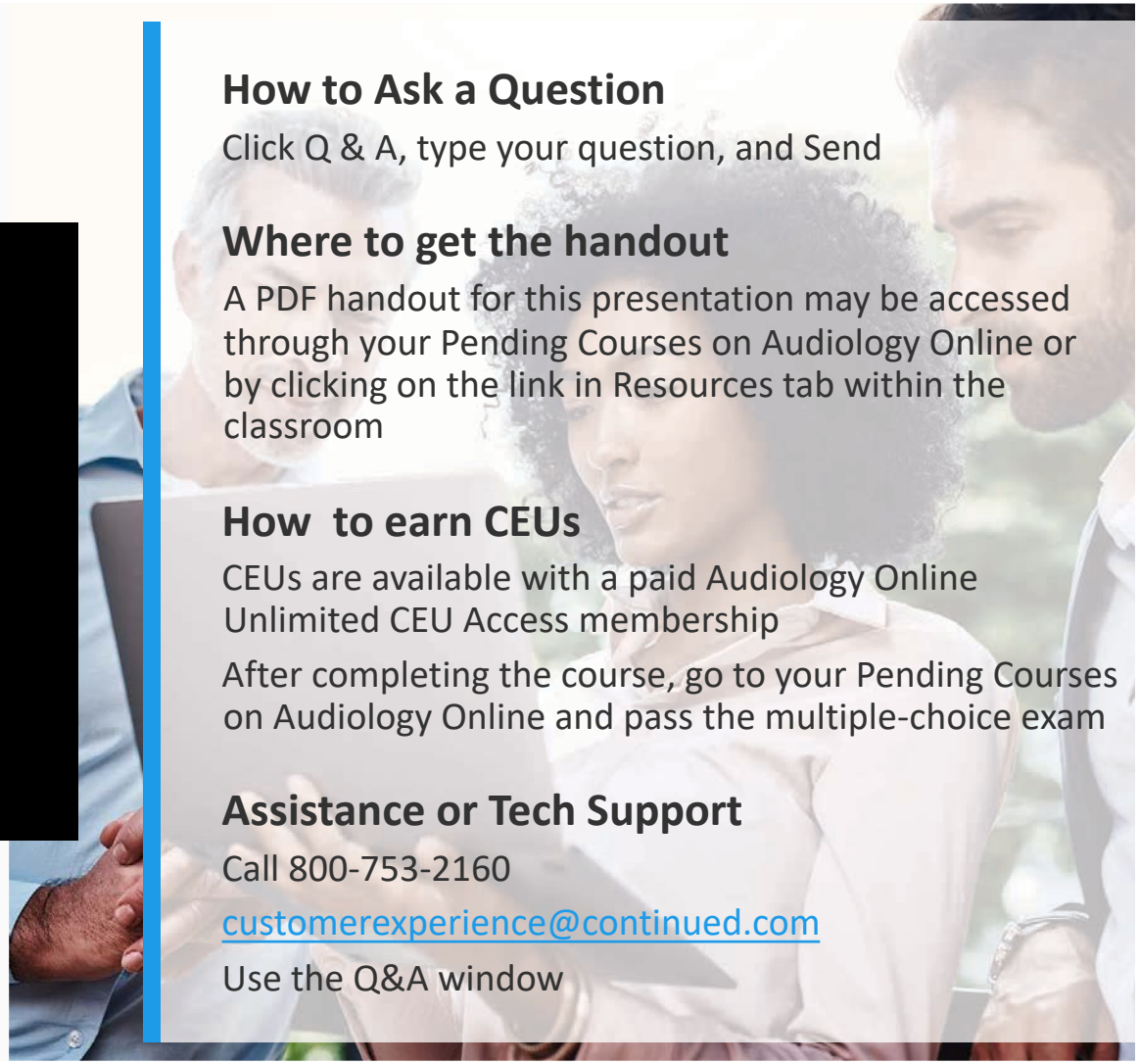
Webinar FAQs

Hearing Loss and Whole-Body Health: Understanding the Connection

Rachel Barrett, Au.D., CCC-A



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Risks and Benefits

The applicability and accuracy of the course content may vary by the clinical, geographical, and cultural context; you should evaluate the course accordingly.

