

# Benefit of Early Intervention of Age-Related Hearing Loss

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# BACKGROUND

- Age related hearing loss begins in the third decade of life, *gradually* decreases with age and is often overlooked in its early stages.
- Even after people become aware of their hearing loss they can be reluctant to seek help.
- It takes on average 10 years from awareness of hearing problems to seeking treatment.
- Untreated hearing loss has been linked to depression, withdrawal from social situations, impaired memory, reduced job performance, and lower household income (NCOA, 1999; Kochkin, 2005).

## Hearing Aids are the **Primary Intervention** for Age-related hearing loss

- Only 20% of adults who could benefit from hearing aids use them (Kochkin, 2009).
- Only 15% of hearing-impaired adults in their fifties who could benefit from hearing aids use them (Lin, 2012).

# PURPOSE

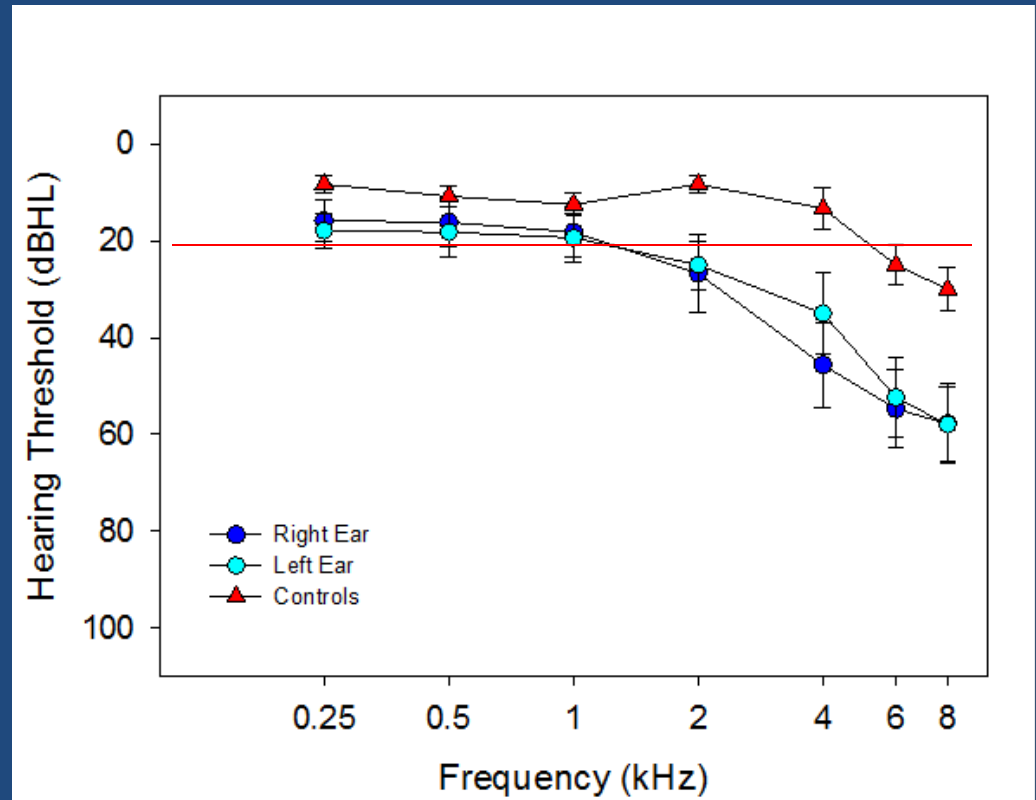
1. Does wearing hearing aids during the early stages of an age-related hearing loss reduce the cognitive and psychosocial consequences of the hearing loss?
2. Can wearing hearing aids during the early stages of an age-related hearing loss change a person's attitudes towards hearing aids?

# PROCEDURE: Overview of Measures

1. Hearing test: bone and air conduction thresholds
2. Fit hearing aids: RIC hearing aids
3. Practical Hearing Aids Skills Test (PHAST-R)
4. Cognitive tests of working memory:  
Auditory n-back and Auditory Reading Span test
5. Subjective questionnaires: Hearing Handicap Questionnaire (HHQ); Hearing Aid Attitude Questionnaire (HARQ); International Outcome Inventory for Hearing Aids (IOI-HA)

# Participants

- 19 hearing-impaired adults 47-73 years of age (mean = 63, SD = 7.6)
- Participants never wore or tried a hearing aid before
- *Hearing Loss Criteria: Two out of three* thresholds must be
  - > 26 dB at 2 kHz,
  - > 30 dB at 3 kHz,
  - > 35 dB at 4 kHz**OR one threshold** > 40 dB at 2, 3 or 4 kHz
- Control Group: 5 normal-hearing adults (53-61 years of age, mean = 57, SD = 2.6)



# Hearing Aids

- Receiver in the canal hearing aids (ReSound Alera 9), bilaterally, and asked participants to wear them every day for six weeks.
- Hearing aids were programmed using DSL v.5 fitting algorithm.
- Insertion gain for an input signal of 70 dB SPL was within 5 dB across the prescribed values for .25, .5, 1, and 2 kHz, and within 10 dB for 4 kHz and 6 kHz.

