Phonak
Quick Practice Guideline.

Quick guide to the management of physical well-being in adults with hearing loss

This publication highlights our growing understanding of the range of physical health conditions that are associated with hearing loss. Recommendations are made to minimize the negative health impact of hearing loss and related co-morbidities, including promoting healthy behaviours, establishing interprofessional teams to provide holistic and patient-centered care, and integrating audiology as part of an interdisciplinary healthcare service.[1]

March 2023

Key highlights

- Hearing loss is associated with a range of negative health conditions, including poorer cardiovascular health and increased odds of falling; it is also a potentially modifiable risk factor for dementia.
- Regular physical activity mitigates many of the health problems that co-exist with hearing loss; it enhances cardiovascular-, mental- (reduced symptoms of anxiety and depression), and cognitive health, as well as overall wellbeing. Physical activity can also help to prevent falls, falls-related injuries, and declines in functional ability.

Considerations for practice

- Encourage healthy behaviours, such as physical activity, in older adults with hearing loss to support healthy aging.
- Become part of an integrated, interprofessional team, ensuring that holistic and person-centered care is delivered to older adults.
- Broaden the questions asked when taking a case history and make referrals to other healthcare professionals where appropriate.
- Educate healthcare professionals on the range of negative conditions associated with hearing loss and encourage the use of screening for hearing loss.

This Phonak Quick Practice Guideline is a condensed version of this peer-reviewed article: Maidment, D. W., Wallhagen, M. I., Dowd, K., Mick, P., Spankovich, C., & Urry, E. (2023). New Horizons in holistic, person-centred health promotion for hearing healthcare. *Age and Ageing, 52*(2), 1-8. https://doi.org/10.1093/ageing/afad020.

Associations between hearing and health

Hearing loss and physical function

Decreased hearing acuity, like declines in other sensory systems, is multifactorial in nature. An accumulating body of evidence demonstrates the interplay between auditory function and other aspects of health. For example, scientific evidence demonstrates that hearing loss in older adults is independently associated with reduced physical activity (Kuo et al., 2021; Martinez-Amezcua et al., 2021; Tsimpida et al., 2019; Wells et al., 2020; Yévenes-Briones et al., 2021); as well as limitations in mobility and physical functioning, limitations in conducting activities of daily living (e.g. walking, taking the stairs), and restrictions in participating in social and leisure activities (Lin et al., 2019; Martinez-Amezcua et al., 2021). Maintaining optimal physical functioning is essential to healthy aging, with declines leading to poorer quality of life and greater dependence, as well as increasing the risk of morbidity and mortality (Painter et al., 1999).

In addition to general declines in physical functioning, hearing loss in older adults is also a specific risk factor for falls (Jiam & Agrawal, 2016). Several mechanistic pathways underpinning the association between hearing loss and physical functioning have been postulated (Fig. 1) and are discussed in detail elsewhere (Huang et al., 2019; Fortunato et al., 2016). Briefly, the *cognitive reserve hypothesis* suggests that, due to the requirement to process degraded sound signals, hearing loss results in an increased load on cognitive and attentional resources, which are also necessary for physical functions, such as postural control and balance. Alternatively, it has been suggested that psychosocial difficulties, namely, social isolation, loneliness, and depression, which are commonly experienced by older adults with hearing loss, mediate associations between hearing loss and physical functioning, termed the *social cascade hypothesis*. A further mechanism involves the vestibular system, whereby measures of hearing loss may act as a proxy for a concomitant vestibular loss that leads to greater imbalance and falls.

Hearing loss and cardiovascular health

Hearing loss is also associated with cardiovascular diseases and their risk factors (e.g., diabetes, high blood pressure, smoking) (Oron et al., 2014; Samocha-Bonet et al., 2021). These associations can likely be explained by pathological changes within the vasculature of the inner ear, given that the cochlea is very metabolically active and relies on robust circulation for optimal functioning. Indeed, cardiovascular risk factors are all associated with inflammation and oxidative stress, which may also directly damage the cochlear (van der Vaart et al., 2004). The pathological changes caused by poor cardiometabolic health accumulate with age and may accelerate age-related hearing loss and cause comorbid disease in multiple organ systems.

