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Vision Loss as a New Potentially Modifiable Risk Factor for Dementia

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An update to the 2020 report of the Lancet Commission on Dementia Prevention, Intervention and Care (Livingston et al., 2020) was presented at the July 2024 Alzheimer's Association International Conference (AAIC) and simultaneously published in the Lancet (Livingston et al., 2024). Importantly, the update provides revised population attributable fraction (PAF) statistics to estimate the potentially modifiable risk factors for dementia. Using global data, the PAF for hearing loss decreased from 8.2% (2020) to 7% (2024). The total number of risk factors increased from 12 (2020) to 14; two new risk factors for dementia were added: high LDL cholesterol (PAF 7% tied with hearing loss) and vision loss (PAF 2%). The accompanying paper in this issue (Pichora-Fuller & Mick, 2024) provides more information about the 2024 global and Canadian PAFs for dementia. In light of the addition of vision loss as a new potentially modifiable risk factor for dementia, the purpose of the present column is to explore what audiologists should know about age-related vision loss and the implications for hearing healthcare of vision being a new risk factor for dementia.

What Audiologists Should Know about Vision Loss

Vision loss is very common in older adults: The Global Burden of Disease Study (Vos et al., 2016) reports that vision and hearing loss are the second and third most prevalent impairments, yet both hearing loss and vision loss are relatively neglected in research, practice, and policy (Cieza et al., 2020; Whitson et al., 2018). The prevalence of sensory loss increases markedly with age; about half of Canadians have a hearing loss, and about half have vision loss by 75 years of age, with about half having a dual sensory (combined hearing and vision) loss by 85 years of age (Mick et al., 2021).

Vision screening: People can screen their own vision using the WHOeyes app provided by the World Health Organization (https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/whoeyes). This vision screening app is similar to the HearWHO app developed for hearing screening (https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/hearwho).

Age-related vision loss cannot always be corrected by lenses**:** Just as there are age-related changes in auditory processing that are not predictable from the audiogram and not corrected by amplification, there can be age-related vision changes that are not predictable from basic visual acuity tests, and lenses may not correct these changes. For example, changes in visual contrast

sensitivity are sometimes likened to changes in speech-in-noise thresholds. Beyond typical presbyopia, eye diseases increase with age (e.g., cataract, diabetic retinopathy, glaucoma, age-related macular degeneration), and lenses may not correct disease-related vision loss, although some conditions (e.g., cataracts) can be corrected surgically (WHO, 2019). Low-vision rehabilitation can help those whose vision cannot be corrected.

Dual sensory loss and functioning**:** Everyday functioning is negatively affected by hearing loss and vision loss alone, and these effects are compounded when people have dual hearing and vision loss. Those with hearing loss are more likely to have vision loss and vice versa; sensory loss, especially dual sensory loss, is associated with reduced social functioning; and vision loss may influence self-reported hearing ability (Hämäläinen, et al., 2021; Mick et al., 2018). There are associations between sensory loss, other aspects of health, physical functioning and even mortality (e.g., Gopinath et al., 2021; Vohra et al., 2024). Notably, there are independent modality-specific associations between sensory loss and measures of cognitive performance, with the strength of these correlations being greater for those with dual sensory loss (Fuller-Thompson et al., 2022; Phillips et al., 2022).

See: International Society of Audiology Hearing in Later Life Working Group webinar on vision loss online

Implications for Audiologic Rehabilitation:

Modality used to administer cognitive screening tests: The association between sensory loss and poorer performance on cognitive tests is independent of the modality of testing (i.e., compared to people with normal hearing, people with hearing loss can have poorer performance on visually administered cognitive tests even if they have normal vision); however, when the quality of the stimuli (whether auditory or visual) used in testing is reduced (e.g., if people have sensory loss) then cognitive performance can be reduced (Dupuis et al., 2015; Phillips et al., 2022). Furthermore, using stimuli in one or the other modality may not avoid the effects of the quality of the input on cognitive performance for the large number of older people with both hearing loss and vision loss. It should not be assumed that wearing a hearing aid overcomes all aspects of auditory aging nor that wearing glasses overcomes all aspects of visual aging. Therefore, audiologists need to know that cognitive screening requires caution for people with hearing and vision loss (Littlejohn et al., 2022; Pichora-Fuller, 2023).

Multi-modal communication and cognition:

Communication is multi-modal, and the complementarity of auditory and visual speech cues used in speech reading is well-known to audiologists. Multi-modal integration of auditory and visual cues is also important for mobility and spatial navigation in many cognitively demanding and complex everyday activities (e.g., walking, driving). Research has examined changes in brain plasticity for people with vision and hearing loss as they adapt to loss in one modality by relying more on information from the other modality to compensate during functioning (see Aguilar & Paul, 2024). Audiologists should know that the availability of visual cues can offset some of the cognitive performance reductions aggravated by hearing loss. The signal quality, whether auditory or visual, affects how well people can attend to, remember, understand, and rapidly process

