

## Research Forum

# Cognitive Decline and Hearing Health Care for Older Adults

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**Purpose:** The purpose of this article is to consider the implications of age-related cognitive decline for hearing health care.

**Method:** Recent research and current thinking about age-related declines in cognition and the links between auditory and cognitive aging are reviewed briefly. Implications of this research for improving prevention, assessment, and intervention in audiologic practice and for enhancing interprofessional teamwork are highlighted.

**Conclusions:** Given the important connection between auditory and cognitive aging and given the high prevalence of both hearing and cognitive impairments in the oldest older adults, health care services could be improved by taking into account how both the ear and the brain change over the life span. By incorporating cognitive factors into audiologic prevention, assessment, and intervention, hearing health care can contribute to better hearing and communication as well as to healthy aging.

The everyday functioning of older communicators with hearing loss may affect and be affected by co-occurring health conditions. Cognitive decline is arguably the comorbidity that looms largest in the minds of patients, audiologists, and policy makers. On the other hand, hearing loss is now of increasing interest to neuropsychologists, primary care physicians, geriatricians, nurses, and other health professionals whose usual focus is on cognitive loss. The quality of life and the quality of health care could be improved for many older adults by taking into account the connections between age-related declines in hearing and cognition and enhancing interprofessional teamwork. This article explores the need for new approaches to prevention, assessment, and intervention strategies for older adults with hearing loss who are at risk for or who already have dementia.

## Age-Related Cognitive Declines and Hearing Loss

Over the adult life span, there are gradual and age-related losses in cognitive processing (e.g., speed of information processing and some types of memory and attention) but gains in cognitive knowledge (e.g., vocabulary, world

knowledge, expertise; Park et al., 2002). It is important to note that age-related cognitive gains can be used to compensate for cognitive losses in healthy older adults (Craik & Bialystok, 2008), with associated changes in patterns of brain activation (Grady, 2012). Beyond normal age-related cognitive changes, clinically significant mild cognitive impairment (MCI) and dementia increase with age; about one fifth of people have a clinically significant cognitive loss by the age of 70 years (Yesavage et al., 2002). The prevalence of dementia increases from 5% in those aged 71 to 79 years to 37% in those aged 90 years and older, with an overall prevalence of approximately 14% for those over 70 years of age (Plassman et al., 2007). Recently refined diagnostic criteria for MCI and dementia (Albert et al., 2011; McKhann et al., 2011) recognize that there is a continuum, with MCI being an intermediary stage that often, but not always, progresses to Alzheimer's disease (AD). The rate of conversion from MCI to AD is about 10% to 15% per year, with about an 80% conversion rate after 6 years (Petersen et al., 2001)—much higher than the rate of only 1% to 2% per year for the general population (Petersen et al., 1999). AD is the most common form of dementia; it is a progressive and degenerative brain disease that is typically fatal within 10 years of diagnosis for those diagnosed by their early 70s (Brookmeyer, Corrada, Curriero, & Kawas, 2002).

Hearing loss also increases gradually with age; about one third of individuals have a clinically significant loss by age 65 years, about one half by age 75 years, and most by age 80 years (Yueh, Shapiro, MacLean, & Shekelle, 2003). Given the high prevalence of hearing loss in older adults

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and given that both hearing loss and cognitive loss increase in prevalence with age, it is reasonable to assume that cognitive problems are common in many of the oldest older adults who have hearing loss. In fact, dementia is more prevalent in people with hearing loss than in counterparts without hearing loss (Uhlmann, Larson, & Koepsell, 1986; Uhlmann, Larson, Rees, Koepsell, & Duckert, 1989). Epidemiologic research indicates that scores on tests of auditory central processing (Gates, Anderson, McCurry, Feeney, & Larson, 2011; Gates, Beiser, Rees, D'Agostino, & Wolf, 2002; Gates et al., 2010), and even audiometric thresholds (Lin et al., 2011a, 2011b, 2013), are associated with incident dementia. The risk of developing dementia is two to five times greater in individuals with hearing loss compared with peers with normal hearing (Lin et al., 2011a). With every 10 dB increase in hearing loss over 25 dB HL, there is a 20% increased risk of developing dementia (Lin et al., 2011b). In adults over 65 years of age, the mean time for developing dementia was 10.3 years in those with hearing loss at baseline versus 11.9 years for counterparts with normal hearing (Gurgel et al., 2014).