# ***Practical Hearing Aid Skills Test Revised (PHAST-R) (Doherty & Desjardins, 2012)***

- Objective measure of how well a person is able to correctly use and care for their hearing aids. Quickly identifies the hearing aid tasks the person needs to be re-counseled on.
- Includes 8 items to assess basic hearing aid skills taught during hearing aid orientation.
- Clinicians rate the hearing aid user's performance on each of the 8 PHAST-R tasks.





# COGNITIVE TESTS of Working Memory

1. *Auditory Reading Span Test* R-SPIN Sentences (Daneman and Carpenter; Pichora-Fuller et. al, 1995)



Present a sequence of 2, 4, or 6 sentences in quiet and in noise. After each sentence, participant repeats it back.

After ALL sentences are presented, experimenter says “RECALL” Participant repeats back only the FINAL word from each sentence.

Example of 4 span in + 8 dB SNR (speech shaped noise)  
(e.g., RISK, SPOON, CRACK, RAG)

# COGNITIVE TESTS of Working Memory cont.

## 2. Auditory N-back Test (N-backer) (Monk et. al., 2011)

Randomly present digits 1 – 9

Ask the subject to repeat 1 digit back from the last digit they heard in a 1 back or 2 digits back for the 2-back

### **Example: 1 back**

Present 5, 2

Response is 5

### **2 back**

Present 3, 6, 1

Response is 3

# Subjective Questionnaires

1. Hearing Handicap Questionnaire (HHQ); (Gatehouse & Noble, 2004),

- 12 question standardized self-assessment tool designed to assess hearing handicap

*How often does your hearing difficulty restrict things you do?*

*Never, Rarely, Sometimes, Often, or Almost Always*

## 2. Hearing Aid Attitude Questionnaire (HARQ) (Hallam & Brooks, 1996)

40 questions to assess an individual's attitudes and emotions towards wearing hearing aids.

HA Stigma: *From what I know, hearing aids don't help a great deal. True, Partly true, or Not true*

Minimization of Hearing Loss: *Difficulty in hearing is not of major concern to me at the moment. True, Partly true, or Not true*

Aid Not Wanted: *I don't really want a hearing aid. True, Partly true, or Not true*

### *3. The International Outcome Inventory for Hearing Aids (IOI-HA) (Cox and Alexander 2002)*

7 item questionnaire designed to assess the effectiveness of hearing aid treatments.

*Think about the situation where you most wanted to hear better, before you got your present hearing aid(s). Over the past two weeks, how much has the hearing aid helped in those situations?*

*Not at all, Slightly, Moderately, Quite a lot, or Very much*

## Timeline of Study

- Testing took place over 8 weeks
- 5 lab visits
- 3 phone calls

## SESSION 1 (week 0)

- Hearing test
- Hearing Handicap Questionnaire (HHQ)
- Hearing Aid Attitude Questionnaire (HARQ)

## SESSION 2 (week 1)

- Un-Aided Cognitive testing
- **Hearing Aid Fitting and PHAST-R**

## PHONE CALL 1 (week 2)

- IOI-HA

## SESSION 3 (week 3)

- PHAST-R
- Aided N-Back Test

## PHONE CALL 2 (week 4)

- IOI-HA

## PHONE CALL 3 (week 5)

- IOI-HA

## SESSION 4 (week 6)

- HHQ, HARQ, IOI-HA
- Aided Cognitive Testing
- PHAST-R
- **Participant Returns Hearing Aid**
- Unaided N-Back Test