Recommendations for enhancing physical well-being in adults with hearing loss

1. Encourage regular physical activity in all clients

Given that metabolic risk factors for cardiovascular diseases are modifiable, and because they are highly prevalent, public health or clinical interventions to better address them could potentially result in significant improvements in hearing health. One of the most strongly supported interventions is physical activity; it is well established that regular physical activity, irrespective of age, benefits multiple physical and mental health outcomes, including improved all-cause mortality and reduced incidence of chronic diseases (WHO, 2020).

Regular physical activity mitigates many of health problems that co-exist with hearing loss; it enhances cardiovascular health, mental health (reduced symptoms of anxiety and depression), cognitive health, and overall wellbeing; as well as helping to prevent falls, and falls-related injuries, and declines in functional ability.

Physical activity can be done at different levels of intensity: light (e.g. walking casually), moderate (e.g. walking briskly), and vigorous (e.g. running). A simple way

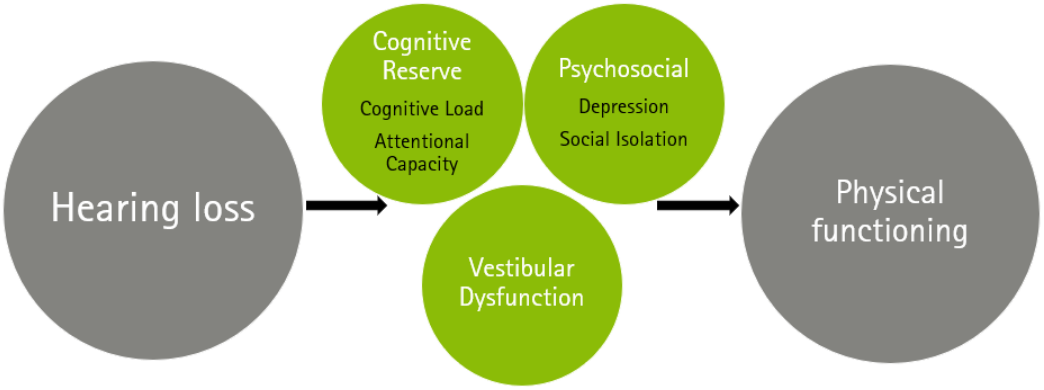

Figure 1: Schematic of possible mechanisms underlying the association between hearing loss and physical functioning.

to judge the intensity of physical activity is the 'talk test': during light activity, you can sing; during moderate activity, you can talk normally; but during vigorous activity, it will be difficult to talk and you will be breathing heavily. According to the World Health Organization's (WHO, 2020) evidence-based guidelines, for substantial health benefits, adults should do at least 150- to 300-minutes of moderate intensity exercise, or at least 75- to 150-minutes of vigorous exercise throughout the week (or an equivalent combination of moderate and vigorous). To meet these recommendations, clients could, for example, take a brisk walk for at least 30 minutes, 5 days a week. Keep in mind that all types of physical activity contribute to health, including exercise for fitness, movement for work, sport, leisure and transport, and everyday household tasks (WHO, 2020). For those unable to meet the WHO recommendations: know that doing some physical activity is better than doing none; and just doing some physical activity will bring benefits to health (WHO, 2020).

To improve physical activity levels, individuals may want to monitor and set goals for themselves, which can be done accessibly via wearable technologies. An increasing number of hearing aids are becoming commercially available that also enable this. For example, Phonak Audéo Lumity, when used in conjunction with the myPhonak app, allows physical activity tracking (steps, activity levels, and distance walked or ran), as well as the option to set step count goals. Setting specific activity goals can have a positive impact on physical activity. Indeed, tracking steps has been shown to motivate individuals to increase their daily movement (2018 Physical Activity Guidelines Advisory Committee).

2. Collaborate with other healthcare services in order to facilitate holistic and patient-centered care

In 2001, the USA-based Institute of Medicine (now the National Academies of Science, Engineering and Medicine) emphasised that, to address the gaps in care, healthcare practitioners and organisations should no longer operate in silos, which results in a lack of complete information about an individual's complex health needs (Institute of Medicine, 2001). To bridge this disparity, it was deemed essential for clinicians and institutions to collaborate to ensure that care was coordinated. This type of coordination and sharing of information is the core of interprofessional practice aiming to provide integrated and patient-centred care to older people, which has been further outlined by the WHO's recent 2019 guidance for integrated care for older people (ICOPE) (WHO, 2019).

