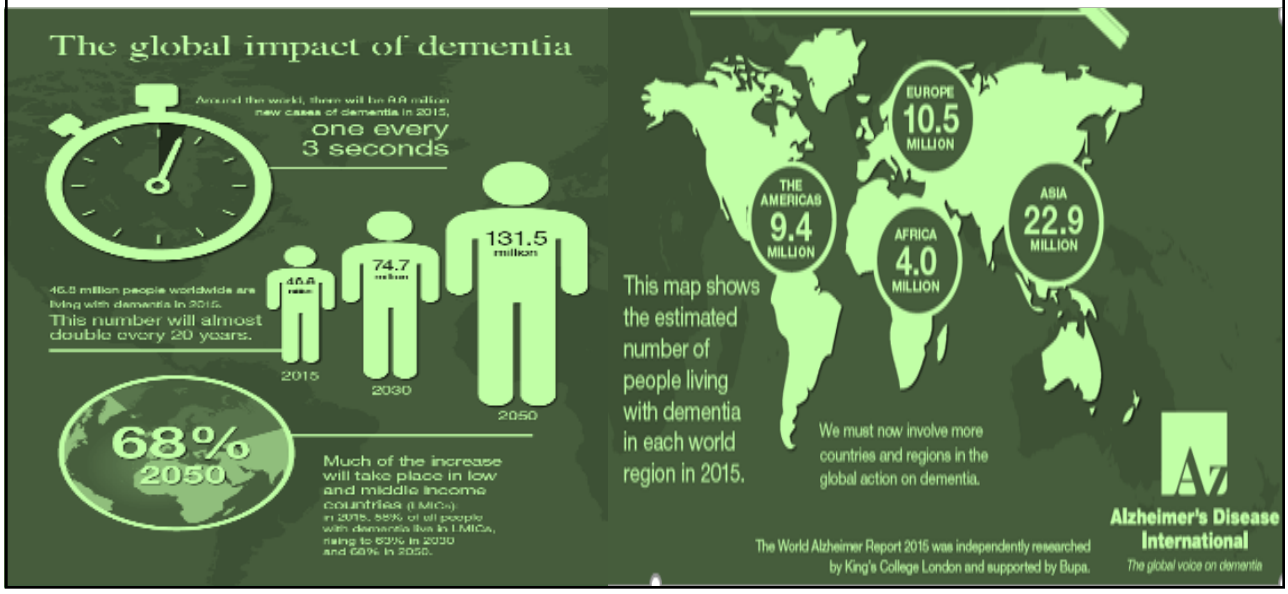
Dementia Prevalence



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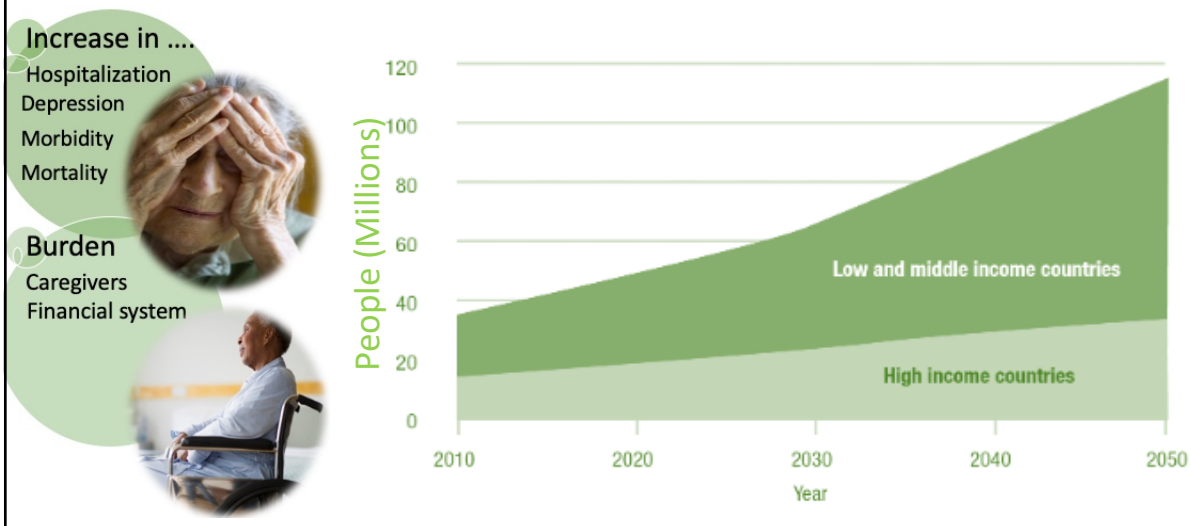
Projected Worldwide Prevalence of Dementia 2010-2050



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Livingston et al., Lancet, 2017; World Alzheimer's Repot, 2015; Alzheimer's Disease International, 2009

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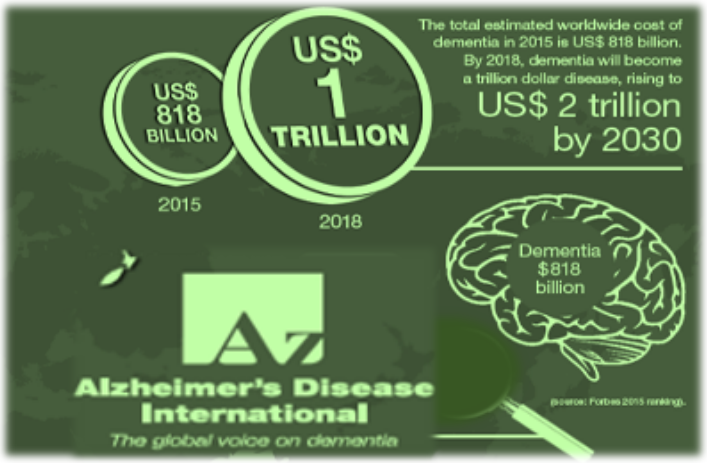
Financial Burden of Dementia

- Over 1 trillion dollars in 2020
- In the US, the yearly monetary cost per person that was attributable to dementia was estimated as over $55k



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World Alzheimer's Repot, 2015; Hurd et al., N Engl J Med, 2013; Alzheimer's Disease International, 2009

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Aging Population

- Silver tsunami!

