Does Hearing Impairment Affect Physical Function? 
Current Evidence, Potential Mechanisms, and Future Research Directions for Healthy Aging 

Willa D. Brenowitz, PhD, MPH; Margaret I. Wallhagen, PhD, GNP-BC

Age-related hearing impairment is emerging as a potential risk factor for a broad range of poor health outcomes in older adults. The article by Martinez-Amezcua et al provides additional insights on the association between hearing loss and physical functioning and points to future research directions that could tease apart the underlying mechanisms and inform intervention strategies. Although hearing loss is not typically considered an important predictor of physical function, prior work suggests an association. Martinez-Amezcua et al examined the association between peripheral hearing loss, as measured with pure tone audiometry, and lower extremity physical functioning, as measured by the short physical performance battery (SPPB), in the Atherosclerosis Risk in Communities study. In this cohort of community-dwelling US Black and White older adults, worse hearing was associated with poorer scores on the composite and individual components of the SPPB (balance and gait speed) as well as walking endurance. Associations with the SPPB were found in both cross-sectional and longitudinal analyses, suggesting that hearing loss could predict declines in physical function. Of the individual components of physical function, balance followed by gait speed and walking endurance were the most strongly associated with hearing loss. This and prior work raise the intriguing idea that hearing may provide essential information to the neural circuits underpinning movement in our environment and that correction for hearing loss may help promote physical well-being. While this hypothesis is appealing and warrants further investigation, there are multiple other potential explanations of such an association, including potential sources of bias that may affect observational studies such as this one.

Hearing difficulty impairs communication and alters the auditory cues that are important for safely moving in one’s environment. Given the impact on communication, hearing impairment is thus, not surprisingly, associated with a range of psychosocial factors, including interpersonal challenges, loneliness, depression, and quality of life. Hearing health research has focused on these consequences as well as on the intriguing association of hearing impairment with cognitive functioning and dementia. Physical health outcomes have been less commonly addressed in connection to hearing loss, especially in contrast to visual impairments. However, prior work has established hearing loss as a potential risk factor for falls, and a few studies have found associations with physical activity and overall measures of physical functioning. Most of the findings of these studies point to similar associations as those found in the current study. The findings in the study by Martinez-Amezcua et al expand on prior work to demonstrate associations with balance, gait speed, and walking endurance, which may indicate that hearing loss affects these components of lower extremity function the most. Although not directly examined in their study, the association between hearing loss and worse balance or walking ability may help to explain some of the association with falls.

Despite an expanding literature describing the associations between hearing loss and adverse health outcomes, there remain questions regarding what mechanisms underlie such associations. There are several plausible pathways through which hearing loss may cause functional decline. First, movement and coordination may rely on acoustic inputs from the environment, and hearing loss may reduce the ability to make complex movements efficiently. There may also be an indirect association of hearing loss with physical function through negative effects of hearing loss on social
engagement, mental health, and physical activity. Finally, hearing loss increases cognitive demands, which could affect attention given to physical surroundings. Because hearing loss often begins in midlife, these may take decades to develop. However, there are also alternative explanations, such as that the associations may be due to common causes of hearing loss and physical functioning (ie, confounding), including cardiometabolic diseases and biologic aging. There may also be more indirect confounding pathways through risk factors for hearing loss, such as medications and noise exposure, that may also affect physical health. It also unclear to what extent impairment in vestibular function compared with auditory cues may drive these associations, and multisensory integration is important for postural control. Although reverse causation of physical functioning affecting peripheral hearing loss seems unlikely, there may be reciprocal pathways linking sensory, physical, and cognitive health across the life course. Understanding these potential mechanisms will be important for informing interventions to mitigate hearing loss as well as prevent declines in physical functioning.

The study by Martinez-Amezcua et al raises several additional questions relevant to potential interventions and clinical relevance. It was unable to assess other factors that are associated with mobility, including prior falls and fear of falling, which are known to affect gait or walking speed. Physical functioning is associated with a broad range of other age-related health factors, including cognitive decline, sarcopenia, and frailty. The complex interrelationships between hearing loss, cognition, mobility, and sarcopenia might warrant further study, as they may inform the development of interventions. Furthermore, the current study could not assess the actual clinical implications and how daily activities were affected for individuals with low physical function. These relationships may be valuable in considering interventions that go beyond correcting or mitigating hearing loss. For example, if hearing loss is associated with poor physical functioning and falls, a broad multidimensional and interprofessional intervention, including hearing health care as well as physical therapy and activities such as tai chi or other balance training may be most appropriate. Data support that activities like tai chi are helpful in promoting balance and that multidimensional strategies are needed to prevent or minimize falls.

Although hearing loss affects as many as 90% of those aged 90 years and older, it is undertreated. Hearing aid uptake is poor, particularly for those with fewer socioeconomic resources. Individuals often delay use of hearing aids until they experience severe hearing loss, yet modification of certain health consequences of hearing loss may require intervention when the individual has mild hearing loss, prior to any auditory brain changes that might occur. Furthermore, as noted earlier, it may be especially valuable to develop interprofessional approaches and multidimensional interventions that target the range of factors that affect hearing or are associated with hearing loss.

The findings of the study by Martinez-Amezcua et al support the need for continued research designed to further tease apart the mechanisms underlying the association of hearing loss with health outcomes, including with poor physical function. Additionally, intervention studies aimed at improving hearing or mitigating hearing loss are needed to fully understand whether such correction affects health outcomes. Furthermore, it may be valuable to study why some individuals with hearing loss experience no health-related effects. If specific risk factors for poor health outcomes after hearing loss can be identified, interventions may be targeted to those at greatest risk. Research may also help to identify whether there are critical periods at which specific interventions may be most effective. In summary, the current study adds to our understandings of how hearing loss may be related to health outcomes but again highlights the critical need for further interprofessional research.
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Corresponding Author: Willa D. Brenowitz, PhD, MPH, Department of Psychiatry and Behavioral Sciences, University of California, San Francisco, 4150 Clement St, San Francisco, CA 94158 (willa.brenowitz@ucsf.edu).

Author Affiliations: Department of Psychiatry and Behavioral Sciences, University of California, San Francisco (Brenowitz); Department of Epidemiology and Biostatistics, University of California, San Francisco (Brenowitz); Department of Physiological Nursing, University of California, San Francisco (Wallhagen).

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REFERENCES