

**Reply to Comment on: Can Hearing Aids Delay Time to Diagnosis of Dementia,  
Depression, or Falls in Older Adults?**

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To the Editor:

In our recently published study,<sup>1</sup> we used administrative claims data to examine the association between hearing aids (HAs) and dementia among older adults with hearing loss (HL). In 2017, a Lancet Commission report highlighted that HL carried a greater risk of dementia than other potential risk factors, such as hypertension and obesity, and could be expected to have a high population-attributable risk due to the increasing prevalence of HL.<sup>2</sup> The study further calculated that more than one third of dementia cases may be prevented by addressing risk factors across the life course. HL is a potentially modifiable risk factor for Alzheimer's disease and related dementias.<sup>2</sup>

While randomized clinical trials may still be considered the gold standard in clinical research, with the availability of large datasets, observational studies are increasingly gaining momentum. Observational studies are inherently less expensive, include a broader patient population, are more efficient, and can examine longitudinal data over a relatively long period of time.<sup>3</sup> With regard to potential biases, there is little evidence to support the superiority of randomized clinical trials over observational studies.<sup>3</sup>

In our recent study, our descriptive results revealed that in aggregate, people with HAs had lower rates of cardiovascular conditions, hypertension, hypercholesterolemia, obesity, and diabetes at

the time of HL diagnosis. Abiola et al. raised a valid concern regarding a potential selection bias in our study.<sup>4</sup> All studies, particularly observational studies are prone to selection bias when comparing different population groups. To address this, we adjusted our analytical models for age, sex, race/ethnicity, and chronic conditions that are more prevalent among individuals with HL and conducted several sensitivity analyses, including propensity score matching between those with and without HL. None of our sensitivity analyses qualitatively changed the results of our original analyses. Abiola et al. also raised a question regarding timing of the HA use.<sup>4</sup> Since we were interested in the association between HAs and time to diagnosis of certain conditions, we included those who acquired HAs right after HL diagnosis (about 60% of HAs users). This made our analysis much cleaner because we were able to follow each patient for at least three years after the diagnosis of HL and first use of HAs. It is plausible that by excluding those who had fewer than three years of follow-up, we introduced some bias into our analysis. Not having information on why an individual is no longer covered by a health plan (i.e death, switching health plans, switching jobs, etc.), we examined the results for those with at least three years of follow-up time. The main shortcoming of our study was unavailability of information on several salient risk factors in our dataset. For example, we did not have information on duration and severity of HL, frequency of HA use, if any, socioeconomic status, and lifestyle choices of our patient population. Future research using other datasets should try to address the limitations of our study and therefore confirm or dispute our findings.

By providing enhanced hearing input, HAs may facilitate greater social engagement, decrease levels of effort required to recognize sounds and speech, decrease levels of depression or anxiety, increase levels of physical balance, and promote greater feelings of independence and self-efficacy.<sup>5-7</sup> Believing in one's physical and cognitive ability to socially engage and accomplish a task or participate in social events has been shown to advance cognitive functioning.

The prevalence of HL is estimated to increase substantially due to our growing geriatric population.<sup>9</sup> The adverse effects of HL are profound and varied, affecting individuals' quality of life and their ability to perform independent activities of daily living.<sup>10</sup> Research has shown that individuals with HL are at higher risk of Alzheimer's disease and related dementias.<sup>2</sup> Thus, it is of paramount importance for researchers to continue examining the effects of HAs, the default non-invasive treatment option for HL, on dementia and mild cognitive impairment among older adults with HL.

## References

1. Mahmoudi E, Basu T, Langa K, et al. Can Hearing Aids Delay Time to Diagnosis of Dementia, Depression, or Falls in Older Adults? *Journal of the American Geriatrics Society* 2019;67:2362.
2. Livingston G, Sommerlad A, Orgeta V, et al. Dementia prevention, intervention, and care. *The Lancet* 2017;390:2673-734.
3. Benson K, Hartz AJ. A comparison of observational studies and randomized, controlled trials. *New England Journal of Medicine* 2000;342:1878-86.
4. Abiola A, Berry S, Kim D. Comment on: Can Hearing Aids Delay Time to Diagnosis of Dementia, Depression, or Falls in Older Adults? *Journal of the American Geriatrics Society* 2019.
5. 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. *Annals of internal medicine* 2011;154:347.
6. Ciorba A, Bianchini C, Pelucchi S, Pastore A. The impact of hearing loss on the quality of life of elderly adults. *Clinical interventions in aging* 2012;7:159.
7. Joore MA, Potjewijd J, Timmerman A, Anteunis L. Response shift in the measurement of quality of life in hearing impaired adults after hearing aid fitting. *Quality of Life Research* 2002;11:299-307.
8. Mulrow CD, Tuley MR, Aguilar C. Sustained benefits of hearing aids. *Journal of Speech, Language, and Hearing Research* 1992;35:1402-5.
9. Lin FR, Niparko JK, Ferrucci L. Hearing loss prevalence in the United States. *Archives of internal medicine* 2011;171:1851-3.
10. Gopinath B, Schneider J, McMahon CM, et al. Severity of age-related hearing loss is associated with impaired activities of daily living. 2011;41:195-200.

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