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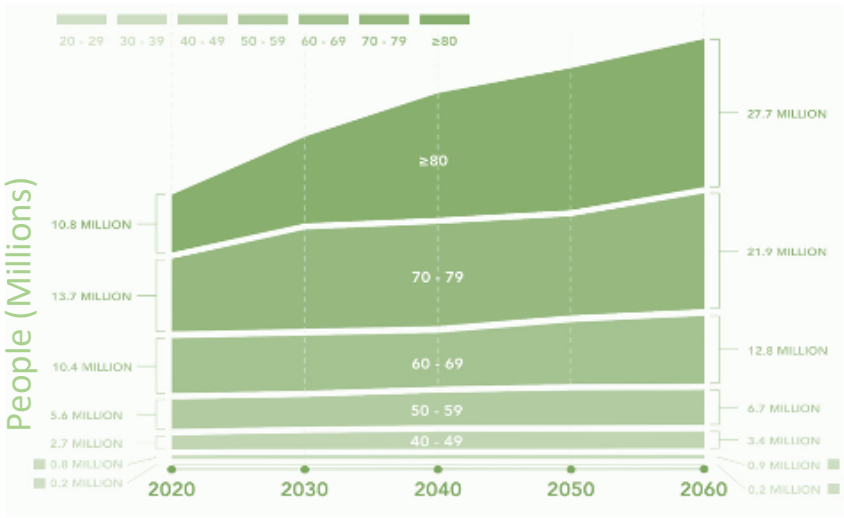
Aging Population

- Silver tsunami!
- Switching to more older adults than younger
- In 2012, 60% of older adults managed 2 or more chronic conditions.



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Colby et al., U.S. Census Bureau, 2014; Ward et al.; Prev Chronic Dis, 2014

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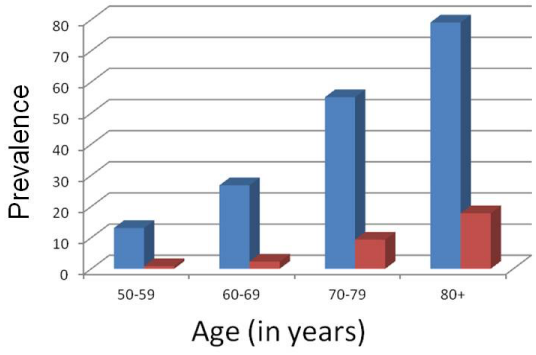
Prevalence of Hearing Loss

Figure 1 Prevalence of hearing loss & hearing aid use in the United States



- 5% of the world's population has disabling hearing loss
- By 2050, the number of people suffering from hearing loss could increase to 12.5%
- Prevalence of hearing loss nearly doubles with every age decade
- 2 of every 3 adults 70 years or older has a clinically-significant hearing loss
- <20% of these individuals use a hearing aid
- Global production of hearing aids meets less than 10% of the global need

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WHO, 2017; Lin *Arch Intern Med.* 2011; Lin *J Gerontol A Biol Sci Med Sci.* 2011; Chien & Lin, *Arch Intern Med.* 2012

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Economic Burden of Hearing Loss

- Estimated costs of unaddressed hearing loss amounts to $750 billion per year worldwide.
- Hearing Loss causes immense annual costs including costs of educational support, loss of productivity, and societal costs, and health sector costs (excluding devices)
- In the United States, estimates of the economic cost of lost productivity varied from $1.8 to $194 billion, and direct medical costs ranged from $3.3 to $12.8 billion.

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WHO, 2017; Huddle et al. JAMA-OTO, 2017

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Effects of Untreated Hearing Loss

Hearing Loss in older adults results in an increased likelihood of….

- Decreased quality of life
- Social isolation
- Depression
- Poor mental health
- Decreased self-sufficiency in Activities of Daily Living
- Hospitalization
- Reduced walking speed
- Increased risk of falls

… Accelerated cognitive decline and dementia

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(National Council on Aging, 1999; Carabellese et al., JAGS, 1993; Li et al., Gait & Posture 2012; Lin et al. Arch Int Med 2012; Genther et al, JAMA, 2013)

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Hearing Loss & Cognition/Dementia

Epidemiologic Analyses

Table 5.—Risk of Dementia at Various Levels of Hearing Loss

Hearing Loss, dB	Adjusted Odds Ratio*	95% Confidence Interval
Mild (20-29)	1.5	0.4-5.4
Moderate (30-39)	2.2	0.6-7.8
Moderate/severe (≥40)	4.1	1.1-15.8

*Odds ratio was adjusted for family history of dementia, depression diagnosis, number of prescription medications, and source of primary care. Reference odds ratio for normal hearing (<20-dB loss) is 1.0. Trend of increasing risk of dementia for increasing level of hearing loss is statistically significant ($P<.05$).

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(Uhlmann, Larson, Rees, Koepsell & Duckert, JAMA 1989)

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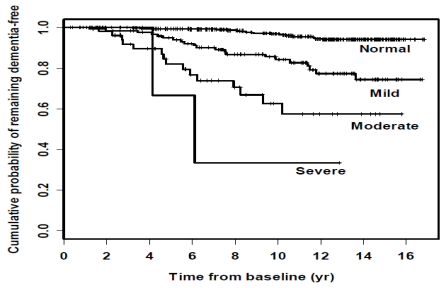
Hearing Loss & Cognition/Dementia

Epidemiologic Analyses

- **NHANES**: National Health and Nutritional Examination Surveys
  - Cross-sectional, representative sample of U.S. population
- **HealthABC**: Health, Aging, & Body Composition Study
  - Prospective, population-based study of ~3000 adults 70 years and older
- **BLSA**: Baltimore Longitudinal Study of Aging
  - Ongoing prospective study of older adults since 1958; *Dementia incidence in 639 adults followed for >10 years*



	HR	95% CI	p
Mild	1.89	1.00 – 3.58	0.05
Moderate	3.00	1.43 – 6.30	.004
Severe	4.94	1.09 – 22.4	.04

[a] Adjusted for age, sex, race, education, DM, smoking, & hypertension

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Lin et al., Arch Neuro., 2011

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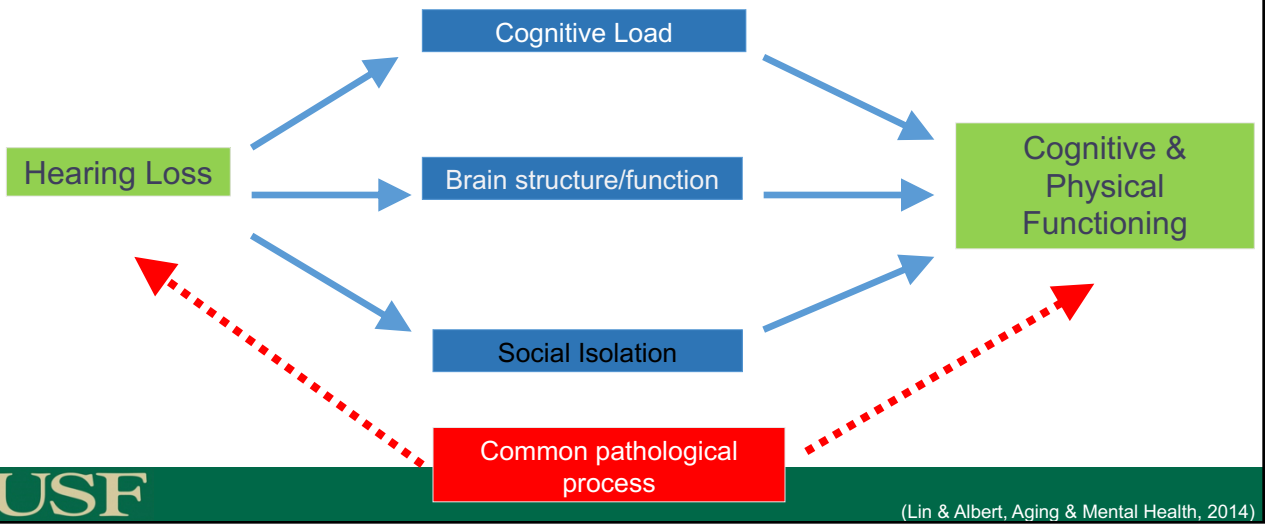
Hearing Loss & Cognitive Decline