As healthcare is rapidly evolving, new findings may change the validity of the information presented in this course. Providers should always consult the latest research and guidelines from professional associations.

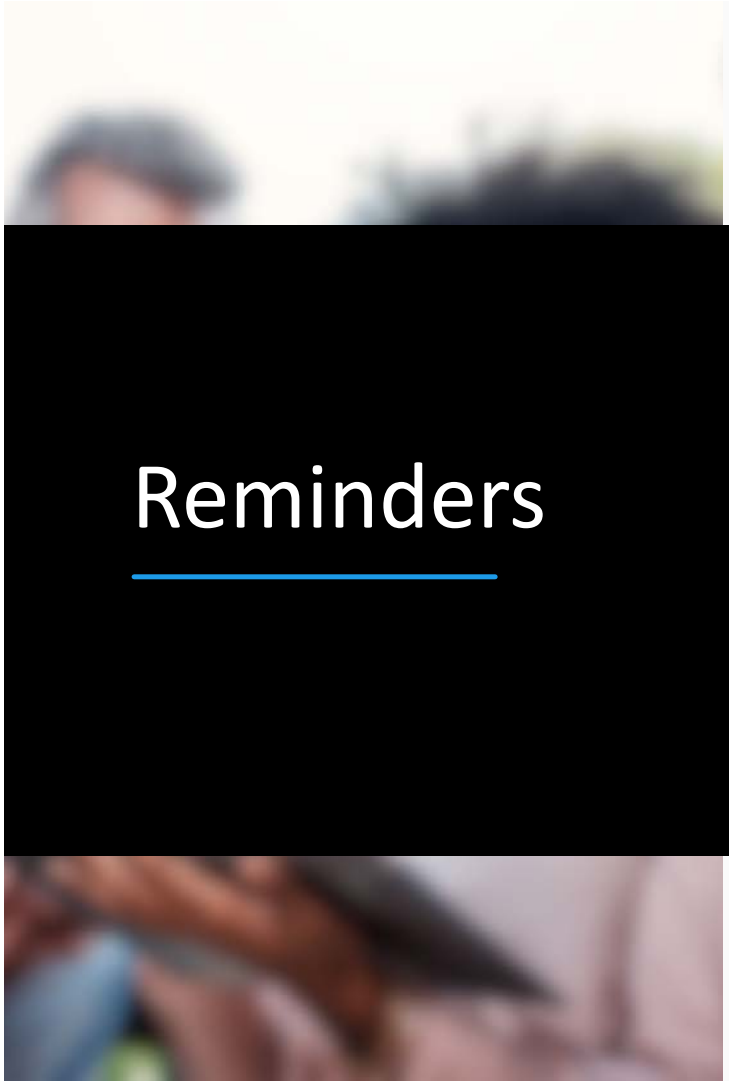
The interventions discussed in this course may be limited in generalizability, requiring practitioners to consider specific individual and population factors.

The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.

Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.

Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.

It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.



Reminders

Evidence-Based

All CE courses on continued.com must be evidence-based.
In evidence-based continuing education sessions, the presenter provides:

- The best available, current, scientific evidence to support a particular practice or guideline which can include exploratory or pilot study data and the related evidence
- Information about his/her clinical expertise, expert opinion, and experience in this topic area
- Information related to client/patient/caregiver values.
- An indication of the level of evidence (e.g., systematic review, randomized control trial, cohort study, expert opinion, etc.) for each piece of evidence presented, ensuring clarity on the strength and reliability of the supporting data.

References

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Agarwal, S., Mishra, A., Jagade, M., Kasbekar, V., & Nagle, S. K. (2013). Effects of hypertension on hearing. Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India, 65(Suppl 3), 614–618. https://doi.org/10.1007/s12070-013-0630-1

Agmon M, Lavie L, Doumas M. The Association between Hearing Loss, Postural Control, and Mobility in Older Adults: A Systematic Review. Journal of the American Academy of Audiology, 2017; 28(6),575–588.