The ICOPE approach proposes that care for older people should be based on a multi-step process that involves:

i. An assessment of an individual's needs, preferences, and goals, including the identification of declines in key physical and mental abilities (e.g., vision, hearing, cognition, psychological health, physical health),

ii. The development of personalised, patient-centered care plans that involve multiple interventions to manage conditions associated with losses in physical and mental abilities.

iii. The engagement and coordination of multiple healthcare services that are all driven to a single goal of maintaining physical and mental abilities and can be delivered through primary- and community-based care.

The WHO ICOPE Handbook App supports healthcare workers to follow this above approach. Healthcare workers can use the screening tool on the app, to assess the health and social care needs of older people and design a personalised care plan.

Unfortunately, however, Wallhagen, Strawbridge and Tremblay (Wallhagen et el., 2021) have highlighted that there are few examples of holistic and interprofessional care described in the literature, especially as related to hearing healthcare. This is because there are several barriers to implementing interprofessional care in this context, including the structure of healthcare services that can make interdisciplinary communication difficult, as well as financial, regulatory, and legal constraints (Wallhagen et al., 2021). Yet, to address the range of health conditions associated with hearing loss, and to minimise its negative impact on health and well-being, hearing healthcare must be integrated into the larger healthcare system.

Further, to provide truly holistic and patient-centred care, providers across the spectrum of healthcare settings must incorporate hearing healthcare into their practices and become aware of the importance of hearing to health. Indeed, it has recently been suggested that a patient-centred approach to hearing healthcare should incorporate evaluations of patients' general health and lifestyle so that more targeted support can be provided to reduce the potential burden of multiple chronic diseases that frequently co-occur with hearing loss (Maidment & Wege, 2021).

One example of including hearing healthcare providers within interdisciplinary healthcare teams is in diabetes services. Persons with diabetes require many different specialists to address the problems they experience, including endocrinology, podiatry, optometry, dental, and

pharmacists. Based on this, the USA's Centers for Disease Control (CDC) has highlighted the need to address hearing loss in their '*Diabetes and Hearing Loss*' online resources (CDC "Diabetes and hearing loss," n.d.). These materials (e.g., *Take Charge of Your Diabetes: Healthy Ears* (CDC "Take Charge of Your Diabetes: Healthy Ears" n.d.) support the ways in which the incorporation of hearing healthcare should be considered by other professionals to prevent the negative impacts associated with diabetes. The CDC, for instance, recommends a baseline hearing test and balance screening at the time of diabetes diagnosis, followed by annual hearing testing.

Current efforts to raise awareness of the effects of diabetes on hearing and balance in the USA are focused on involving physicians and diabetes education specialists. One recommendation is to assign the task of taking an online hearing screening and completing a brief balance survey as one component of diabetes education classes. The diabetes education specialist can then discuss this information with the patient or as part of a group session, along with recommendations for appropriate follow-up. Another effort in the USA is to include hearing and balance recommendations in the discharge recommendations of hospital's electronic medical records to ensure that this is considered if patients are seen at subsequent medical emergencies, such as stroke, heart attack, out of control diabetes or trauma. Automating the medical necessity referral for each patient takes away the issues of not seeing the invisible handicaps of hearing loss and associated risk of falls or other comorbidities.

While such holistic recommendations are currently uncommon, the focus on diabetes by the CDC provides an example of the way in which audiologists and other hearing healthcare providers might use such data in their practices. Thus, for instance, when a person is identified with hearing loss, questions about vision and a vision exam can suggest the need for modifications in an individual's dependence on speechreading and the need to incorporate other cues for communication. Alternatively, if a person with diabetes is having balance problems and is at risk of falls, referral to audiology for evaluation of potential vestibular problems, physical therapy, or podiatry, as well as to persons with expertise in balance exercises may be necessary. Vision is also integrally connected to the risk of falls and may need further evaluation.

