

Title: Lower General Cognitive Function is Related to Elevated Low-Frequency Thresholds and Poorer Dichotic Listening in Older Adults

Authors: Jacqueline M. Eberhard[#], Lois J. Matthews, Kenneth I. Vaden Jr., Judy R. Dubno, Mark A. Eckert^{*}

Lower general cognitive function is frequently reported in older adults with elevated pure-tone thresholds. This relationship may be due to age-related speech recognition difficulties that occur with declines in the peripheral and central auditory system. The present study examined the extent to which: 1) Mini-Mental Status Exam (MMSE) performance was related to pure tone thresholds in a relatively large cross-sectional sample (N=508; 63% female; 60.05-89+ years; MMSE mean=28.47, sd=1.51; mean 250 Hz threshold=16.68 dB HL, sd=10.03; mean 8000 Hz threshold=58.41 dB HL, sd=22.08); and 2) that association could be explained by speech recognition difficulties. Measures of speech recognition included the Northwestern University Auditory Test No. 6 (NU-6) of monosyllabic words in quiet, Speech Perception in Noise (SPIN) low context sentences, and the dichotic Staggered Spondaic Word (SSW) test. Hierarchical regression was used to examine the association between total MMSE performance and low and high frequency threshold constructs that were computed from the pure-tone thresholds (250 Hz to 8000 Hz). Across participants, lower MMSE performance was observed when low- and high-frequency hearing thresholds were elevated, including when education level was included in the model (low-frequency $p < 0.001$; high-frequency $p < 0.01$; education $p < 0.001$). The high-frequency association was no longer significant when participant age was included in the model (low-frequency $p < 0.005$; high-frequency $p > 0.10$; age $p < 0.05$). The low-frequency association was most pronounced in females (females: low $p < 0.001$; males: low $p > 0.10$), who had significantly elevated low-frequency thresholds compared to males ($p < 0.001$). Within females, the low-frequency threshold association with total MMSE performance was not dependent on the NU-6 and SPIN scores. The low-frequency threshold association with MMSE performance was diminished but remained significant ($p < 0.05$) when the number of SSW errors was included in the regression. SSW errors were more pronounced with lower MMSE performance for females ($p < 0.001$) and males ($p < 0.005$), after accounting for the low-frequency threshold and demographic variables. Hearing thresholds accounted for, at most, ~5% of the variance in MMSE performance. Although the selective attention and attention switching demands of the SSW may explain the association with MMSE performance, the reason(s) for modest associations between low-frequency thresholds and MMSE performance remain unclear.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Contact Information: eckert@musc.edu, 00-1-843-792-5914

Affiliations: Hearing Research Program, Department of Otolaryngology – Head and Neck Surgery, Medical University of South Carolina, Charleston, SC, USA; Department of Psychology, College of Charleston, Charleston, SC, USA

Acknowledgement of Funding Sources: NIH/NIDCD P50 DC00422, NIH/NCATS UL1 TR001450, NIH/NCRR C06 RR014516

Poster Only