Common Cause or *Modifiable Risk Factor*



(Lin & Albert, Aging & Mental Health, 2014)

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Summary: Dementia, Hearing, & Aging Population

- High prevalence of dementia
- Hearing Loss is highly prevalent in older adults and has been associated with adverse health outcomes
- Association between hearing loss and cognition
- Significant public health concern

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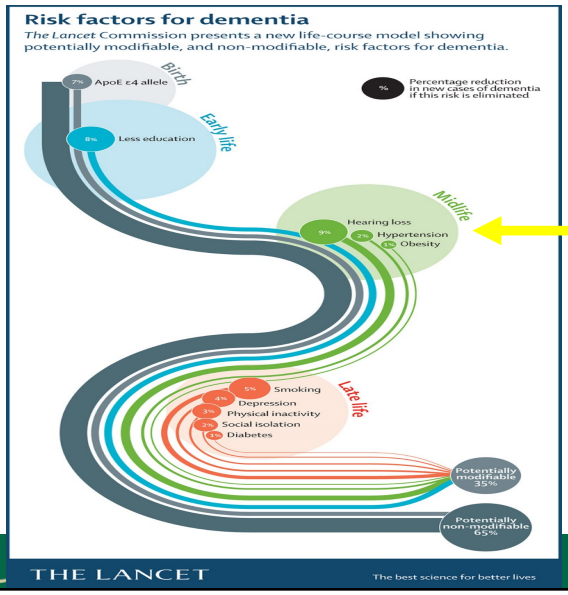
Lancet Commission on Dementia Prevention, Intervention & Care



- 1/3 of dementia cases may be preventable through modifiable lifestyle factors
- Managing diabetes, obesity, smoking, and hearing loss
- Hearing loss in mid & late life identified as the modifiable risk factor for dementia

G. Livingston et al., Lancet, 19 July 2017

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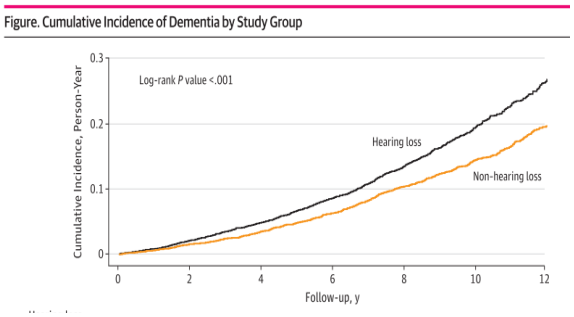
Hearing Loss & Cognition/Dementia

Epidemiologic Analyses

- **Danish Conscription Database & Danish Conscription Registry (DCD & DCR):**
  - 942,567 Danish men
  - Midlife hearing loss was associated with an increased rate of dementia diagnosed before the age of 60 (Osler et al. 2019)
- **National Health Insurance Research Database of Taiwan**:
  - Dementia incidence rate in the hearing loss group was higher than the normal hearing group (Liu et al. 2019)
  - The group with hearing loss aged 45 to 64 was associated with the **highest risk of dementia**



The 8135 patients with hearing loss (HL group) were matched by sex, age, residence, and insurance premium with 8135 individuals without hearing loss (non-HL group).

Osler et al 2019; Liu et al. 2019

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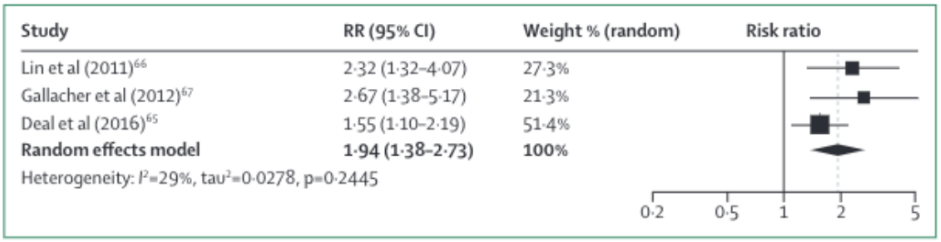
Hearing Loss & Cognition/Dementia

Epidemiologic Analyses

Evidence is strong with hearing loss independently associated with:

- 2-5 fold increased risk of incident dementia
- Accelerated cognitive decline on cognitive assessments (3MS and digit symbol test)
- Accelerated whole brain and lateral temporal lobe atrophy
- Across studies, consistent report of 1.9 increase in dementia risk



Study	RR (95% CI)	Weight % (random)
Lin et al (2011)[66]	2·32 (1·32–4·07)	27·3%
Gallacher et al (2012)[67]	2·67 (1·38–5·17)	21·3%
Deal et al (2016)[65]	1·55 (1·10–2·19)	51·4%
Random effects model	**1·94 (1·38–2·73)**	**100%**

Heterogeneity: I^2=29%, tau^2=0·0278, p=0·2445

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Neurology 2012; Arch Neuro 2011; Arch Int Med 2013; NeuroImage, 2014; Livingston et al., Lancet, 2017

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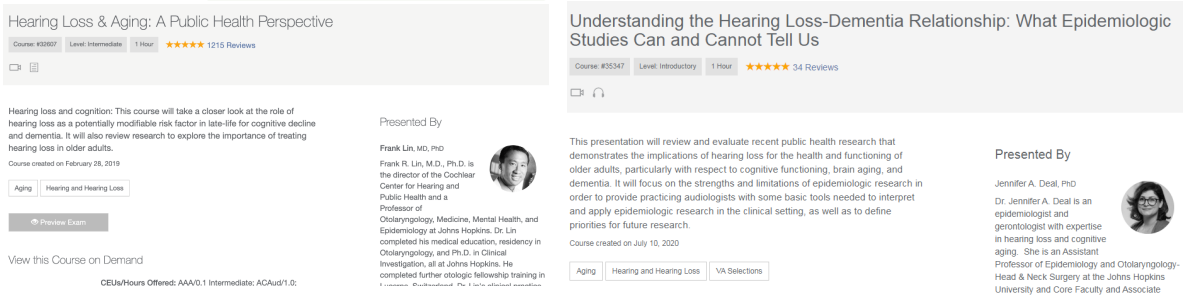
Hearing Loss & Cognition/Dementia

Want More Details?

AudiologyOnline!



Hearing Loss & Aging: A Public Health Perspective

Course: #32607 | Level: Intermediate | 1 Hour | ★★★★★ 1215 Reviews

Hearing loss and cognition: This course will take a closer look at the role of hearing loss as a potentially modifiable risk factor in late-life for cognitive decline and dementia. It will also review research to explore the importance of treating hearing loss in older adults.

