# Association of Hearing Loss and Cognition Among Older Indians

**[1]Matthew Van Leeuwen, BS,**
**[2]Nicholas Reed, AuD, PhD**

[1]NYU Grossman School of Medicine
[2]NYU Langone Health

## INTRODUCTION

Several recent studies from the U.S. and Western Europe suggest hearing loss, measured by pure tone audiometry, is linked to cognitive decline in older adults. Global data remains limited, and studies often rely on potentially biased self-reported data that could over- or underestimate an association. We analyzed newly collected pure tone audiometry data from a large, nationally representative study of older adults in India to explore an association between hearing loss and cognition in this population.

## METHODS

The Harmonized Diagnostic Assessment of Dementia for the Longitudinal Aging Study in India (LASI-DAD) collects data on cognition and health among Indians over 60. In wave 2 (2022-2024), pure-tone audiometry was conducted and validated by Johns Hopkins audiologists. Hearing loss was categorized using pre-2021 WHO criteria (see Table 1). Cognitive function was evaluated using both global and domain-specific scores in memory, executive functioning, language, visuospatial abilities, and orientation based on instruments designed for comparison to the U.S. Health and Retirement Study.

We used descriptive statistics and multivariate linear regression, considering demographic, socioeconomic, and health-related factors, to examine the relationship between hearing and cognition. Our multivariate regression models included:

- **Model 1**: Hearing loss and demographic characteristics [age, sex, religion, caste, marital status].
- **Model 2**: Model 1 plus socioeconomic factors [education, literacy, urbanicity].
- **Model 3**: Fully adjusted for demographics, socioeconomic factors, and health conditions [hypertension, diabetes, stroke, heart disease, smoking, BMI].

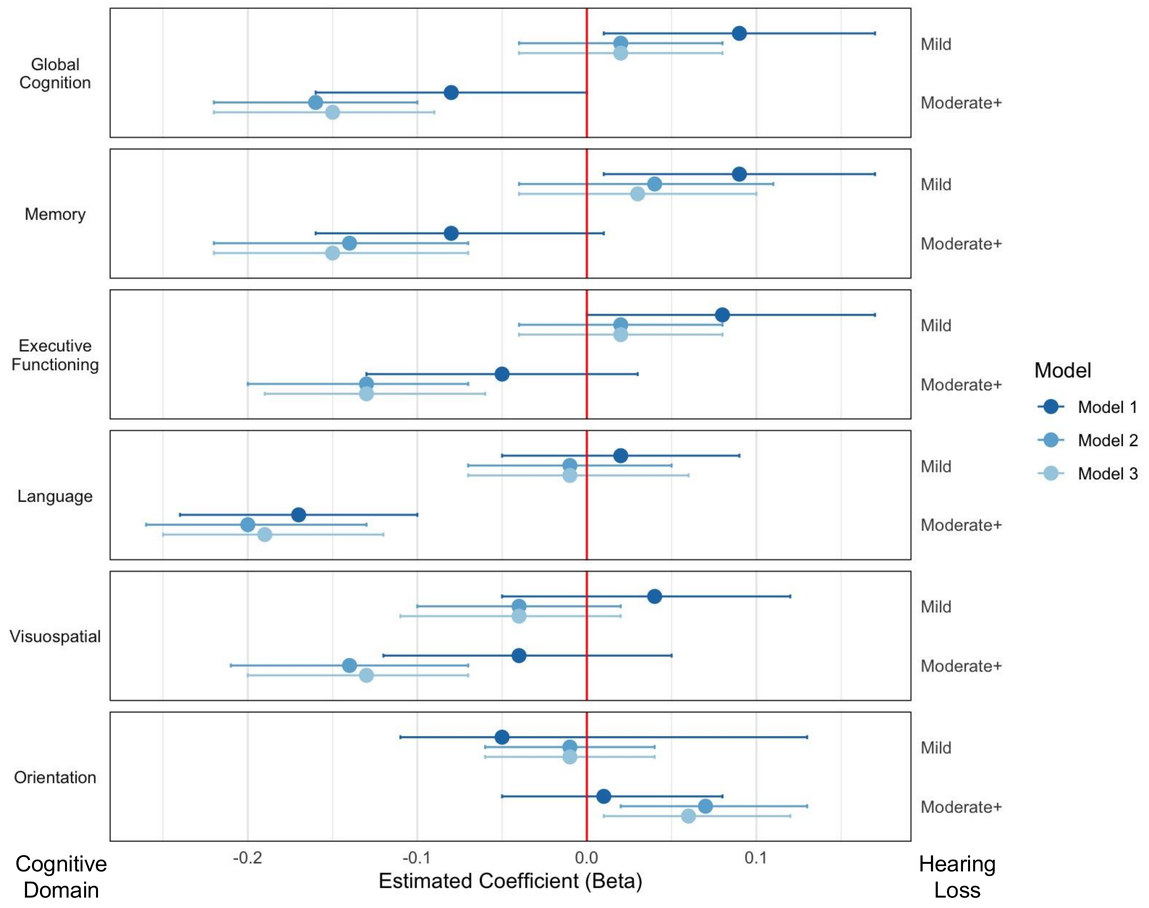


Figure 1: Plot of estimated coefficient (beta) from multivariate models, organized by cognitive domain (global cognition, memory, executive functioning, language, visuospatial, and orientation) and level of hearing loss (mild vs. moderate+). Error bars represent 95% confidence interval.

## RESULTS

Among 3406 participants (mean age 69.4 years), 506 had no hearing loss, 1465 had mild hearing loss, and 1435 had moderate or greater hearing loss. Those with hearing loss were more likely to be male, less educated, in poorer health, and urban residents. Fully adjusted models showed moderate hearing loss was linked to lower global cognitive scores **(β= -.15; 95%CI= -.22:-.07),** but mild hearing loss was not **(β= .03; 95%CI= -.04:.10).** Moderate hearing loss correlated with lower scores in memory, executive function, visuospatial, and language domains, but not orientation. Similar results were found when hearing loss was measured continuously.

## CONCLUSION

In a nationally representative sample of older adults in India, only moderate hearing loss was linked to poorer cognitive scores, differing from U.S. studies showing a more linear dose-response association. Further investigation in the LASI-DAD sample and replication studies are needed to better understand how hearing impacts healthy aging in India and other countries.

| Grade of Impairment | Corresponding Audiometric ISO Value | Performance |
|---|---|---|
| 0 (no impairment) | 25 dB or better | No or very slight hearing problems. Able to hear whispers |
| 1 (mild) | 26–40 dB | Able to hear and repeat words spoken in normal voice at 1 meter |
| 2 (moderate) | 41–60 dB | Able to hear and repeat words using raised voice at 1 meter |
| 3 (severe) | 61–80 dB | Able to hear some words when shouted into better ear |
| 4 (profound) | 81 dB or greater | Unable to hear and understand even a shouted voice |

Table 1: Pre-2021 WHO grades of hearing impairment. ISO: International Organization for Standardization. Audiometric values were measured in the better ear, using an average of 500, 1000, and 4000 Hz.

Corresponding Author: Nicholas Reed, AuD, PhD

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**Department of Otolaryngology – Head and Neck Surgery**

NYU Langone Health