A suggested approach in Audiology may be to broaden the questions asked when taking a case history. Figure 2 shows the causative and protective factors associated with hearing

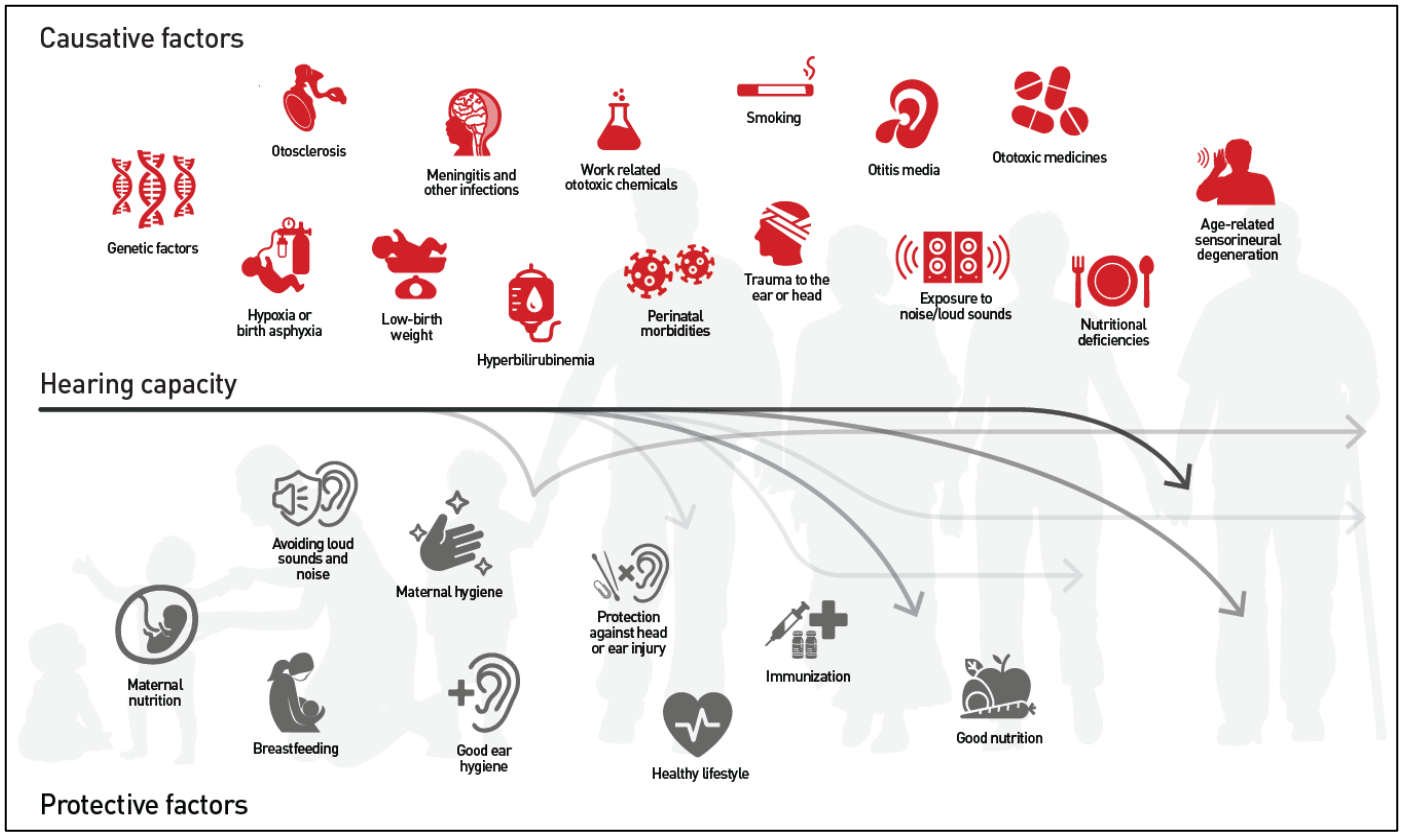

Figure 2. Risk- and protective-factors influencing hearing capacity across the life span.