Course created on February 28, 2019

Aging | Hearing and Hearing Loss

Preview Exam

View this Course on Demand

CEUs/Hours Offered: AAA/0.1 Intermediate; ACAud/1.0;

Presented By

Frank Lin, MD, PhD

Frank R. Lin, M.D., Ph.D. is the director of the Cochlear Center for Hearing and Public Health and a Professor of Otolaryngology, Medicine, Mental Health, and Epidemiology at Johns Hopkins. Dr. Lin completed his medical education, residency in Otolaryngology, and Ph.D. in Clinical Investigation, all at Johns Hopkins. He completed further otologic fellowship training in

Understanding the Hearing Loss-Dementia Relationship: What Epidemiologic Studies Can and Cannot Tell Us

Course: #35347 | Level: Introductory | 1 Hour | ★★★★★ 34 Reviews

This presentation will review and evaluate recent public health research that demonstrates the implications of hearing loss for the health and functioning of older adults, particularly with respect to cognitive functioning, brain aging, and dementia. It will focus on the strengths and limitations of epidemiologic research in order to provide practicing audiologists with some basic tools needed to interpret and apply epidemiologic research in the clinical setting, as well as to define priorities for future research.

Course created on July 10, 2020

Aging | Hearing and Hearing Loss | VA Selections

Presented By

Jennifer A. Deal, PhD

Dr. Jennifer A. Deal is an epidemiologist and gerontologist with expertise in hearing loss and cognitive aging. She is an Assistant Professor of Epidemiology and Otolaryngology-Head & Neck Surgery at the Johns Hopkins University and Core Faculty and Associate

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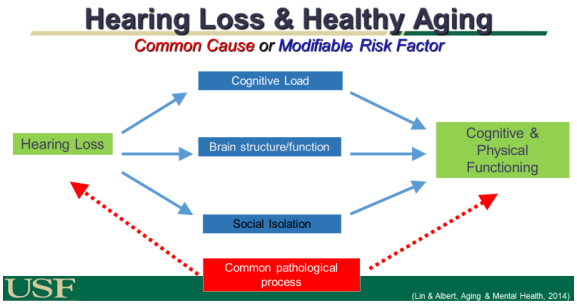
Hearing Loss & Cognition/Dementia

How about hearing intervention and Cognition/Dementia?

- Hearing intervention
  - Improved communication
    - speech recognition, listening ability
  - Improve quality of life
  - Listening effort, memory, and other cognitive outcomes



Although some unaided/aided experiments and cross-sectional cohort studies have reported either improved cognition or slower rate of cognitive decline with hearing aid use, <u>others have found no significant effect</u>.

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Ferguson et al., *Cochrane Database of Systematic Reviews,* 2017; Dawes et al., Int J Audiol 2015

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Hearing Loss & Cognition/Dementia

Determining the role of hearing intervention in attenuating cognitive decline/dementia in observational studies is not possible.

- Individuals choosing to use hearing aids differ substantially from those who do not
- Hearing intervention cannot be determined from observational data
- Limitation in the current literature include:
  - small sample size
  - retrospective design
  - self-report hearing aid use
  - self-report hearing loss; and, type, degree, and configuration of hearing loss are not defined

Sarant et al., 2020

- 99 adults 60-84 years old, followed for 18 months with well controlled hearing aid usage
- Improved speech perception, self-reported listening disability and quality of life
- No decline in cognitive battery and improved executive function
- No control group or randomization

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Sarant et al, J Clin Med, 2020

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Hearing Loss & Cognition/Dementia

Mulrow et al., 1990

- Randomized Controlled Trial (RCT) of hearing treatment (n = 192 veterans)
- Outcomes measured at 4 months post-tx
- Reported improved communicative and emotional functioning
- Improved cognition (cognitive screener)

Results never confirmed in a trial with a larger representative cohort, using current hearing rehabilitative strategies/technologies, and evaluating cognition with longer follow-up (to observe for reduced risk of decline/incident dementia)

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Mulrow et al *Ann Intern Med 1990*

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The question of whether treating hearing loss could <u>delay</u> cognitive/physical decline or dementia remains unknown

There has never been a randomized clinical trial of treating hearing loss to explore effects on <u>reducing the risk</u> of cognitive decline/dementia

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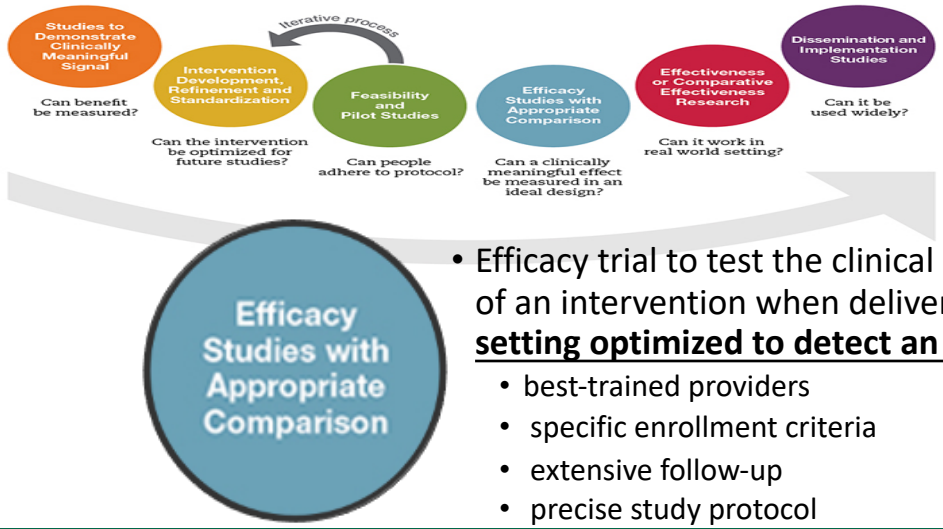
Generating the Evidence: Multiphase Process



- Efficacy trial to test the clinical benefit of an intervention when delivered in a **setting optimized to detect an effect**
  - best-trained providers
  - specific enrollment criteria
  - extensive follow-up
  - precise study protocol

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The *Aging and Cognitive Health Evaluation in Elders (ACHIEVE RCT)*

ACHIEVE HEALTHY AGING

In partnership with Josef Coresh, MD PhD and the Atherosclerosis Risk in Communities-Neurocognitive Study (ARIC-NCS)

ARIC Neurocognitive Study

NIH-NIA: R34AG046548, R01AG055426; Lin & Coresh, Co-P.I.s

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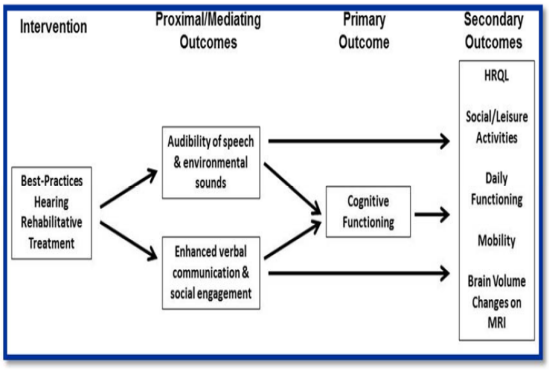
ACHIEVE RCT: Rationale