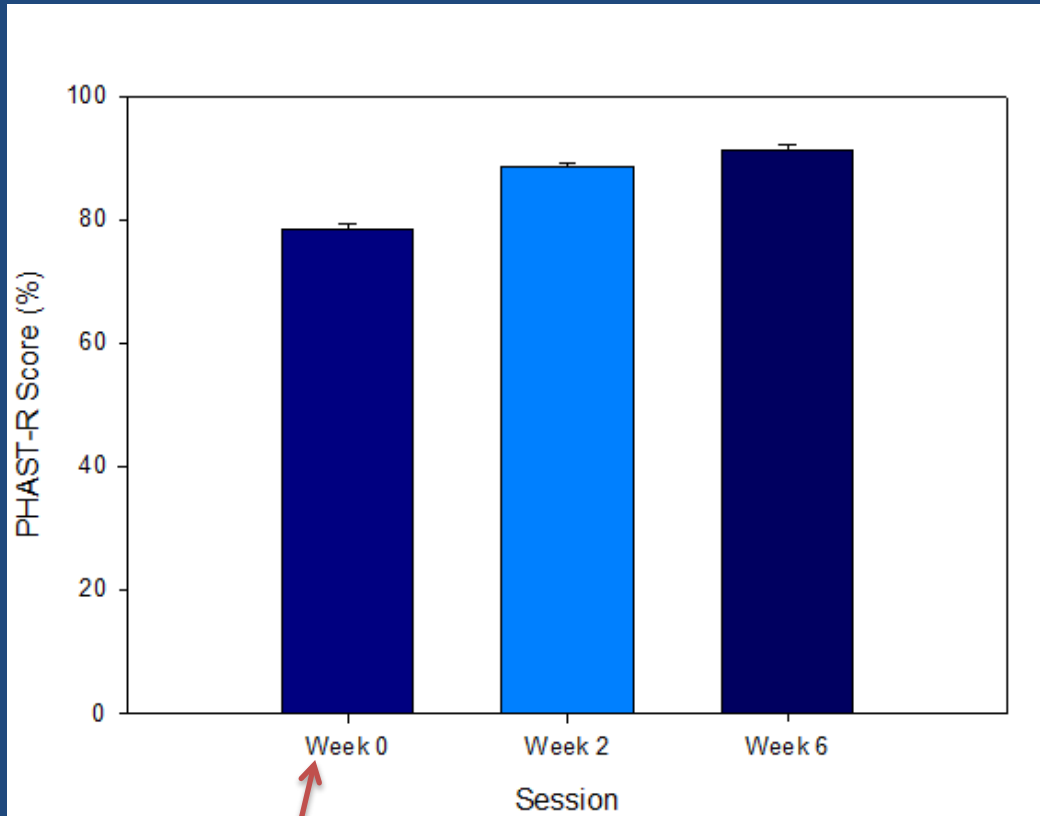
## SESSION 5 (week 8)

- Unaided N-Back Testing
- HARQ

# RESULTS



# PHAST-R



Hearing Aid  
Orientation

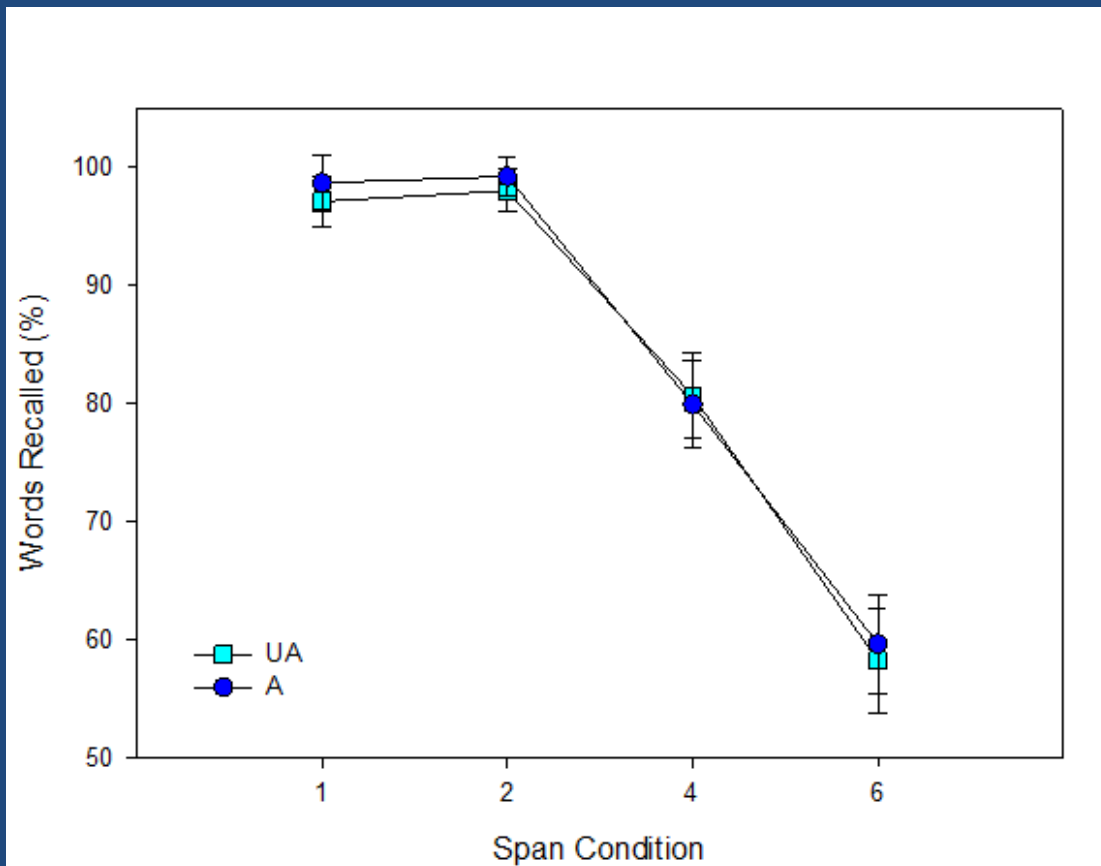
## Most Common Problems

1. Changing the battery (i.e., opening battery door, placing battery in compartment,
2. Inserting Aid
3. Using program button for noise