Ambrose, A. F., Paul, G., & Hausdorff, J. M. (2013). Risk factors for falls among older adults: a review of the literature. Maturitas, 75(1), 51–61. doi:10.1016/j.maturitas.2013.02.009

Black and Souza (2020). "Cognitive-Screening Practices Among Audiologists," Audiology Today, 32 (5), 44-51.

Burns, E., & Kakara, R. (2018). Deaths from falls among persons aged ≥65 years - United States, 2007-2016. MMWR. Morbidity and Mortality Weekly Report, 67(18), 509–514. doi:10.15585/mmwr.mm6718a1

Caballero-Borrego, M., & Andujar-Lara, I. (2025). Type 2 diabetes mellitus and hearing loss: A Prisma systematic review and meta-analysis. Otolaryngology--Head and Neck Surgery: Official Journal of American Academy of Otolaryngology-Head and Neck Surgery, 173(5), 1041–1053. doi:10.1002/ohn.1346

Chang, J. E., Weinstein, B., Chodosh, J., & Blustein, J. (2018). Hospital readmission risk for patients with self-reported hearing loss and communication trouble. Journal of the American Geriatrics Society, 66(11), 2227–2228. doi:10.1111/jgs.15545

Eckstrom E, Parker EM, Lambert GH, Winkler G, Dowler D, Casey CM. Implementing STEADI in Academic Primary Care to Address Older Adult Fall Risk. Innovation in Aging, 2017;1(2),igx028.

Haddad, Y. K., Karani, M. V., Bergen, G., & Marcum, Z. A. (2019). Willingness to change medications linked to increased fall risk: A comparison between age groups. Journal of the American Geriatrics Society, 67(3), 527–533. doi:10.1111/jgs.15696

Harvey, J. A., Chastin, S. F. M., & Skelton, D. A. (2015). How sedentary are older people? A systematic review of the amount of sedentary behavior. Journal of Aging and Physical Activity, 23(3), 471–487. doi:10.1123/japa.2014-0164

Hutchinson, K. M., Alessio, H., & Baiduc, R. R. Association Between Cardiovascular Health and Hearing Function: Pure-Tone and Distortion Product Otoacoustic Emission Measures. American Journal of Audiology, 2010;19(1), 26–35.

Kuo, P. L., Di, J., Ferurcci, 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. https://doi.org/10.1001/jamanetworkopen.2021.5484

Lalwani, A. K., Katz, K., Liu, Y.-H., Kim, S., & Weitzman, M. (2013). Obesity is associated with sensorineural hearing loss in adolescents. *The Laryngoscope*, *123*(12), 3178–3184. doi:10.1002/lary.24244

Livingston, G., Huntley, J., Sommerlad, A., Ames, D., Ballard, C., Banerjee, S., Brayne, C., Burns, A., Cohen-Mansfield, J., Cooper, C., Costafreda, S. G., Dias, A., Fox, N., Gitlin, L. N., Howard, R., Kales, H. C., Kivimäki, M., Larson, E. B., Ogunniyi, A., Orgeta, V., … Mukadam, N. (2020). Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. *Lancet (London, England)*, *396*(10248), 413–446. https://doi.org/10.1016/S0140-6736(20)30367-6

Mahafza, N., Zhao, F., El Refaie, A., & Chen, F. (2021). A comparison of the severity of tinnitus in patients with and without hearing loss using the tinnitus functional index (TFI). *International Journal of Audiology*, *60*(3), 220–226. doi:10.1080/14992027.2020.1804081

Moreland, B., Kakara, R., & Henry, A. (2020). Trends in nonfatal falls and fall-related injuries among adults aged ≥65 years - United States, 2012-2018. *MMWR. Morbidity and Mortality Weekly Report*, *69*(27), 875–881. doi:10.15585/mmwr.mm6927a5

Nawaz, M. U., Vinayak, S., Rivera, E., Elahi, K., Tahir, H., Ahuja, V., … Naz, S. (2021). Association between Hypertension and hearing loss. *Cureus*, *13*(9), e18025. doi:10.7759/cureus.18025