Source: World Report on Hearing; © World Health Organization 2021; Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; https://creativecommons.org/licenses/by-nc-sa/3.0/igo).

loss according to the WHO report 2021. Hearing care professionals routinely ask about many of these factors when taking a case history, such as past ear infections, trauma to the head, complications around birth (pediatrics), family history of hearing loss, noise exposure etc. There may, however, be some risk factors that are not currently asked, and these could be added to a routine case history, such as:

- Healthy lifestyle (e.g., current or past smoker, nutrition, participation in physical activity)
- Balance and fall risk (e.g., had a fall in the past year)
- Medical diagnoses and medication regimen (both chronic and acute health conditions)

Adding these questions to a client's history-taking could bring awareness to the client that these aspects have an effect on hearing. It may also highlight other health issues where the audiologist may decide to refer the client to another healthcare professional.

3. Educate healthcare teams on importance of hearing to overall health, and available hearing screening tools

A further consideration is that healthcare practitioners in general need to be aware of hearing ability when providing counselling and discussing plans of care because miscommunication can occur and impact safe and effective care (Cudmore et al., 2017; Wallhagen et al., 2019). In this regard, there is a need to educate multidisciplinary, primary healthcare teams (e.g., general practitioners, practice nurses, etc.) and other healthcare professionals about the importance of hearing to health, as well as about the need to implement valid screening tests for hearing capacity. This is essential because hearing loss is not easily recognised in a one-on-one, face-to-face meeting in a quiet examination room. Hearing loss is invisible and may not be identified if the person is only asked if they have a hearing loss. The issue that patients may not know they have a sensory impairment (termed anosognosia), as well as the stigma often associated with hearing loss and hearing aids, often limits the subjective recognition of hearing loss. Primary healthcare teams should also be mindful of other sensory losses, including visual acuity, given the prevalence of vision loss similarly increases with age.

There are now a range of possible hearing screening tools available that could be easily incorporated into various primary healthcare settings. This includes commercially available calibrated screening equipment, screening apps e.g. hearWHO (WHO, *hearWHO,* 2014) for smartphones or tablet computers, or validated questionnaires to help uncover hearing difficulty (e.g., Hearing Handicap Inventory for Adults or Elderly (Ventry & Weinstein, 1982)). Upon failing a hearing screen, healthcare workers should refer the client to Audiology. A simpler alternative would be to recommend a series of questions such as:

1. *Do you or your family perceive any change in your hearing?*
2. *Do you have hearing difficulty in quiet places or noisy places?*
3. *Have you had your hearing tested in the past two years?*
4. *Do you know what to do if you perceive a change in hearing?*
5. *Do you know how to reduce your risk for hearing loss?*

If the patient answers "Yes" to questions one or two or "No" to questions three through five, it is recommended they be referred for an audiological evaluation.

Conclusion

In summary, this article highlights why there is a need for interprofessional teams to provide holistic and patient-centered hearing healthcare. As a grounding to this involvement, it is important that hearing healthcare professionals are aware of the range of conditions associated with hearing loss and the way in which hearing loss places individuals at risk for other negative health effects, such as falls and poor cardiovascular health. These understandings, emphasised in the current publication, can also broaden holistic, patient-centred care provided in all hearing and general healthcare settings to support healthy aging.

References

2018 Physical Activity Guidelines Advisory Committee. *2018 Physical Activity Guidelines Advisory Committee Scientific Report. Washington, DC: U.S. Department of Health and Human Services, 2018.* Available from: https://health.gov/our-work/nutrition-physical-activity/physical-activity-guidelines/current-guidelines/scientific-report#:~:text=The%202018%20Physical

Assef, R. A., Almeida, K., & Miranda-Gonsalez, E. C.d. (2022). Sensitivity and specificity of the Speech, Spatial and Qualities of Hearing Scale (SSQ5) for screening hearing in adults. *CoDAS, 34*(1), 1-8. doi: 10.1590/2317-1782/20212021106

Center for Disease Control. Diabetes and Hearing Loss. Retrieved February 14th, 2023, from https://www.cdc.gov/diabetes/managing/diabetes-hearing-loss.html

Center for Disease Control. Take Charge of Your Diabetes: Healthy Ears. Retrieved February 14th, 2023, from https://www.cdc.gov/diabetes/library/factsheets/healthy-ears.html

Cudmore, V., Henn, P., O'Tuathaigh, C. M., & Smith, S. (2017). Age-related hearing loss and communication breakdown in the clinical setting. *JAMA Otolaryngology–Head & Neck Surgery*, *143*(10), 1054-1055. doi: 10.1001/jamaoto.2017.1248.