## HOURS OF USE PER DAY

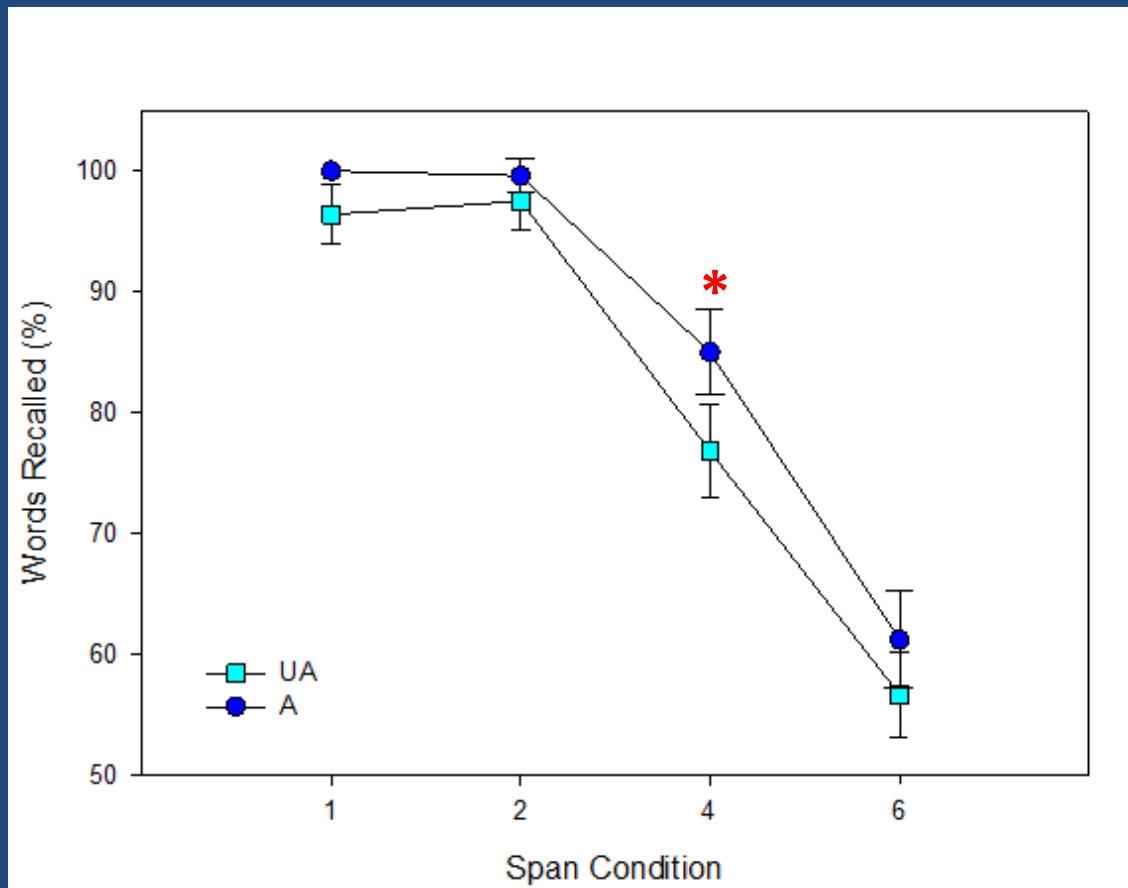
- **Mean = 12 hrs (SD = 5.5)**

# Reading Span Test Aided