- **Aim of ACHIEVE is to determine the effects of best-practices hearing Intervention on:**
  - Outcome measures
    - Rates of cognitive decline
    - Health-related quality of life, social/leisure activities, daily functioning, mobility, and longitudinal brain atrophy on structural MRI.
  - To investigate the mechanistic pathways through which hearing rehabilitative intervention affects cognitive functioning

Figure 2. Conceptual Model for the Clinical Trial



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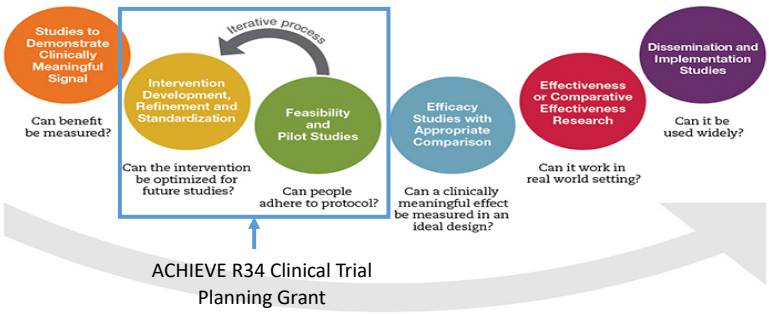
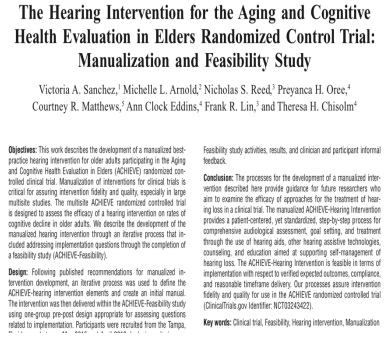
ACHIEVE Trial Design: *Timeline & Overview of RCT*

- Timeline:
  - 2014-2016: RCT planning process (R34AG046548)
    - Feasibility study, development of protocol/manualized interventions, etc.

ACHIEVE





The Hearing Intervention for the Aging and Cognitive Health Evaluation in Elders Randomized Control Trial: Manualization and Feasibility Study

Victoria A. Sanchez,[1] Michelle L. Arnold,[2] Nicholas S. Reed,[3] Preyanca H. Oree,[4] Courtney R. Matthews,[3] Ann Clock Eddins,[4] Frank R. Lin,[3] and Theresa H. Chisolm[4]

Objectives: This work describes the development of a manualized best-practice hearing intervention for older adults participating in the Aging and Cognitive Health Evaluation in Elders (ACHIEVE) randomized controlled clinical trial. Manualization of interventions for clinical trials is critical for assuring intervention fidelity and quality, especially in large multisite studies. The multisite ACHIEVE randomized controlled trial is designed to assess the efficacy of a hearing intervention on rates of cognitive decline in older adults. We describe the development of the manualized hearing intervention through an iterative process that included addressing implementation questions through the completion of a feasibility study (ACHIEVE-Feasibility).

Design: Following published recommendations for manualized intervention development, an iterative process was used to define the ACHIEVE-hearing intervention elements and create an initial manual. The intervention was then delivered within the ACHIEVE-Feasibility study using one-group pre-post design appropriate for assessing questions related to implementation. Participants were recruited from the Tampa, Feasibility study activities, results, and clinician and participant informal feedback.

Conclusion: The processes for the development of a manualized intervention described here provide guidance for future researchers who aim to examine the efficacy of approaches for the treatment of hearing loss in a clinical trial. The manualized ACHIEVE-Hearing intervention provides a patient-centered, yet standardized, step-by-step process for comprehensive audiological assessment, goal setting, and treatment through the use of hearing aids, other hearing assistive technologies, counseling, and education aimed at supporting self-management of hearing loss. The ACHIEVE-Hearing Intervention is feasible in terms of implementation with respect to verified expected outcomes, compliance, and reasonable timeframe delivery. Our processes assure intervention fidelity and quality for use in the ACHIEVE randomized controlled trial (ClinicalTrials.gov Identifier: NCT03243422).

Key words: Clinical trial, Feasibility, Hearing intervention, Manualization

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Sanchez et al., Ear&Hear 2020; Image source: https://nccih.nih.gov/grants/mindbody/framework

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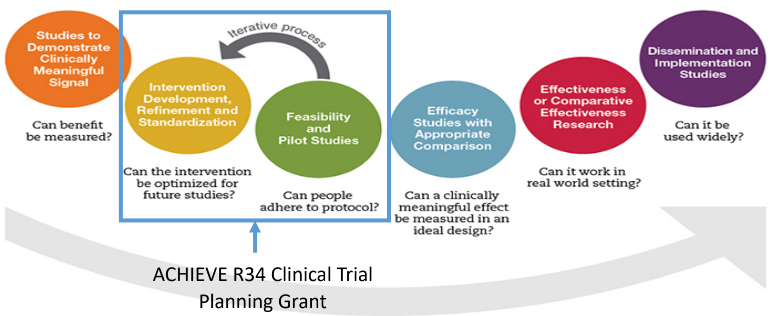
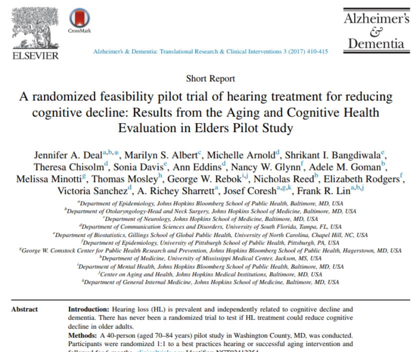
ACHIEVE Trial Design: *Timeline & Overview of RCT*

- Timeline:
  - 2014-2016: RCT planning process (R34AG046548)
    - Feasibility study, development of protocol/manualized interventions, etc.
    - Pilot Study

ACHIEVE

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Alzheimer's & Dementia: Translational Research & Clinical Interventions 3 (2017) 410-415

Alzheimer's & Dementia

Short Report

A randomized feasibility pilot trial of hearing treatment for reducing cognitive decline: Results from the Aging and Cognitive Health Evaluation in Elders Pilot Study

Jennifer A. Deal, Marilyn S. Albert, Michelle Arnold, Shrikant I. Bangdiwala, Theresa Chisolm, Sonia Davis, Ann Eddins, Nancy W. Glynn, Adele M. Goman, Melissa Minotti, Thomas Mosley, George W. Rebok, Nicholas Reed, Elizabeth Rodgers, Victoria Sanchez, A. Richey Sharrett, Josef Coresh, Frank R. Lin

Abstract

Introduction: Hearing loss (HL) is prevalent and independently related to cognitive decline and dementia. There has never been a randomized trial to test if HL treatment could reduce cognitive decline in older adults.

