

# Hearing Loss in Older Adults

## Who's Listening?

Frank R. Lin, MD, PhD

**T**HE MANIFESTATIONS OF AGE-RELATED HEARING LOSS (ARHL) in many older adults are subtle<sup>1</sup>—having to increase the volume of the television, missing words of a conversation—and hence, hearing loss is often perceived as an unfortunate but inconsequential part of aging. This observation is borne out by the epidemiologic data, which report that although 26.7 million US adults aged 50 years or older have a clinically significant hearing loss, fewer than 15% use hearing aids.<sup>2</sup>

The current approach to studying and treating ARHL is unfortunately rooted in this perception rather than in actual scientific evidence. The broader consequences of hearing loss in older adults are now beginning to surface in epidemiologic studies. ARHL has been found to be independently associated with poorer cognitive functioning<sup>3</sup> and incident dementia,<sup>4</sup> such that compared with individuals with normal hearing, those with mild, moderate, and severe hearing loss had a 2-, 3-, and 5-fold increased risk of developing dementia, respectively. The specific mechanisms underlying this association are unknown but may be related to the effects of hearing loss on cortical processing,<sup>5</sup> increasing cognitive load,<sup>6</sup> and social isolation, non-mutually exclusive pathways that could precipitate other cascading downstream effects of hearing loss on the health and functioning of older adults.

Although the effects of ARHL on cognitive pathways have yet to be fully elucidated, its effects on impaired verbal communication and reduced social engagement are commonly accepted. This latter point though, if indeed true, is profoundly important. Social engagement in older adults is a key determinant of overall morbidity and mortality in later life with direct causal and neurobiological pathways linking loneliness with physiologic pathology.<sup>7</sup> Determining the long-term consequences of ARHL and whether the mechanistic pathways underlying these associations would be amenable to hearing-rehabilitative therapies in older adults is critically needed.

The current approach toward treating hearing loss, however, remains flawed and shaped by a medical model of disability in which a hearing impairment is simply

addressed with medical devices. Consequently, there is an overwhelming impression among health care professionals and also the public that a hearing aid is all that is needed to “treat” hearing loss. In reality, ARHL is like any other physical impairment and requires concerted counseling, rehabilitative training, environmental accommodations, and patience.

ARHL begins and proceeds insidiously and is often characterized by the inability to understand words rather than the inability to hear, leading to the refrains of “I can hear you but I can’t understand you” or perhaps more commonly, “My hearing is fine. You’re just mumbling.” Overcoming these biases toward hearing loss and convincing patients of the functional and clinical significance of hearing loss is not easily accomplished in a 45-minute clinical appointment. There are currently no major public health programs focused on educating the public and the medical community about ARHL. Rather, efforts to understand the scope of the problem and address it are coming only from advocacy groups lacking the resources needed to have an appreciable influence on public health.

The current criterion standard for hearing health care is focused on clinic-based audiologic evaluation and follow-up appointments for hearing aid fitting and adjustments, a model of care that remains inaccessible to all but the most motivated of patients. Community-based interventions are needed to ensure that older adults are able to integrate and apply hearing technologies in their daily lives. The role of other alternative models of hearing health care delivery (eg, through self-fitting of hearing aids), while generally frowned upon by hearing professionals because of concerns about improper programming, also deserves thorough consideration.

In many cases, however, even adequate counseling, rehabilitative training, and properly fitted hearing aids are not enough. The most advanced hearing aids will still preferentially amplify whichever sounds are loudest and closest—useful in some situations but disadvantageous in many others, particularly those where people are gath-

**Author Affiliations:** Departments of Otolaryngology–Head and Neck Surgery and Epidemiology, The Johns Hopkins University School of Medicine, and Bloomberg School of Public Health, Center on Aging and Health, The Johns Hopkins Medical Institutions, Baltimore, Maryland.

**Corresponding Author:** Frank R. Lin, MD, PhD, The Johns Hopkins Center on Aging and Health, 2024 E Monument St, Ste 2-700, Baltimore, MD 21205 (flin1@jhmi.edu).

See also p 1185.

ered in an echo-filled environment with multiple talkers (eg, listening to a minister in a church or to overhead announcements in an airport). Hearing-loop induction systems in which a thin wire fitted to a room's perimeter transmits amplified sounds directly to hearing aids are inexpensive, broadly scalable, and accessible (hear an example at <http://www.nytimes.com/2011/10/24/science/24loops.html>). These systems, however, are rarely installed because of insufficient awareness of the benefits of this technology, despite such assistive listening devices being mandated by the Americans with Disabilities Act in public spaces where audible communication is necessary.<sup>8</sup> Indeed, broad implementation of these systems has been achieved in select communities where advocacy groups have increased public awareness and have worked closely with local officials and community leaders.