vs. Unaided in Quiet



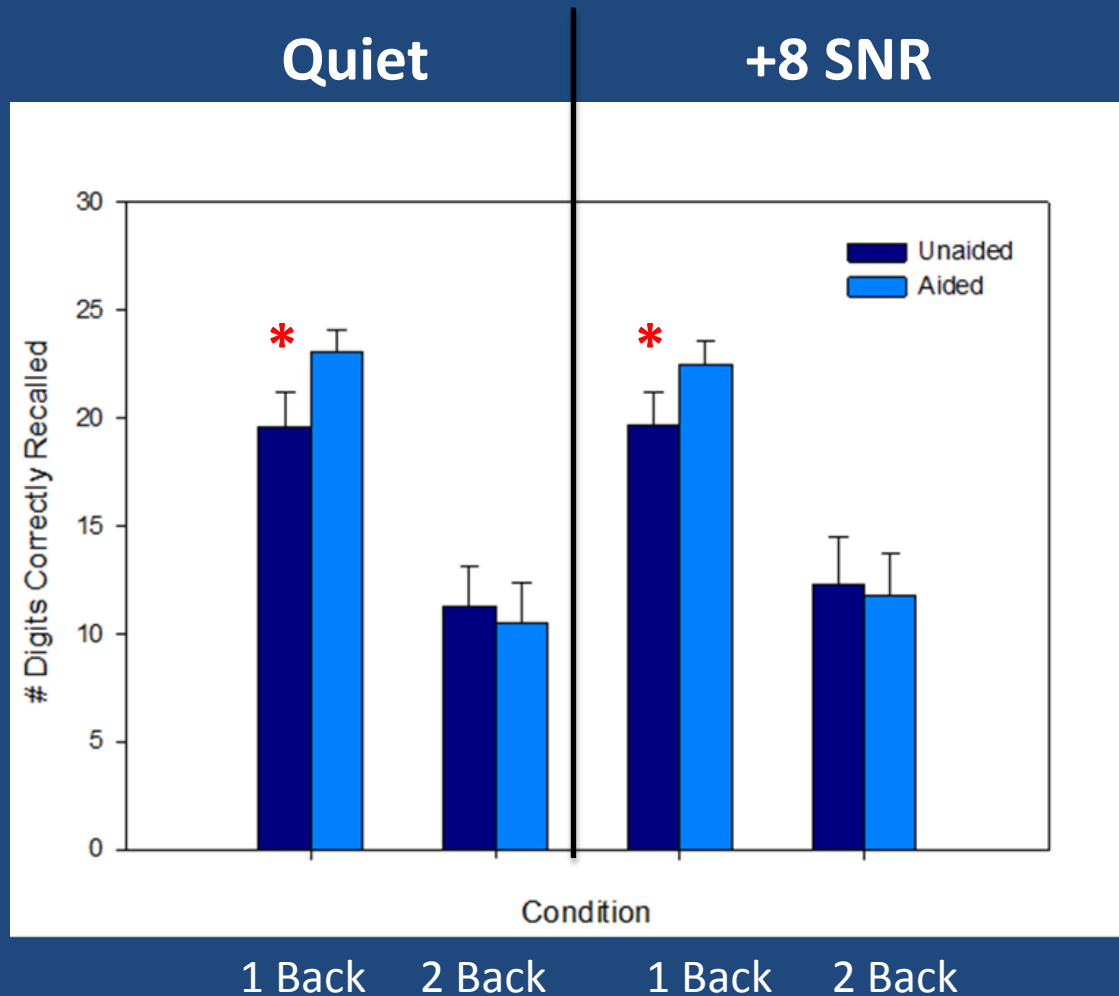
# Reading Span Test

## Aided vs. Unaided in Noise (+8 dB SNR)