Methods: A 40-person (aged 70–84 years) pilot study in Washington County, MD, was conducted. Participants were randomized 1:1 to a best practices hearing or successful aging intervention and followed for 6 months. clinicaltrials.gov Identifier: NCT02412254.

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Deal et al., Alzheimers Dement; 2017; Deal et al., Alzheimers Dement; 2018; Image source: https://nccih.nih.gov/grants/mindbody/framework

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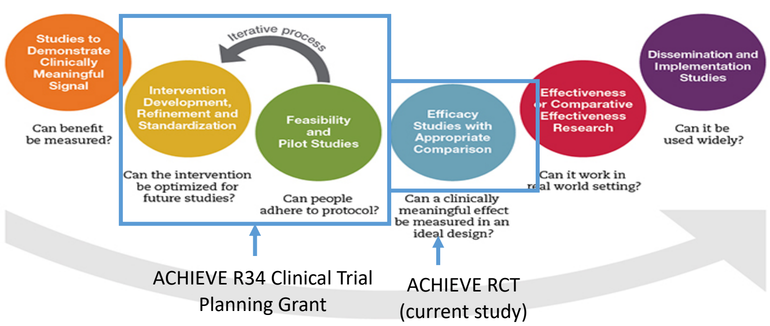
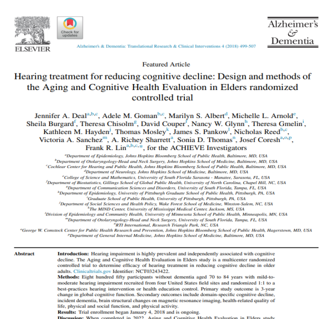
ACHIEVE Trial Design: *Timeline & Overview of RCT*

- Timeline:
  - 2014-2016: RCT planning process (R34AG046548)
  - 2017 Trial Started

ACHIEVE HEALTHY AGING

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Alzheimer's & Dementia

Featured Article

Hearing treatment for reducing cognitive decline: Design and methods of the Aging and Cognitive Health Evaluation in Elders randomized controlled trial

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Deal et al., Alzheimers Dement; 2017; Deal et al., Alzheimers Dement; 2018; Image source: https://nccih.nih.gov/grants/mindbody/framework

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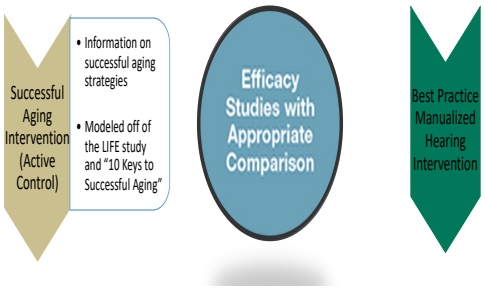
ACHIEVE Trial Design: *Timeline & Overview of RCT*

- Timeline:
  - 2014-2016: RCT planning process (R34AG046548)
  - 2016 Trial grant submission
  - 2017-18 Recruitment at ARIC field sites
  - 2018-21 Follow-up
  - 2022 Results



- Participants: Recruited 977 healthy, cognitively normal community-dwelling adults 70-84 years old with untreated mild-moderate HL
- Intervention: Randomization to best-practices hearing rehabilitative treatment vs. successful aging intervention control

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Newmanet al., J Aging Health. 2010; https://nccih.nih.gov/grants/mindbody/framework

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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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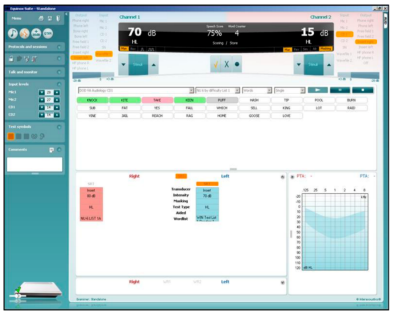
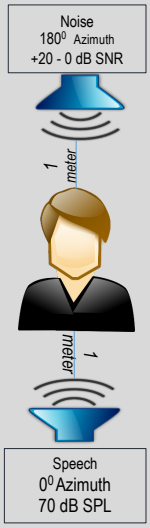
ACHIEVE Hearing Intervention

Comprehensive Evaluation & Educational Counseling

- Otoscopy, Tympanometry
- Pure-tone Audiometry
- Word Recognition in Quiet
- Soundfield Speech-in-Noise Recognition

Figure 2.1. Equinox Set Up Screen: Word Recognition in Quiet





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ACHIEVE Hearing Intervention

Comprehensive Evaluation & Educational Counseling

Individualized Goal Setting, Educational Counseling, & Self-Management

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

- Must create **person-centered** goals for hearing intervention
  - Client Oriented Scale of Improvement (COSI)
- Goals must be **specific** and **prioritized** by the participant

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Dillion et al., JAAA 1997

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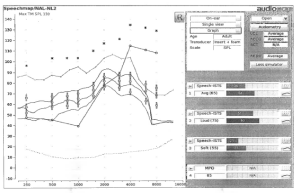
ACHIEVE Hearing Intervention


Comprehensive Evaluation & Educational Counseling

Individualized Goal Setting, Educational Counseling, & Self-Management


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

- Centered around Amplification:
  - Selection of appropriate level of hearing aid technology
  - Electroacoustic analysis
  - On-ear device verification



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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

- Hearing Assistive Technology
  - Selection of technology Based on QuickSIN, hearing loss, COSI goals, and participant history and preferences

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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

Education, Counseling, Self-Management

- Orientation, counseling, and follow-up in ACHIEVE are standardized

…..and of course! Our audiologists' expertise!

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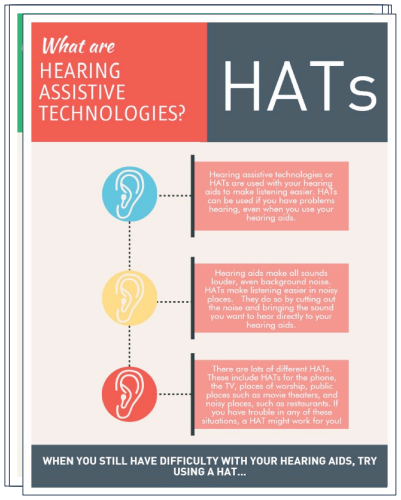
ACHIEVE Hearing Intervention: Toolkit for Self-Management ©

Toolkit for Self-Management ©

- Teach adult hearing aid users about their hearing loss
- Support new hearing aid users by providing strategies based on **their** goals; Customized to a participant's specific goals for intervention
- Topics include:
  - Understanding in noise
  - Communication strategies
  - Telephone and television
  - Meetings & Crowds
  - Places of worship
  - HATs
- Be understood by persons from a variety of health literacy backgrounds and incorporate inclusive, racially-diverse images



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Arnold, M. L., Oree, P., Sanchez, V., Reed, N., & Chisolm, T. (2019). Development and formative assessment of the Hearing Loss Toolkit for Self-Management. *Seminars in Hearing, 40*(1), 49-67. doi: 10.1055/s-0038-1676783.