## Prevention

In light of the connection between age-related auditory and cognitive declines, questions are raised about what the mechanisms underlying the connection might be and if earlier or better hearing health care could stave off or slow down dementia (Lin et al., 2013; Pichora-Fuller, 2010). The popular "use it or lose it" view of cognitive aging has been supported by evidence that a range of lifestyle factors involving social, physical, or mental activity can help protect older adults from cognitive decline (e.g., Scarmeas & Stern, 2003). Such activity includes engagement in social leisure activities (e.g., Fratiglioni, Paillard-Borg, & Winblad, 2004), physical exercise and/or eating a Mediterranean-type diet (e.g., Scarmeas et al., 2009), or cognitive expertise such as being bilingual (e.g., Bialystok, Craik, & Freedman, 2007) or a musician (e.g., Hanna-Pladdy & MacKay, 2011). One possibility is that the relationship between hearing loss and incident dementia is mediated by lifestyle factors; for example, participation in social leisure activities is known to be related to good cognition but is compromised by hearing loss. Because AD has become a dominant global public health concern, rigorous research is needed to investigate the possibility that hearing rehabilitation could help stave it off or slow it down (e.g., by preventing social withdrawal).

## Assessment

Two issues of great practical concern are (a) to what extent hearing loss and/or noisy test environments undermine the accuracy of cognitive assessments and (b) whether audiologic practice could be improved by taking cognition into account when assessing client needs. It seems that interprofessional teamwork could help audiologists, neuropsychologists, physicians, and other health professionals better understand the differential and combined effects of hearing

loss and cognitive loss on task performance in the clinic and on functioning in everyday life.

As the population ages, more health professionals are administering cognitive screening tests more often to more patients in a wider range of settings. Most physicians administer cognitive screening tests when diagnosing dementia (Davey & Jamieson, 2004), but only a minority ask about hearing (Jorgensen, Palmer, & Fischer, 2014). Because cognitive tests often require the patient to hear instructions and respond to auditory stimuli, unless these tests are administered in a quiet environment using appropriate listening technology, cognitive abilities may be underestimated. Audiologists could help by providing information about the hearing abilities and needs of those who are undergoing cognitive testing so that the influence of hearing loss and/or noise on the results can be controlled and appropriately interpreted. Nevertheless, even when testing conditions are optimized and hearing loss is taken into account during testing, it still seems that those with hearing loss do not perform as well on cognitive screening tests as peers with good hearing (Dupuis et al., 2015). These findings suggest that health care professionals concerned with cognitive health may need to monitor older adults in the early stages of cognitive decline more aggressively if they have hearing loss than if they have good hearing. At the same time, audiologists may need to offer audiologic interventions tailored to the needs of these patients and/or collaborate in interprofessional teams that provide interventions to bolster cognitive health or support caregivers of people with dementia (Pichora-Fuller, Reed, & Lemke-Kalis, 2013).

## Intervention

Other questions awaiting answers concern how to tailor interventions to the ongoing needs of those with dual hearing and cognitive losses and their caregivers. Rather than waiting until MCI or AD has been identified, earlier intervention using a health promotion approach to encourage help-seeking for hearing loss may be advantageous. Some evidence suggests that hearing rehabilitation could contribute to cognitive health (Allen et al., 2003). For those already diagnosed with dementia, hearing aid use can reduce the number of problem behaviors reported by caregivers (Palmer, Adams, Bourgeois, Durrant, & Rossi, 1998; Palmer, Adams, Durrant, Bourgeois, & Rossi, 1999).

Surprisingly little is known about audiologic best practice for treating the oldest older adults who have dual hearing and cognitive impairments (Pichora-Fuller et al., 2013). Too often, the oldest older adults do not have access to hearing care because audiological services are typically delivered in clinics or offices rather than in a home care or community care service delivery model. Another reason that geriatric audiology services may not be provided is the belief by some that the oldest older adults cannot learn to use hearing aids. It is fortunate that a combination of factors now sets the stage for new approaches to delivering hearing health care to the oldest older adults. These factors include new knowledge about cognitive aging and brain

plasticity, changing attitudes about aging and disability, and the urgent social imperative to meet the health care needs of the growing number of people who are eager to age successfully and preserve their health. Other articles in this forum provide examples of such new approaches.

## Future Research

Much future research is needed! For prevention, well-controlled, longitudinal clinical trials are needed to provide strong evidence that hearing rehabilitation could stave off or slow down dementia. For assessment, research is needed about how to best advance interprofessional teamwork so that information about hearing can guide cognitive health care and information about cognition can guide hearing health care. For intervention, research is needed to characterize how hearing loss influences caregiver burden, with related program development and evaluation research to demonstrate the benefits of intervention in reducing caregiver burden for family members of the oldest older adults with both hearing loss and dementia.

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