Fortunato, S., Forli, F., Guglielmi V., Corso E. d., Paludetti, G., Berrettini, S., & Fetoni, A. R. (2016). A review of new insights on the association between hearing loss and cognitive decline in ageing. *Acta Otorhinolaryngologica Italica 36*(3),155-166. doi: 10.14639/0392-100X-993.

Grenness, C., Hickson, L., Laplante-Levesque, A., & Davidson, B. (2014). Patient-centred audiological rehabilitation: perspectives of older adults who own hearing aids. *International Journal of Audiology, 53*(1), 60-67. doi: 10.3109/14992027.2013.866280.

Hannula, S., Bloigu, R., Majamaa, K., Sorri, M., & Mäki-Torkko, E. (2011). Self-reported hearing problems among older adults: prevalence and comparison to measured hearing impairment. *Journal of the American Academy of Audiology, 22*(8), 550-559. doi: 10.3766/jaaa.22.8.7

Huang, C., Sun, S., Wang, W., Li, Y., Feng, W., & Wu, Y. (2019). Cognition mediates the relationship between sensory function and gait speed in older adults: evidence from the English Longitudinal Study of Ageing. *Journal of Alzheimer's Disease, 70*(4), 1153-1161. doi: 10.3233/JAD-190364.

Humes, L. E. (2021). An approach to self-assessed auditory wellness in older adults. *Ear and Hearing, 42*(4), 745-761. doi: 10.1097/AUD.0000000000001001.

Institute of Medicine. (2001). Crossing the quality chasm: a new health care system for the 21st century. Washington, DC: Institute of Medicine.

Jiam, N. T. L., Li, C., & Agrawal, Y. (2016). Hearing loss and falls: A systematic review and meta-analysis. *The Laryngoscope, 126*(11), 2587-2596. doi: 10.1002/lary.25927.

Krist, A. H., Davidson, K. W., Mangione, C. M., Cabana, M., Caughey, A. B., Davis, E. M., Donahue, K. E., Doubeni, C. A., Epling Jr., J. W., Kubik, M., Li, L., Ogedegbe, G., Pbert, L., Silverstein, M., Stevermer, J., Tseng, C. W., & Wong, J. B. (2021). Screening for hearing loss in older adults: US Preventive Services Task Force recommendation statement. *JAMA, 325*(12),1196-1201. doi: 10.1001/jama.2021.2566.

Kuo, P. L., Di, J., Ferrucci, L., & Lin, F. R. (2021). Analysis of hearing loss and physical activity among US adults aged 60-69 years. *JAMA network open*, *4*(4), e215484-e215484. doi:10.1001/jamanetworkopen.2021.5484

Lin, T. C., Yen, M., & Liao, Y. C. (2019). Hearing loss is a risk factor of disability in older adults: A systematic review. *Archives of Gerontology and Geriatrics*, *85*, 103907. doi.org/10.1016/j.archger.2019.103907

Maidment, D. W., & Wege, T. E. (2021). The association between non-communicable disease and hearing aid adoption in older adults with hearing loss. *International Journal of Audiology, 61*(2), 220-227. doi: 10.1080/14992027.2021.1910740.

Martinez-Amezcua, P., Kuo, P.L., Reed, N. S., Simonsick, E. M., Agrawal, Y., Lin, F. R., Deal, J. A., Ferrucci, L., & Schrack, J. A. (2021). Association of hearing impairment with higher level physical functioning and walking endurance: Results from the Baltimore Longitudinal Study of Aging (BLSA).

Martinez-Amezcua, P., Powell, D., Kuo, P. L., Reed, N. S., Sullivan, K. J., Palta, P., Szklo, M., Sharrett, R., Schrack, J. A., Lin, F. R., & Deal, J. A. (2021). Association of age-related hearing impairment with physical functioning among community-dwelling older adults in the US. *JAMA Network Open*, *4*(6), e2113742-e2113742.doi:10.1001/jamanetworkopen.2021.13742

Martinez-Amezcua, P., Suen, J. J., Lin, F., Schrack, J. A., & Deal, J. A. (2021). Hearing impairment and objectively measured physical activity: a systematic review. *Journal of the American Geriatrics Society, 70*(1), 301-304. doi: 10.1111/jgs.17529

Oron, Y., Elgart, K., Marom, T., & Roth, Y. (2014). Cardiovascular risk factors as causes for hearing impairment. *Audiology and Neurotology, 19*(4), 256-260. doi: 10.1159/000363215.