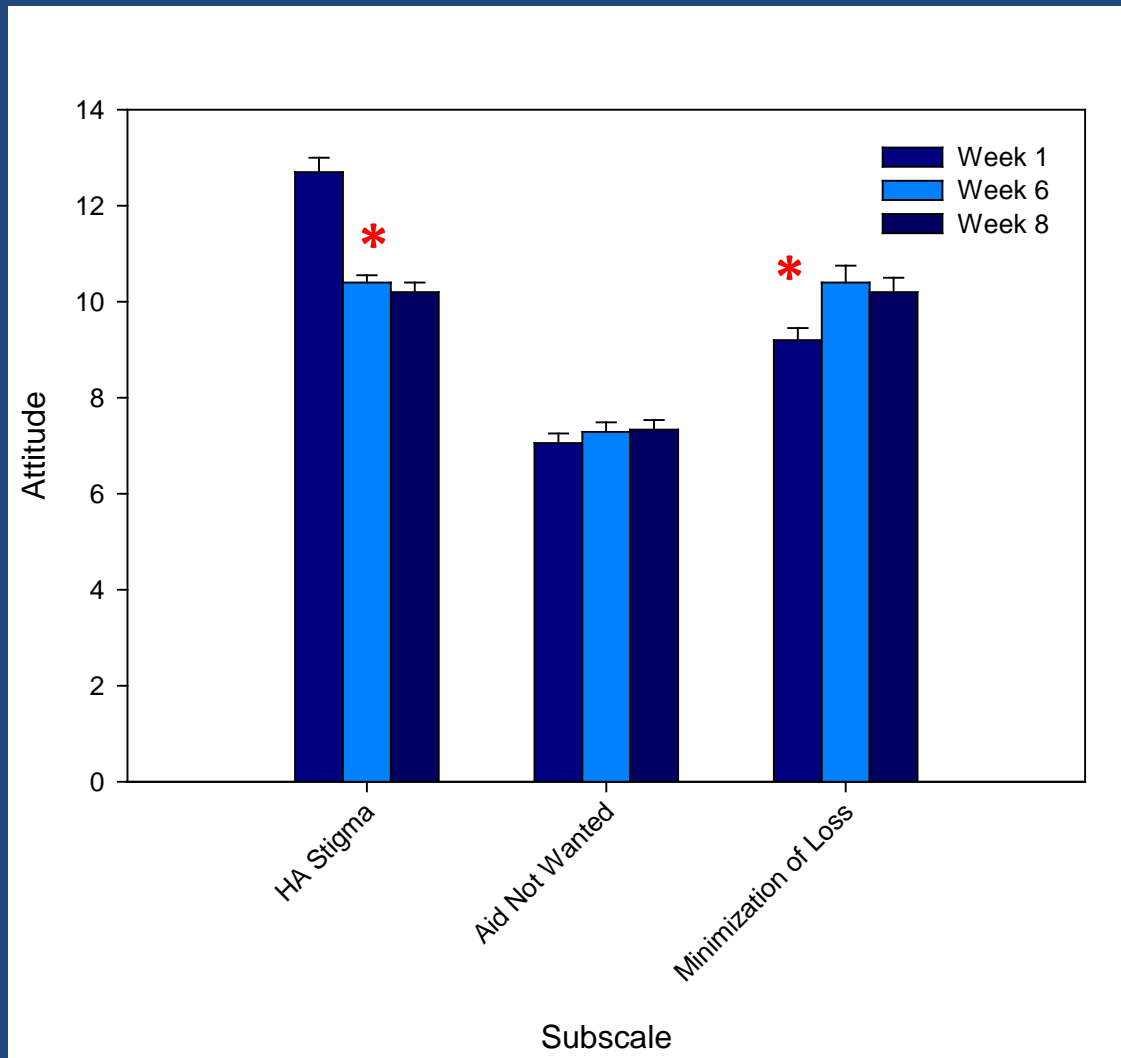


# Auditory N-Back Test

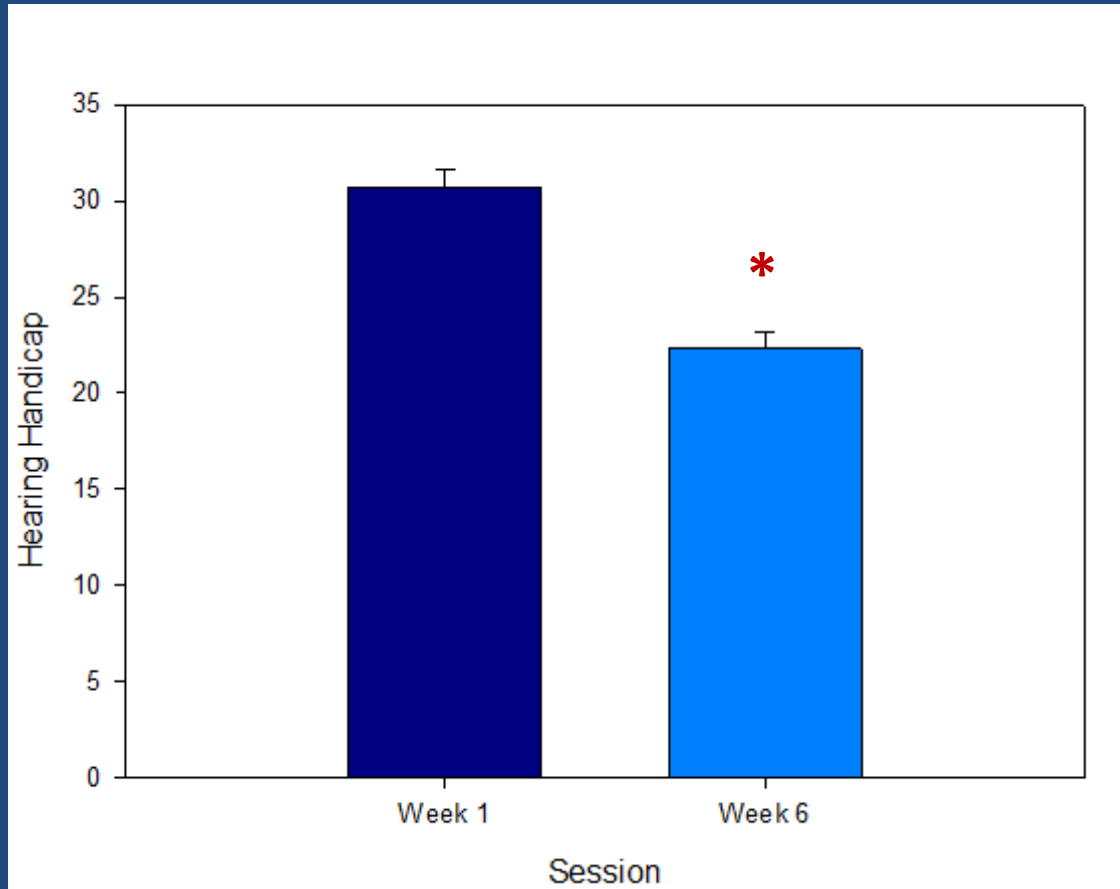
## Unaided vs. Aided