References

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Paganini-Hill, A., Greenia, D. E., Perry, S., Sajjadi, S. A., Kawas, C. H., & Corrada, M. M. (2017). Lower likelihood of falling at age 90+ is associated with daily exercise a quarter of a century earlier: The 90+ Study. *Age and Ageing*, *46*(6), 951–957. doi:10.1093/ageing/afx039

Perissinotto, C. M., Stijacic Cenzer, I., & Covinsky, K. E. (2012). Loneliness in older persons: a predictor of functional decline and death. *Archives of Internal Medicine*, *172*(14), 1078–1083. doi:10.1001/archinternmed.2012.1993

Piccirillo, J. F., Rodebaugh, T. L., & Lenze, E. J. (2020). Tinnitus. *The Journal of the American Medical Association*, *323*(15), 1497–1498. doi:10.1001/jama.2020.0697

Picou, E. M. (2020). MarkeTrak 10 (MT10) survey results demonstrate high satisfaction with and benefits from hearing aids. *Seminars in Hearing*, *41*(1), 21–36. doi:10.1055/s-0040-1701243

Ray, J., Popli, G., & Fell, G. (2018). Association of cognition and age-related hearing impairment in the English Longitudinal Study of Ageing. *JAMA Otolaryngology-- Head & Neck Surgery*, *144*(10), 876–882. doi:10.1001/jamaoto.2018.1656

Reed, N. S., Chen, J., Huang, A. R., Pike, J. R., Arnold, M., Burgard, S., … ACHIEVE Collaborative Research Group. (2025). Hearing intervention, social isolation, and loneliness: A secondary analysis of the ACHIEVE randomized clinical trial. JAMA Internal Medicine, 185(7), 797–806. doi:10.1001/jamainternmed.2025.1140

Reinhart, P., Griffin, K., & Micheyl, C. (2021). Changes in Heart Rate Variability Following Acoustic Therapy in Individuals With Tinnitus. *Journal of speech, language, and hearing research : JSLHR*, *64*(4), 1413–1419. https://doi.org/10.1044/2021_JSLHR-20-00596

Seol, H. Y., Jo, M., & Moon, I. J. (2023). The effectiveness of a smartphone application for tinnitus relief. Healthcare (Basel, Switzerland), 11(17), 2368. doi:10.3390/healthcare11172368

Souza, P., Schoof, T., and Shen, J. (2017), "Can Individual Cognitive Abilities Direct Audiology Treatment?" Audiology Today, 29 (2), 25-31.

Stevens, J. A., Ballesteros, M. F., Mack, K. A., Rudd, R. A., DeCaro, E., & Adler, G. (2012). Gender differences in seeking care for falls in the aged Medicare population. *American Journal of Preventive Medicine*, *43*(1), 59–62. doi:10.1016/j.amepre.2012.03.008

Stevens, J. A., Noonan, R. K., & Rubenstein, L. Z. (2010). Older adult fall prevention: Perceptions, beliefs, and behaviors. *American Journal of Lifestyle Medicine*, *4*(1), 16–20. doi:10.1177/1559827609348350

Stevenson, J. S., Clifton, L., Kuźma, E., & Littlejohns, T. J. (2022). Speech-in-noise hearing impairment is associated with an increased risk of incident dementia in 82,039 UK Biobank participants. Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 18(3), 445–456. doi:10.1002/alz.12416

Tan, C. J.-W., Koh, J. W. T., Tan, B. K. J., Woon, C. Y., Teo, Y. H., Ng, L. S., & Loh, W. S. (2024). Association between hearing loss and cardiovascular disease: A meta-analysis. Otolaryngology--Head and Neck Surgery: Official Journal of American Academy of Otolaryngology-Head and Neck Surgery, 170(3), 694–707. doi:10.1002/ohn.599

Tiase, V. L., Tang, K., Vawdrey, D. K., Raso, R., Adelman, J. S., Yu, S. P., Applebaum, J. R., & Lalwani, A. K. (2020). Impact of Hearing Loss on Patient Falls in the Inpatient Setting. American journal of preventive medicine, 58(6), 839–844. https://doi.org/10.1016/j.amepre.2020.01.019

