

EPIDEMIOLOGY

NIH Toolbox-Cognition performance of older persons with normal hearing, cochlear implant candidates, and cochlear implant users

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Abstract

Background: A history of hearing loss is associated with lower scores on cognitive tests, as well as with incident Mild Cognitive Impairment and Alzheimer's disease. In order to compare hearing adaptation in older age, we used iPad-based testing to assess older healthy controls and older persons with two distinct approaches to hearing correction: one group with cochlear implants and another comprised of individuals with hearing aids awaiting cochlear implants. Speech recognition in noise is a common measure of hearing accuracy and reflects effectiveness of both hearing aids and implants. We expected to find that better speech recognition scores would relate to higher levels of cognitive performance across the groups.

Method: Participants were 54 individuals over 65 years of age (cochlear implants, n = 28; implant candidates using hearing aids n = 12; and normal hearing, n = 14), recruited through the University of Michigan Medical Center. All participants completed a speech in noise task and the NIH Toolbox-Cognition battery (NIHTB-CB) adapted for individuals with hearing loss. All scores from the NIHTB-CB were corrected for education, age, race, and gender.

Result: For speech recognition, all groups performed significantly differently from each other ($F = 57.408$, $p < 0.001$), with the normal hearing group performing the best and the pre-implant group performing the worst. For NIHTB-CB scores, the only difference found was lower performance for the cochlear implant group compared to the normal-hearing group on the Picture Vocabulary subtest ($F = 3.417$, $p = 0.041$). Duration of hearing loss was not correlated with cognitive performance on any of the tasks.

Conclusion: Overall, as expected, there were significant differences between groups on speech recognition. However, controls and all groups with hearing loss performed essentially equally well on all aspects of the adapted NIHTB-CB. This suggests that in cases where hearing is partially corrected with a hearing aid or cochlear implant and tests are adapted for patients with hearing loss, group differences in cognition are not clearly evident, even when groups differed in speech perception. We hypothe-

sized that duration of hearing loss may have driven the differences noted in vocabulary knowledge, however this was not supported in the results.

Supported by NIH#R01DC015809-03S1 and P30AG072931.