in Quiet and Noise



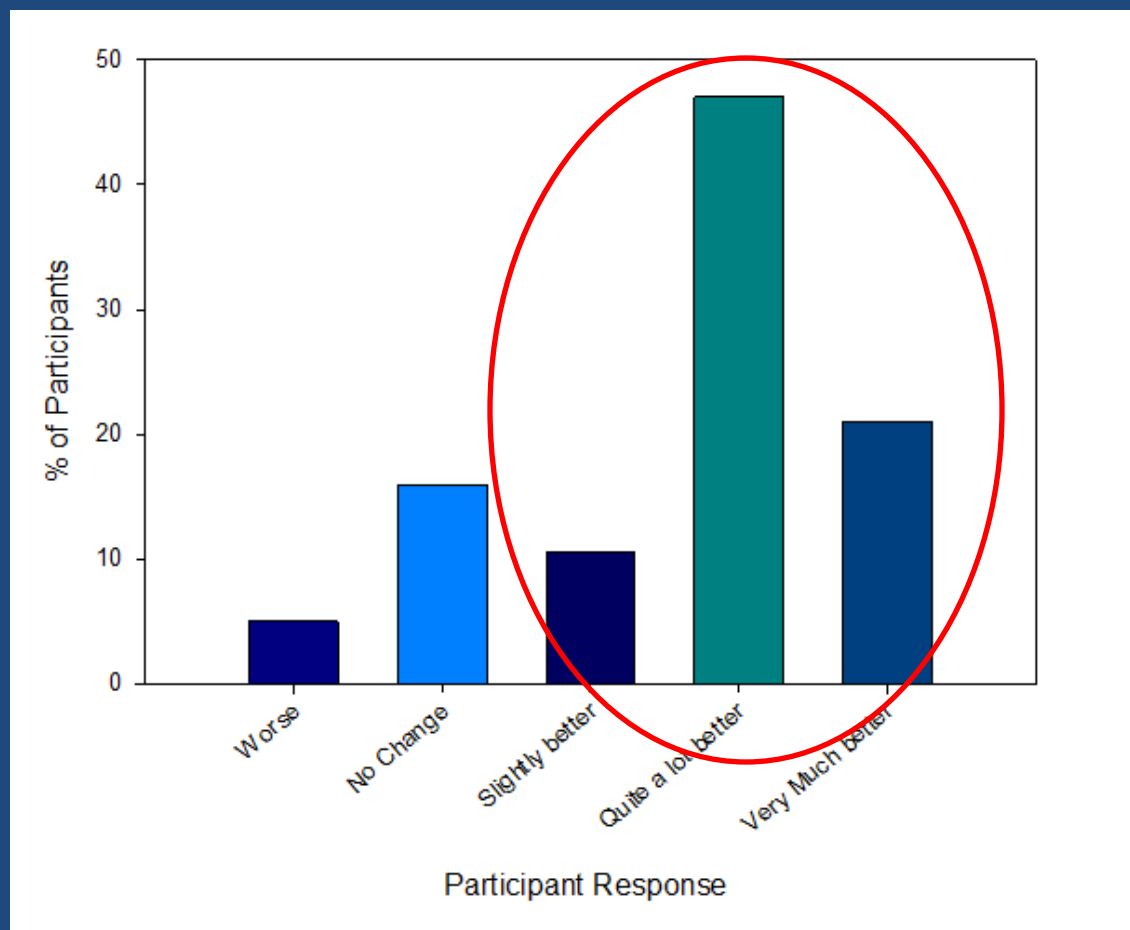
# HEARING AID ATTITUDES IN REHABILITATION QUESTIONNAIRE (HARQ)