Tinetti, M. E., Speechley, M., & Ginter, S. F. (1988). Risk factors for falls among elderly persons living in the community. The New England Journal of Medicine, 319(26), 1701–1707. doi:10.1056/NEJM198812293192604

Wattamwar, K., Qian, Z. J., Otter, J., Leskowitz, M. J., Caruana, F. F., Siedlecki, B., … Lalwani, A. K. (2018). Association of cardiovascular comorbidities with hearing loss in the older old. JAMA Otolaryngology-- Head & Neck Surgery, 144(7), 623–629. doi:10.1001/jamaoto.2018.0643

Yang, J. R., Hidayat, K., Chen, C. L., Li, Y. H., Xu, J. Y., & Qin, L. Q. (2020). Body mass index, waist circumference, and risk of hearing loss: a meta-analysis and systematic review of observational study. Environmental health and preventive medicine, 25(1), 25. https://doi.org/10.1186/s12199-020-00862-9

Learning Outcomes

1. Identify three comorbid conditions that are associated with hearing loss
2. List three risk factors for the prevention of dementia according to the Lancet Commission
3. List two fall risk factors that are modifiable

Hearing Loss and Whole-Body Health: Understanding the Connection

Rachel Barrett, Au.D., CCC-A
Education & Training Audiologist

Starkey

Agenda

Introduction

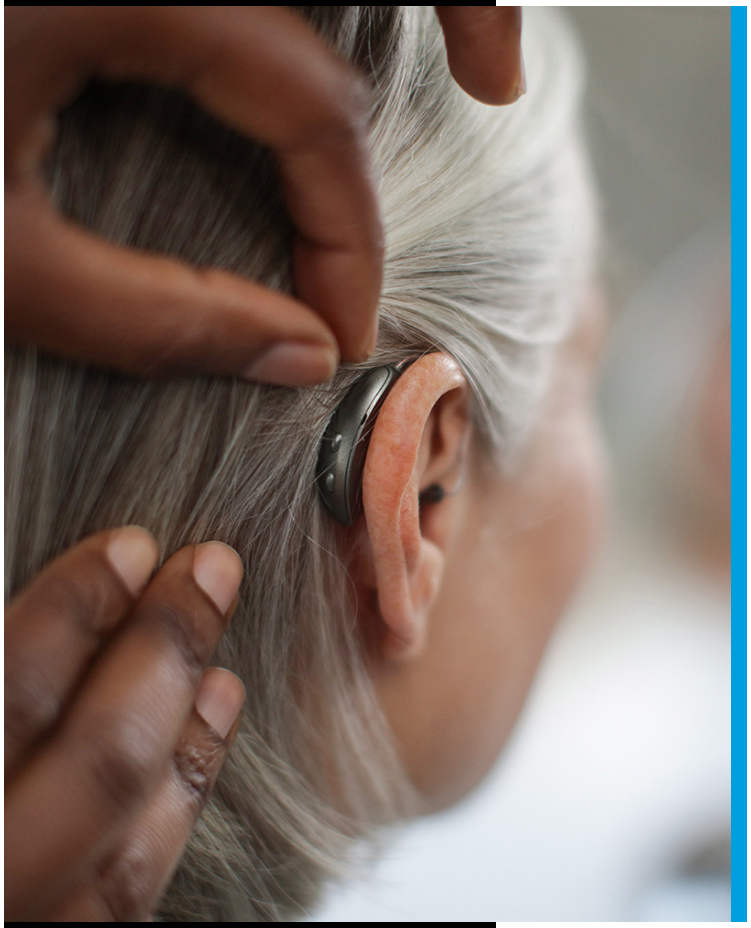
Current Research

Setting Up for Success

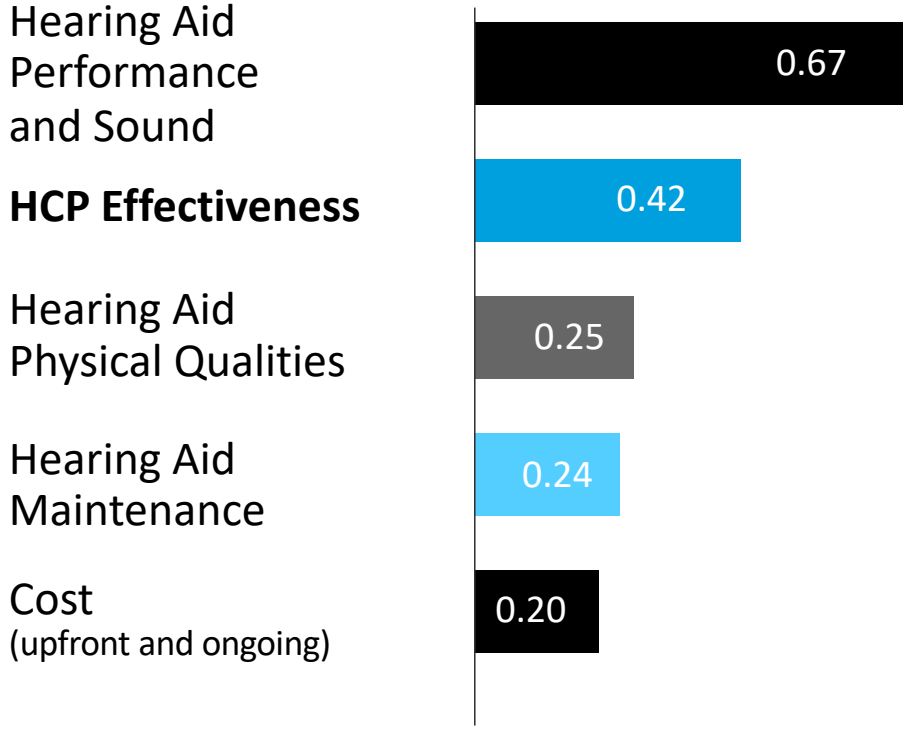
Closing

Starkey

> The provider-patient relationship is a foundation of clinical care…it has been shown to positively influence health outcomes by increasing patient satisfaction, leading to greater patient understanding of health problems and treatments available, and contributing to better adherence to treatment plans.
>
> *- Duke Center for Personalized Health Care*