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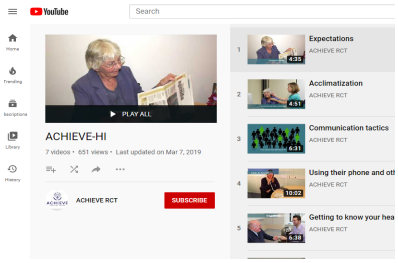
ACHIEVE Hearing Intervention: C2Hear RLOs

C2Hear Reusable Learning Objects (RLOs)

ACHIEVE-HI RCT YouTube
https://youtu.be/T85pTnv4614



- C2Hear RLOs - Americanized
  - Nottingham University Biomedical Research Unit
  - Brief, 2-7 minute video clips
  - Cover a variety of common topics and issues for hearing aid users

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

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ACHIEVE Hearing Intervention: Fidelity & Post-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

Intervention Fidelity

- The ongoing assessment, monitoring, and enhancement of the reliability and internal validity of a study
- Intervention fidelity is key in multi-site RCTs to ensure:
  - Consistency across sites
  - Adherence to study protocol

Post-Hearing Intervention

- Post-HI sessions take place at 6, 12, 18, 24, 30, and 36 months following the baseline audiologic evaluation

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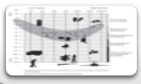
ACHIEVE Hearing Intervention: Outcomes


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

Table 2 Summary of ACHIEVE Outcome Measures

Test	Assessment Timepoint
Proximal Outcomes – All participants	
Cohen Social Network Index	BL,6,12,24,36
UCLA Loneliness Scale	BL,6,12,24,36
CES-D Scale	BL,6,12,24,36
Hearing Handicap Inventory for the Elderly	BL,6,12,24,36
Satisfaction/Willingness-to-Pay	6, 36
Hearing intervention process outcomes	
Real-ear aided response	HI,6,12,24,36
Speech Intelligibility Index (SII) (aided)	HI,6,12,24,36
Quick Speech-in-noise (aided)	HI,6,12,24,36
Hearing Aid Data Log	HI,6,12,24,36
International Outcome Inventory - Hearing Aids & Alternative Interventions	HI,6,12,24,36
Client-Oriented Scale of Improvement	HI,6,12,24,36
Primary Outcome Components	
Mini-Mental State Exam	BL,6,12,24,36
Delayed Word Recall Test	BL,12,24,36
Logical Memory I	BL,12,24,36
Incidental Learning	BL,12,24,36
Trail Making Test Part A	BL,12,24,36
Trail Making Test Part B	BL,12,24,36
Digit Symbol Substitution Test	BL,12,24,36
Digit Span Backward	BL,12,24,36
Boston Naming Test	BL,12,24,36
Word Fluency	BL,12,24,36
Secondary Outcomes	
Accelerometry	BL,12,24,36
Short Form 36	BL,6,12,24,36
Short Physical Performance Battery	BL,12,24,36
Grip strength	BL,12,24,36
Hospitalizations	BL,12,24,36
Falls	BL,12,24,36
Adjudicated dementia	6,12,24,36
Brain MRI**	BL, 36
Covariates	
Demographics	BL,12,24,36
Medical History	BL,12,24,36
Vision Screening	BL
Anthropometry	BL,12,24,36
Seated blood pressure	BL,12,24,36
Comprehensive audiologic battery	BL,12,24,36
Apolipoprotein E4	BL

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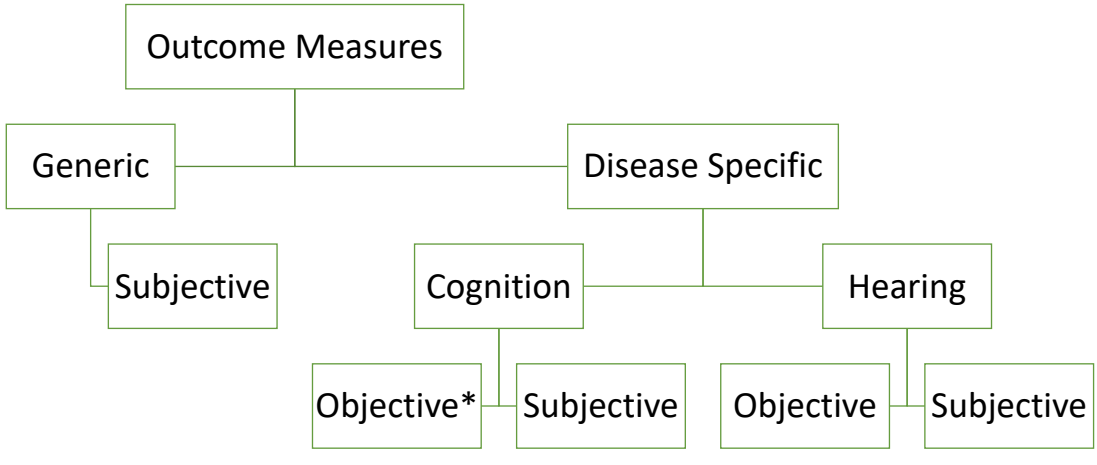
ACHIEVE Hearing Intervention: Outcomes



*** Primary Outcome – Neurocognitive Battery**

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ACHIEVE Hearing Intervention: Outcomes

Hearing Outcome Measures

Objective

Datalogging
- Average Use
- Processing Analyzer

Speech Recognition in Noise
- Soundfield
- QuickSIN

Subjective

COSI Goal Attainment

Hearing Handicap Inventory
- HHI-A/E

International Outcome Inventory (IOI)
- Hearing aids (IOI-HA)
- Alternative Interventions (IOI-AI)

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Generating the Evidence: Multiphase Process

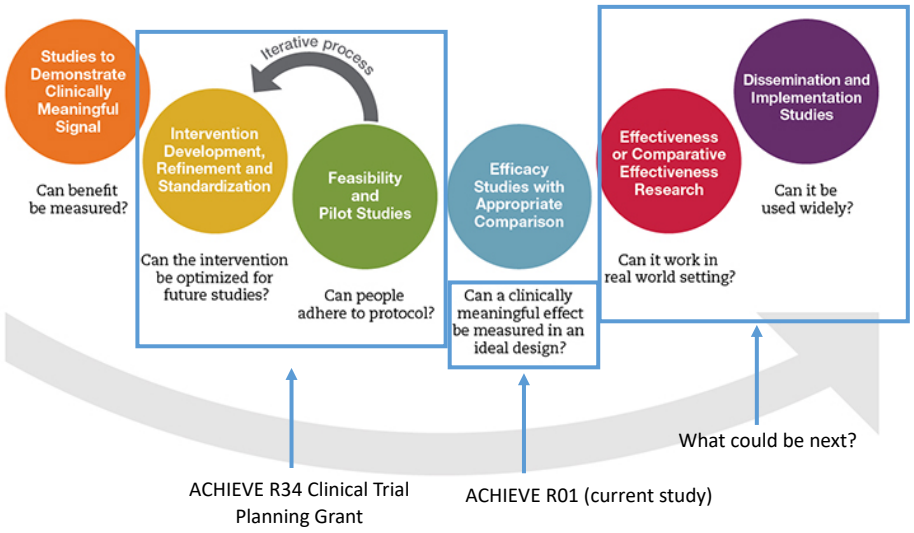

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Image source: https://nccih.nih.gov/grants/mindbody/framework

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Post-ACHIEVE, what could be next?