# HEARING HANDICAP QUESTIONNAIRE (HHQ)

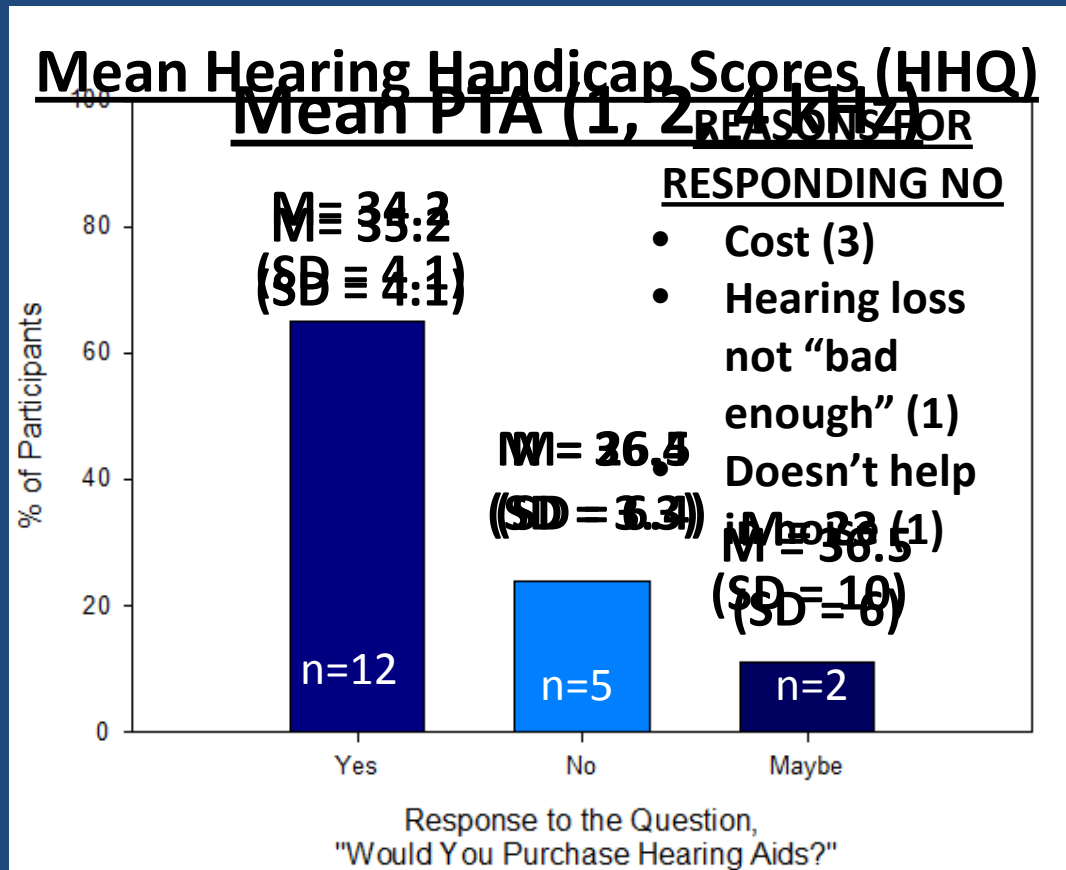


At end of 6 weeks response to question #7 on IOI- HA  
"Considering everything, how much has your present hearing aid(s) changed your enjoyment of life?"

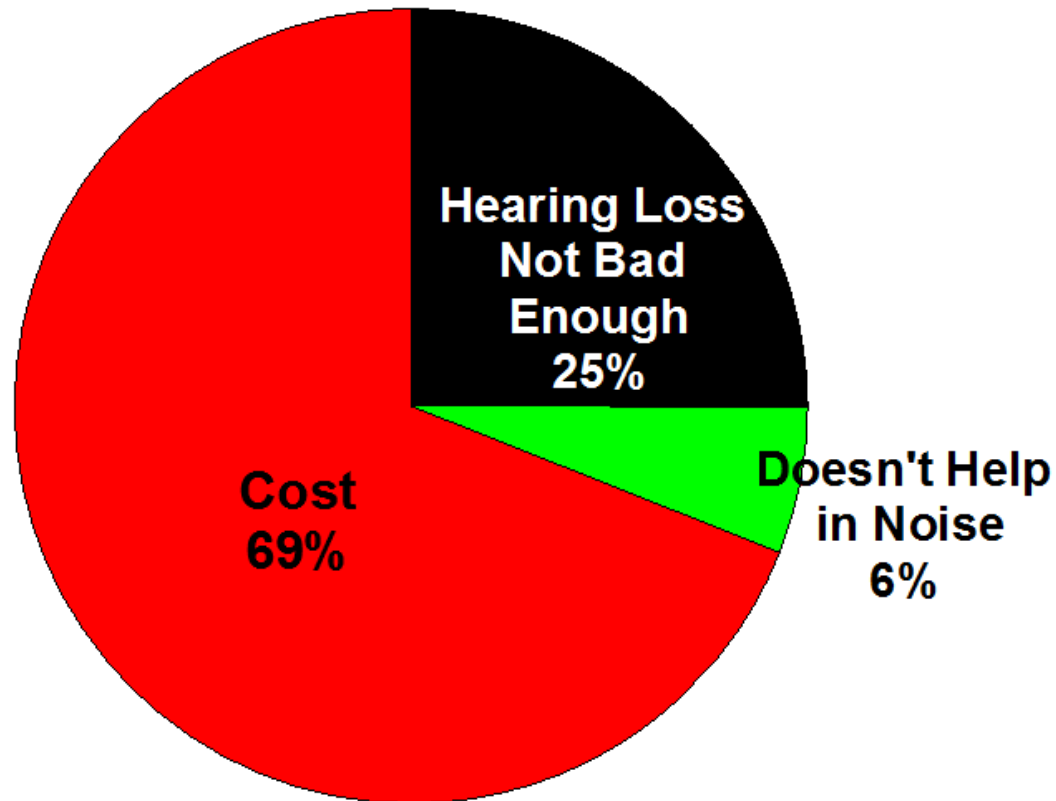




# WOULD YOU PURCHASE HEARING AIDS? (asked at last session - 8 weeks)



# POTENTIAL LIMITATIONS FOR OBTAINING A HEARING AID



# CONCLUSIONS

- 1) Working memory in quiet *and* noise is significantly improved while wearing hearing aids.
- 2) Wearing hearing aids for 6 weeks significantly reduced hearing aid stigma and hearing handicap.
- 3) 80% of participants' reported that wearing hearing aids for 6 weeks "*improved their enjoyment of life*".
- 4) 63% of participants reported that they would purchase a hearing aid after using hearing aids for 6 weeks.

# SUMMARY

- ❖ Using hearing aids in the early stages of age-related hearing loss can;
  - ✓ a positive affect on a person's attitudes towards wearing hearing aids,
  - ✓ decrease hearing handicap,
  - ✓ and improve working memory in quiet and in noise.

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