Hearing Aid Satisfaction



MarkeTrak 10 / Hearing Industries Association, 2019


Consumers are
Becoming More
Proactive About
Healthcare

Take Charge of Their Health and Healthcare Decisions

Boomers are **2.5x more likely** to be proactive about their health

View their providers as partners who work with them to optimize their health

4x more likely to actively research health information

80% expect to be healthy and active at the age of 75

Patient Education and Research

HEARING LOSS IS THE

Third Most Prevalent

Chronic Condition in the World

2020

430 Million

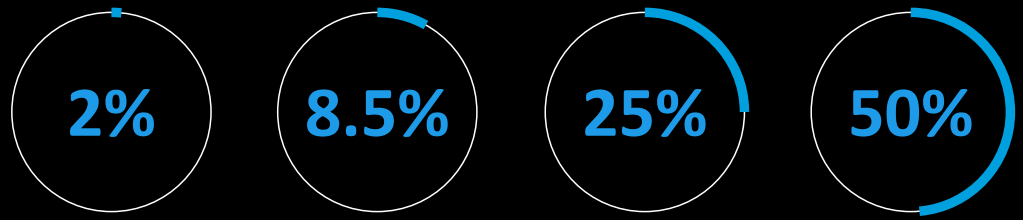
have disabling **hearing loss**

2050

700 Million

will have disabling **hearing loss**

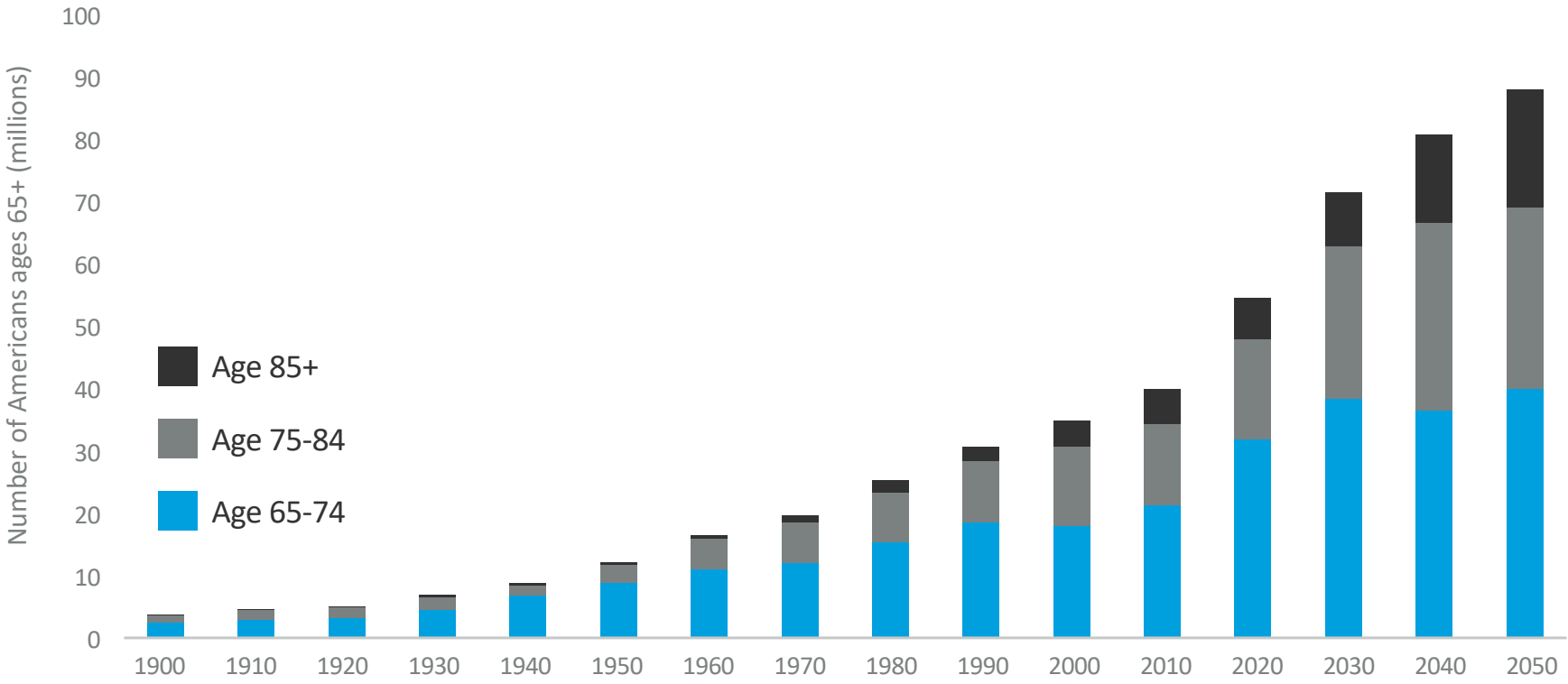
AGE IS THE STRONGEST PREDICTOR OF HEARING LOSS



