Hearing Healthcare and Cognition

A summary of the latest research on hearing and cognition, plus what it means for your clients.

Douglas L. Beck AuD
Vice President of Academic Sciences
Oticon Inc

What does cognition have to do with hearing and listening and hearing care professionals? Quite a lot.

Myklebust (1949) noted clinical psychology has an important contribution to make within hearing healthcare. He stated there are clinical and research problems in psychological evaluation which are in "urgent need of mutual investigation by clinical psychology and audiology." Clearly, as some people age and progress into later-life, they acquire hearing loss and their cognitive abilities tend to slow down. Many people simply attribute reductions in cognitive ability and hearing to aging, and perhaps that's correct, sometimes.

However, there are many people with stellar cognitive skills and normal audiometric thresholds in their 70s, 80s and 90s. Thus, "aging" is not a non-negotiable etiology of these

reductions. Beck, Bant and Clarke (2020) reported four hypotheses which may help explain why hearing loss and cognitive decline often co-occur, including 1- Common Cause, 2- Cascade via Social Effects, 3- Cascade via Auditory Deprivation and 4- Cognitive Load. Aging is not among the four, although aging is certainly not irrelevant.

Gillis, Mirzaei, Potashman and colleagues (2019) reported Mild Cognitive Impairment (MCI, a noticeable decline in cognitive ability, which does not impact daily functioning) does place the individual at a higher risk to develop Alzheimer's Diseases (AD). They reported approximately half the people with MCI, ages 58 years and older, have underlying AD pathology. Although the numbers vary widely, the Alzheimer's Association estimates that 15% of people over age 60 years have MCI (www.alz.org accessed September 30, 2021) and the prevalence of MCI increases with age. Alzheimer's Disease (AD) is the most common form of dementia. The American Alzheimer's Association (www.alz.org 2020) reports more than 6 million Americans age 65 and over have AD, and 72% of them are age 75 years and older. Of note, almost two-thirds of the AD patients in America are women. Older Black Americans are twice as likely to have AD as older White Americans and older Hispanics are about 1.5 times more likely to have AD than White Americans. Of note, age is the greatest risk-factor for AD. For those aged 65-74 years, the incidence of AD is 3%, of those aged 75-84 years the incidence is 17%, and for those over age 85 years, the incidence of AD is 32%.

Amieva, Ouvrard, Guiliolo and colleagues (2015) investigated the relationships between hearing loss, hearing aid use and cognitive decline. Their study involved 3,670 participants ages 65 years and older over a 25-year period. A self-report questionnaire determined baseline performance. 137 participants had severe hearing loss, 1139 reported moderate hearing loss and 2,394 reported no hearing loss. The Mini Mental State Examination (MMSE) was used to assess global cognitive performance. The authors performed multiple analyses examining hearing loss, hearing aid use and MMSE scores, as well as the effect of hearing aids regarding additional cognitive decline, and confounding factors such as depression, social isolation, comorbidities, dementia and more. Their results indicated hearing loss was associated with cognitive decline, as people with hearing loss had lower MMSE scores than those who did not report hearing loss. They reported no MMSE difference between those who reported no hearing loss and those who reported hearing loss and wore hearing aids. However, and of importance, their analysis which considered confounding factors such as depression, social isolation, comorbidities, dementia and more, did not find a cognitive difference among participants based on self-election of hearing loss or hearing aid use. The authors stated hearing aid use may impact long-term cognitive decline. However, they noted self-reports of hearing loss and cognitive decline may be mitigated by social isolation and depression, and there may be no direct effect on cognitive decline due to hearing loss. That is, they posited that hearing aids may be beneficial because they alleviate communication difficulties and improve mood and facilitate improved communication, thereby reducing social isolation and depression. In essence, the Amieva, Ouvrard, Guiliolo and colleagues (2015) report was extraordinary due to the large number of participants, the 25-year longitudinal analysis and the important observations offered. However, there was no distinction among the 3,670 participants as to who had objective audiometric hearing loss (there are 38 million people with audiometric hearing loss in the USA) versus people with normal thresholds who had suprathreshold listening difficulty (an additional 26 million people without hearing loss have suprathreshold listening difficulty in the USA, see Beck and Danhauer, 2019). That is, the people who self-elected that they had hearing loss may have had hearing loss, or may have had suprathreshold listening difficulty without hearing loss, or both, or neither. Individuals generally cannot tell the difference. Of note,

Researchers suggest that "hearing aid use may impact long-term cognitive decline."

Continued on page 36

Continued from page 35

common causes of suprathreshold listening disorders include attention deficit disorder, attention deficit hyperactivity disorder, auditory processing disorders, auditory neuropathy spectrum disorder, cochlear synaptopathy, dementia, mild cognitive impairment, cognitive decline, poor working memory, traumatic brain injury, concussion, and more.