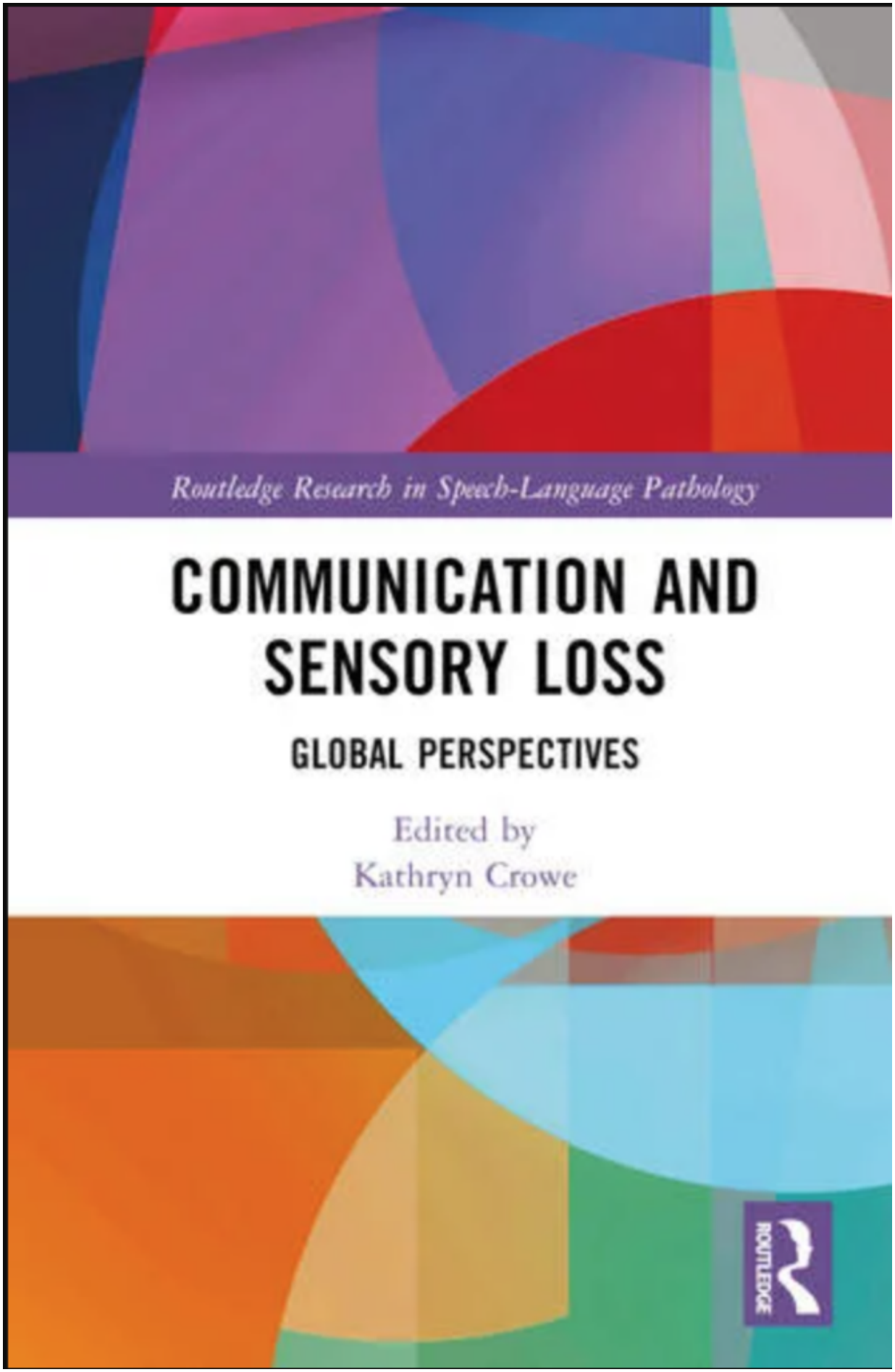
information in one or both modalities. Memory for words presented in audio-only conditions decreases as the signal-to-noise ratio (SNR) decreases. Still, lipreading helps, and memory is largely resistant to decreases in SNR when words are presented in audio-visual conditions (Pichora-Fuller, 1998). The speech perception benefits typically gained from audio-visual presentation are reduced when vision is blurred (Legault et al., 2010). Perception and memory for visual-only stimuli improves after cataract surgery (Whitson et al., 2018; Livingston et al., 2024). Audiologists should recognize the importance of ensuring that people with hearing loss are receiving good vision care.

Hearing aid candidacy:

Vision loss may be an important consideration for audiologists when recommending hearing technologies. The ergonomic choices made in selecting hearing aids and accessories (e.g., remote microphone technology) may vary if people have poor vision (Dupuis et al., 2019). Compared to people with good vision, people with poor vision who cannot compensate as well by using visual cues may become candidates for hearing aids when their audiometric loss is relatively mild (Erber, 20023). Finally, the barriers to uptake and maintaining the use of technologies for hearing loss are similar to the barriers encountered for those with low vision who require vision technologies in addition to lenses, and there is a paucity of assistive technology for people who have dual sensory impairments (Wittich et al., 2021). Audiologists should consider vision when selecting technologies – people with vision loss may have more significant and different hearing needs and they may require ergonomic features that rely less on vision.

Conclusion

The addition of vision as a new potentially modifiable risk factor for dementia is important for audiologists because many older adults with hearing loss also have vision loss. Reduced opportunities for multisensory integration and cross-modal compensation must be considered in all aspects of hearing care: screening, assessment, recommending technologies, and providing counselling or communication training. Integrated inter-professional person-centered care (ICOPE; WHO, 2017) that includes hearing, vision, mobility and cognition considerations would be ideal (Pichora-Fuller, 2024).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