Telehealth Approach?

- Expand access and affordability of hearing health care
- Greater flexibility, Lower costs, Individualized plans (lifestyle/listening needs)
- Conducting eAudiology pilot study at USF with re-manualization

What about other patient populations? And, hearing interventions?

- Conductive or Mixed hearing loss?
- Single-sided Deafness?
- Other hearing interventions
  - Cochlear implants
  - Ossesointegrated devices (OID)

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Why other patient populations & hearing interventions?

- Little is known about hearing levels in the large epidemiological datasets
  - Hearing loss is defined by various methods
  - Configurations of hearing losses are not well described
- Reported benefit from OIDs relate to similar reasons of why traditional hearing aids are important for age-related sensorineural hearing loss
  - Improved access to sound
  - Decrease in listening effort
  - Decrease cognitive load `
  - Improved speech perception
  - Improved quality of life
  - Improved memory

USF Pittman et al., Ear& Hearing, 2019; Lunner et al, Ear&Hearing. 2016 46

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Why other patient populations & hearing interventions?

Want More Details?

AudiologyOnline!

Candidacy for a Bone Anchored Hearing System in the Adult Population

Course: #34973 | Level: Introductory | 1 Hour | ★★★★★ 67 Reviews

This course will provide an overview of the candidacy, evaluation process, and post-operative follow up for patients pursuing a bone anchored hearing system (BAHS). We will also briefly discuss some of the data on our single-sided deafness (SSD) study currently being conducted at Michigan Ear Institute.

Course created on June 9, 2020

Bone Conduction Implants and Middle Ear Devices

Presented By

Jaclyn Renker, AuD, CCC-A

Jackie Renker graduated from Central Michigan University where she completed her Bachelor of Science degree in 2013 and her Doctor of Audiology (Au.D.) degree in 2017. Along with state licensure, she also holds her Certificate of

Single-Sided Deafness (SSD): Application of CROS, Bone Anchored Implants, and Cochlear Implants

Course: #34989 | Level: Intermediate | 1 Hour | ★★★★★ 67 Reviews

There are a number of available hearing interventions for the treatment of single sided deafness (SSD). This course will cover the evidence for the different options as well as provide data-driven recommendations for clinical application.

Course created on June 23, 2020

Bone Conduction Implants and Middle Ear Devices | Cochlear Implants

Preview Exam

Presented By

Rene Gifford, PhD, CCC-A

René H. Gifford, Ph.D, CCC-A, is a Professor of Hearing and Speech Sciences and Otolaryngology at Vanderbilt University Medical Center. She is the Director of

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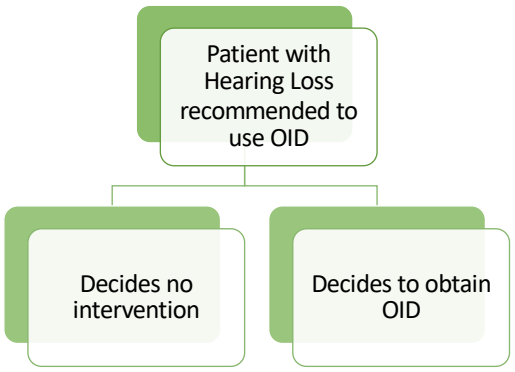
Observational Comparative Effectiveness Pilot Study: OID Use and Cognition

- **Design:** Observational Comparative Effectiveness Research
- **Study Population:** Adult patients with hearing loss that could benefit from OID hearing intervention.
  - Conductive, Mixed, or Single-sided Deafness
- **Primary Objective/Purpose:** Evaluate the hearing, quality-of-life, and cognition with OID hearing intervention among patients who could vs. do utilize an OID.



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OID Use and Cognition: Outcomes

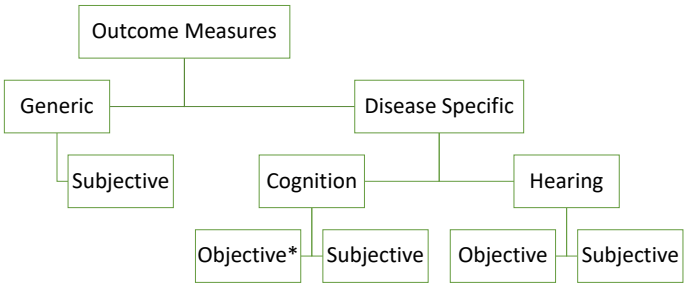
- **Study Schedule:** Participants will be asked to complete a screening visit and up to 11 study visits.

Assessment	Screening	Baseline	Intervention & Follow-Up Visits									
	Visit 0	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Visit 9	Visit 10	Visit 11
	(Day -31 to Day 0)	Day 0	W1-3	W3-5	W6-8	W8-10	6mo	12mo	18mo	24mo	30mo	36mo
			A	B	C	D		Yr1		Yr2		Yr3
1. Informed Consent	X	X										
1. Demographics		X										
1. Health History Form		X						X		X		X
1. Activities of Daily Living	X							X		X		X
1. WRAT		X										X
1. Audiometric Assessment (SOC)	X							X		X		X
1. Neurological Test Battery (Primary Outcome)		X					X	X	X	X	X	X
1. Neurological Interview		X					X	X	X	X	X	X
1. Questionnaires		X					X	X	X	X	X	X
1. Adverse Event Assessment/Unanticipated problems		X					X	X		X		X
OID Hearing Intervention Participants Only – All Standard of Care (SOC) Procedures												
1. Client-Oriented Scale of Improvement (SOC)		X	X	X	X	X	X	X	X	X	X	X
1. Word Recognition in Quiet and Noise – Aided (SOC)			X			X		X		X		X
1. In-Situ Bone Conduction Audiometry (SOC)			X				X	X	X	X	X	X
1. OID Data Log (SOC)				X	X	X	X	X	X	X	X	X
1. International Outcome Inventory for Comprehensive Intervention (SOC)						X	X	X	X	X	X	X

OID Use and Cognition: Outcomes

- **Study Schedule:** Participants will be asked to complete a screening visit and up to 11 study visits.
-

ACHIEVE Hearing Intervention: Outcomes



* Primary Outcome – Neurocognitive Battery

…. Stay tuned, study starting this fall!

Summary: Hearing Intervention & Cognition

- The aging population
  - High prevalence of dementia
  - High prevalence of hearing loss
- Association between hearing loss and cognition
- Need clinical trials to determine the mediating effect of hearing intervention on cognitive decline and dementia
- Implications on healthcare policy and healthcare reform

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This is the end of the presentation…. Thank you!

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