Self-Reported Hearing Loss, Cognitive Performance, and Risk of MCI: Findings from the Wisconsin Registry for Alzheimer's Prevention

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BACKGROUND

- Individuals with **mild cognitive impairment (MCI)**[1,2] and dementia due to **Alzheimer's disease (AD)**[2,3] often exhibit auditory dysfunction
- To the extent that these auditory deficits precede MCI/AD diagnosis, they may be a risk factor for impending cognitive decline and incident impairment
- Although there is growing interest in the relationship between hearing and cognition in cognitively healthy individuals, most longitudinal studies have involved elderly adults[4,5]
- The protracted disease course of AD highlights the importance of identifying early risk factors that may increase the likelihood of developing impairments later in life

OBJECTIVES

- Determine the prevalence of **self-reported diagnosed hearing loss (dxHL**) in a cognitively healthy, late middle-aged cohort at risk for AD
- Evaluate whether dxHL at baseline is associated with poorer prospective cognitive performance and increased incidence of MCI at follow-up five years later

METHODS

Participants:

- N = 783 cognitively healthy, late middle-aged adults enrolled in the Wisconsin Registry for Alzheimer's Prevention (**WRAP**, see **Table 1**)
- At baseline, participants reported whether they had ever been diagnosed with hearing loss as part of a medical history questionnaire

Clinical and Neuropsychological Assessment

- Diagnosis of MCI rendered via multidisciplinary consensus conference
- Cognitive tests of interest:
  - Trail Making Tests A & B (**psychomotor speed and mental flexibility**)
  - WAIS-R Digit Symbol Substitution Test (**set switching**)
  - Mini Mental State Exam (**global cognitive functioning**)

Statistical Analyses

- Frequency distribution to assess prevalence of self-reported dxHL at baseline
- Linear regression to assess relationship between baseline hearing status and cognitive performance at baseline and follow-up visits
- Logistic regression to estimate risk of incident MCI as a function of baseline hearing status
- Both regressions were adjusted for age, sex, education, and baseline/follow-up interval

FIGURES & TABLES

Table 1. Participant characteristics at baseline.

Characteristic	no dxHL (n = 711, 90.8%)	dxHL (n = 72, 9.2%)
Baseline age, y, mean (SD)	57.6 (6.4)	61.0 (5.8)
Follow-up interval, y, mean (SD)	4.9 (0.7)	4.8 (0.6)
Standardized reading score, mean (SD)	107.9 (8.8)	**110.6 (7.5)**[a]
Female, %	74.0	**55.6**[b]
APOE ε4+, %	38.1	38.9

[a] Mann-Whitney U test, p<.05; [b] Pearson chi-squared test, p<.05

Figure 1. Main effect of baseline hearing status on cognitive performance.

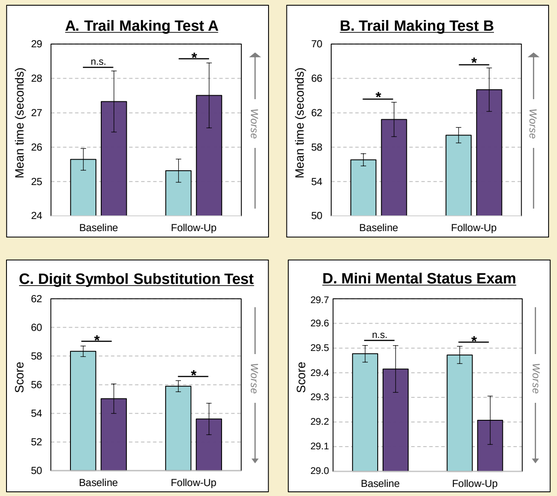
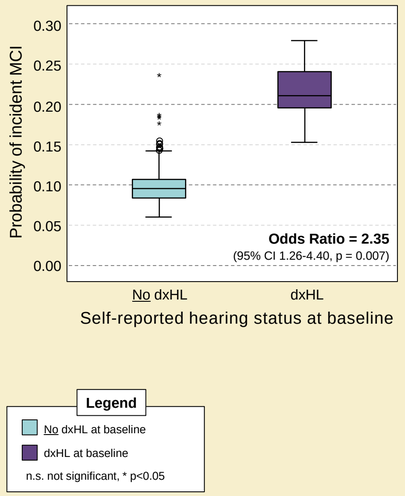


Figure 2. Main effect of baseline hearing status on risk of incident MCI



RESULTS & DISCUSSION

- Prevalence of self-reported diagnosed hearing loss (dxHL) at baseline was 9.2% (**Table 1**)
  - Considerably lower than hearing loss prevalence (~30%) reported previously for this age group,[6] likely due to self-report method
  - → *Suggests observed effects may be under-estimated and highlights the importance of obtaining objective auditory measures in this population in the future*
- Individuals with dxHL at baseline performed significantly poorer on multiple tests of speed and flexibility (**Figure 1A-C**) and global cognition (**Figure 1D**) at follow-up
  - However, group performance also differed on several measures at baseline (**Figure 1B,C**)
  - → *Further analysis required to determine whether rate of decline also differs between groups*
- dxHL at baseline was associated with an over two-fold increased risk of incident MCI at follow-up (**Figure 2**)

CONCLUSIONS

- Hearing loss among cognitively healthy, late middle-aged adults was prospectively associated with poorer cognitive performance and more than double the risk of developing MCI over 5 years
- Results add to growing body of evidence that hearing loss may be a risk factor for MCI and thus identifying and treating hearing loss may help reduce the burden of AD
- Further studies, using objective auditory measures and biomarkers of AD pathology, will be necessary to clarify the nature of these associations

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