Painter, P., Stewart, A. L., & Carey, S. (1999). Physical functioning: definitions, measurement, and expectations. *Advances in Renal Replacement Therapy, 6*(2), 110-123. doi: 10.1016/S1073-4449(99)70028-2

Samocha-Bonet, D., Wu, B., & Ryugo, D. K. (2021). Diabetes mellitus and hearing loss: A review. *Ageing Research Reviews, 71*. 101423. doi: 10.1016/j.arr.2021.101423.

Spankovich, C., & Yerraguntla, K. (2019). Evaluation and management of patients with diabetes and hearing loss. *Seminars in Hearing, 40*(4), 308-314. doi: 10.1055/s-0039-1697644.

Strawbridge, W. J., & Wallhagen, M. I. (2017). Simple tests compare well with a hand-held audiometer for hearing loss screening in primary care. *Journal of the American Geriatrics Society, 65*(10), 2282-2284. doi: 10.1111/jgs.15044.

Tsimpida, D., Kontopantelis, E., Ashcroft, D., & Panagioti, M. (2019). Socioeconomic and lifestyle factors associated with hearing loss in older adults: a cross-sectional study of the English Longitudinal Study of Ageing (ELSA). *BMJ open*, *9*(9), e031030. doi:10.1136/ bmjopen-2019-031030.

van der Vaart, H., Postma, D. S., Timens, W., Hylkema, M. N., Willemse, B. W. M., Boezen, H. M., Vonk, J. M., de Reus, D. M., Kauffman, H. F., & ten Hacken, N. H. T., (2004). Acute effects of cigarette smoke on inflammation and oxidative stress: a review. *Thorax, 59*(8), 713-721. doi: 10.1136/thx.2003.012468.

Ventry, I. M., & Weinstein, B. E. (1982). The Hearing Handicap Inventory for the Elderly: a new tool. *Ear and Hearing, 3*(3),128-134. doi: 10.1097/00003446-198205000-00006.

Wallhagen, M. I., Strawbridge, W. J., & Tremblay, K. (2021). Leveraging the age friendly healthcare system initiative to achieve comprehensive, hearing healthcare across the spectrum of healthcare settings: an interprofessional perspective. *International Journal of Audiology, 60*(2), 80-85. doi: 10.1080/14992027.2020.1853263.

Wallhagen, M. I., Ritchie, C. S., & Smith, A. K. (2019). Hearing loss: effect on hospice and palliative care through the eyes of practitioners. *Journal of Pain and Symptom Management, 57*(4), 724-730. doi: 0.1016/j.jpainsymman.2018.12.340.

Wells, T. S., Nickels, L. D., Rush, S. R., Musich, S. A., Wu, L., Bhattarai, G. R., & Yeh, C. S. (2020). Characteristics and health outcomes associated with hearing loss and hearing aid use among older adults. *Journal of Aging and Health*, *32*(7-8), 724-734. doi/10.1177/0898264319848866

World Health Organisation. (2014). *hearWHO*. https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/hearwho

World Health Organization. (2019). Integrated care for older people (ICOPE): guidance for person-centred assessment and pathways in primary care. Geneva: World Health Organization.

World Health Organisation. (2020). WHO guidelines on physical activity and sedentary behaviour. Geneva: World Health Organization.

Yévenes-Briones, H., Caballero, F. F., Struijk, E. A., Rey-Martinez, J., Montes-Jovellar, L., Graciani, A., Rodríguez-Artalejo, F., & Lopez-Garcia, E. (2021). Association between hearing loss and impaired physical function, frailty, and disability in older adults: a cross-sectional study. *JAMA Otolaryngology–Head & Neck Surgery*, *147*(11), 951-958. doi:10.1001/jamaoto.2021.2399

Ziegler, T., Abdel Rahman, F., Jurisch, V., & Kupatt, C. (2019). Atherosclerosis and the capillary network; pathophysiology and potential therapeutic strategies. *Cells, 9*(1):50. doi: 10.3390/cells9010050.