Livingston, Huntley, Sommerlad and colleagues (2020) stated that 60% of one's risk for dementia is due to deoxyribonucleic acids (DNA) and is therefore, non-modifiable. The other 40% risk is due to 12 modifiable risk factors (excessive alcohol, traumatic brain injury (TBI), air pollution, hearing loss, less education, hypertension, obesity, social isolation, diabetes, smoking, depression). The single largest modifiable risk factor is hearing loss, with a population attributable factor (PAF) of 8.2%. The authors report "hearing loss might result in cognitive decline through reduced cognitive stimulation."

O'Loughlin, Pavithra, Regan and colleagues (2021) report that fears of memory loss and dementia are the largest fears associated with aging. Unfortunately, prolonged fears can have harmful consequences even without pre-existing cognitive decline. Specifically, just the fear of dementia is associated with poorer health outcomes, reduced psychological well-being, and increased memory failures in adults.

REFERENCES:

www.alz.org (accessed September 30, 2021): Alzheimer's Association

www.alz.org 2020: Alzheimer's Association report. 2020 Alzheimer's Disease Facts and Figures. Alz-journals.onlinelibrary.wiley.com/doi/full/10.1002/alz.12068

Beck, Bant, Clarke (2020): Hearing loss and cognition: a discussion for audiologists and hearing healthcare professionals. Journal of Otolaryngology ENT Research. Volume 12 Issue 3 – 2020

Beck, DL. & Danhauer, JL. (2019): Amplification for adults with hearing difficulty, speech in noise problems - and normal thresholds. Journal of Otolaryngology ENT Research. Volume 11 Issue 1 - 2019

Gillis, C., Mirzaei, F., Potashman, M., Ikram, MA. & Maserejian (2019): The Incidence of Mild Cognitive Impairment: A systematic Review and Data Synthesis. Alzheimers Dement (Amst), December, 11:248-256

Livingston, G., Huntley, J., Sommerlad, A.,Amees, D., Ballard, C. et al (2020): Dementia Prevention, Intervention, and Care: 2020 Report of The Lancet Commission. Volume 396, August 8, 2020

Myklebust, HR. (1949): The Relationship Between Clinical Psychology and Audiology. Journal of Speech & Hearing Disorders. Jun 14. 14(2): 98-103

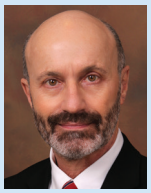
O'Loughline,P., Pavithra, P., Regan, J., Bennet, M., Knight, R., et. al.. (2021): A Randomized Controlled Trial Investigating the Feasibility of a Low-Intensity Psychological Intervention for Fear of memory Loss and Quality of Life in Plder Adults: Protocol for Reducing Fear and Avoidance of Memory Loss (REFRAME) Study. JMIR Res Protoc; 10(7): e30514

Ross B, Dobri S, Schumann A. Psychometric function for speech-in-noise tests accounts for word-recognition deficits in older listeners. J Acoust Soc Am. 2021 Apr;149(4):2337. doi: 10.1121/10.0003956. PMID: 33940923

All of which brings us back to the original question, "What does cognition have to do with hearing and listening and hearing care professionals?" The answer is that when a patient comes to see us and their primary complaint is "I cannot understand speech in noise," **we need to weigh all the possible intervening factors, and we should not automatically attribute an inability to understand speech-in-noise to presbycusis.**

The vast relationships and intricate co-dependencies across auditory processing disorders, specific language issues and cognition often present with a similar chief complaint and may masquerade as each other. Specifically, "I cannot understand speech in noise" might be due to hearing loss, or suprathreshold listening disorders, or dementia, mild cognitive impairment, or other cognitive issues. It could be none of the above, all the above, or some of the above. These anomalies are not silos. They exist and co-exist alone and in tandem. ■

Douglas L. Beck, AuD, Vice President of Academic Sciences, Oticon Inc.



Dr. Beck began his career at the House Ear Institute (LA) in cochlear implant research and intraoperative cranial nerve monitoring. Within a few years, he became Director of Audiology at St Louis University. Beck joined Oticon in 2005. From 2008 through 2015 he also served as Web Content Editor for the American Academy of Audiology (AAA). In 2016, he became Senior Editor for Clinical Research at the *Hearing Review* and Adjunct Clinical Professor of Communication Disorders & Sciences at the State University of New York at Buffalo. In 2019, he was appointed Vice President of Academic Sciences at Oticon. Dr. Beck is among the most prolific authors in audiology with 188 publications and more than 1250 abstracts, interviews and op-eds.