The effects of treating hearing loss in older adults also remains poorly understood. Only 1 randomized controlled trial of hearing aids has investigated outcomes beyond quality of life. This moderately sized randomized controlled trial of veterans, performed more than 20 years ago, demonstrated positive effects of hearing aids on cognition and other functional domains at 4 months posttreatment.<sup>9</sup> Trials incorporating more representative cohorts and technology (eg, digital hearing aids, cochlear implants), observing patients for several years, and providing reports of the effects of hearing rehabilitation on cognitive and social functioning have not been performed. From a clinical standpoint, determining whether treating hearing loss could affect outcomes critical to public health such as delaying cognitive decline and dementia remains the most salient question at hand and will never be answered with observational epidemiologic studies. In addition, a mandate to include hearing rehabilitative services and devices as essential health benefits in federal health care legislation (thereby opening the door to insurance coverage) will likely only come with results from definitive trials.

Future research initiatives for ARHL need to address fundamental questions pertaining to hearing loss and public health that remain unanswered: what are the consequences of untreated hearing loss in older adults, how can effective hearing rehabilitative interventions be delivered in the community, and how does treating hearing loss affect outcomes critical to older adults and society?<sup>10</sup> These questions cut across the disciplines of audiology, otolaryngology, and geriatrics/gerontology—disciplines

that historically have operated within distinct cultures and silos of thinking. Answering these basic questions will, therefore, require research initiatives that span the interface of these fields and that can foster collaboration between auditory and gerontological researchers across multiple research areas (eg, understanding the biology of aging in the cochlea, conducting epidemiologic studies of hearing loss in older adults, developing community-based approaches to hearing loss rehabilitation, and conducting clinical trials).

As a society with a rapidly aging population, implementing innovative strategies to promote successful aging in older adults is a public health, economic, and moral imperative. Concerted and interdisciplinary public health and research initiatives joining physicians, audiologists, gerontologists, public health researchers, and community advocates to study and treat hearing loss in older adults could potentially have substantial implications for society and the health of older adults—a message to which everyone needs to listen.

**Conflict of Interest Disclosures:** Dr Lin reports being an unpaid speaker for Cochlear Corp and working as a consultant for Pfizer.

**Funding/Support:** This work was supported in part by a grant from the National Institutes of Health (NIH K23DC011279) and a Triological Society/American College of Surgeons Clinician Scientist Award.

**Role of the Sponsors:** Neither funding organization had any role in the preparation, review, or approval of this article.

## REFERENCES

1. Pacala JT, Yueh B. Hearing deficits in the older patient: I didn't notice anything. *JAMA*. 2012;307(11):1185-1194.
2. Chien W, Lin FR. Prevalence of hearing aid use among older adults in the United States. *Arch Intern Med*. 2012;172(3):292-293.
3. Lin FR, Ferrucci L, Metter EJ, An Y, Zonderman AB, Resnick SM. Hearing loss and cognition in the Baltimore Longitudinal Study of Aging. *Neuropsychology*. 2011;25(6):763-770.
4. Lin FR, Metter EJ, O'Brien RJ, Resnick SM, Zonderman AB, Ferrucci L. Hearing loss and incident dementia. *Arch Neurol*. 2011;68(2):214-220.
5. Peelle JE, Troiani V, Grossman M, Wingfield A. Hearing loss in older adults affects neural systems supporting speech comprehension. *J Neurosci*. 2011;31(35):12638-12643.
6. Wingfield A, Tun PA, McCoy SL. Hearing loss in older adulthood—what it is and how it interacts with cognitive performance. *Curr Dir Psychol Sci*. 2005;14(3):144-148.
7. Cacioppo JT, Hawkley LC, Norman GJ, Berntson GG. Social isolation. *Ann N Y Acad Sci*. 2011;1231:17-22.
8. US Department of Justice. 2010 ADA standards for accessible design. [http://www.ada.gov/2010ADAstandards\\_index.htm](http://www.ada.gov/2010ADAstandards_index.htm). Accessed February 29, 2012.
9. Mulrow CD, Aguilar C, Endicott JE, et al. Quality-of-life changes and hearing impairment: a randomized trial. *Ann Intern Med*. 1990;113(3):188-194.
10. Chou R, Dana T, Bougatsos C, Fleming C, Beil T. Screening adults aged 50 years or older for hearing loss: a review of the evidence for the US Preventive Services Task Force. *Ann Intern Med*. 2011;154(5):347-355.