Age 45-54 | Age 55-64 | Age 65-74 | Age 75+

The Aging Population

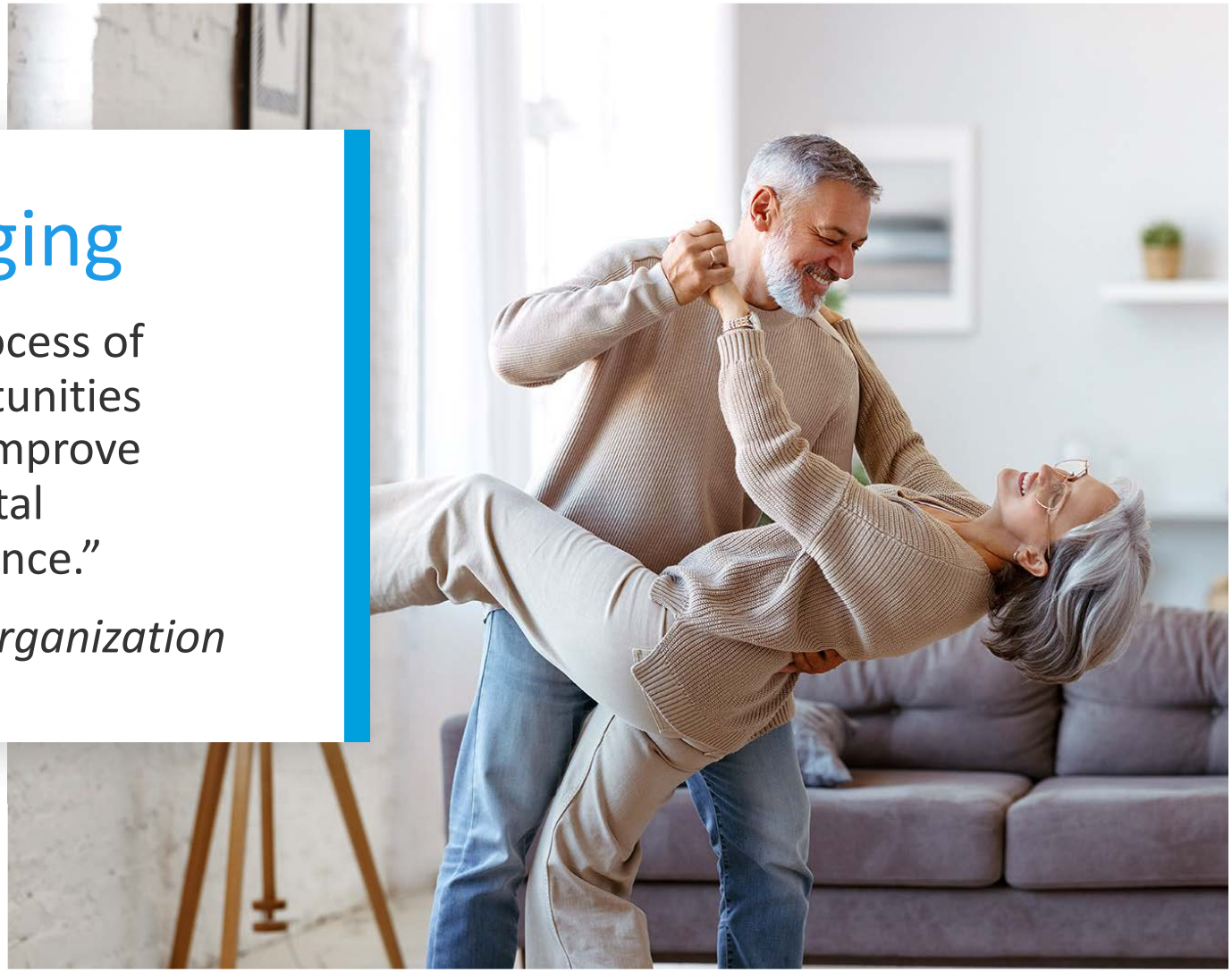
Population of Americans Ages 65+, 1900-2050



Healthy Aging

"A continuous process of optimizing opportunities to maintain and improve physical and mental health independence."

– World Health Organization



2021-2030 has been designated as the Decade of Healthy Aging

A 2022-2023 survey of 136 countries documented a 20% increase in:

Legislation against ageism

Legislation to support senior access to assistive products

Assessment of health and social needs of the aging population

National programs for age friendly cities and communities

Aging in Place

> The ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level.

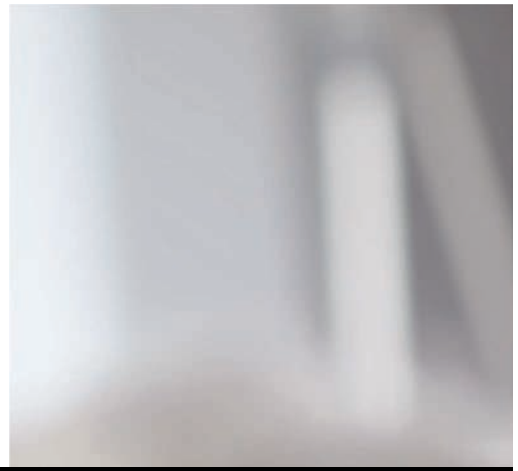
– U.S. Centers for Disease Control and Prevention

Obesity

Diabetes

Hypertension

Cardiovascular Disease



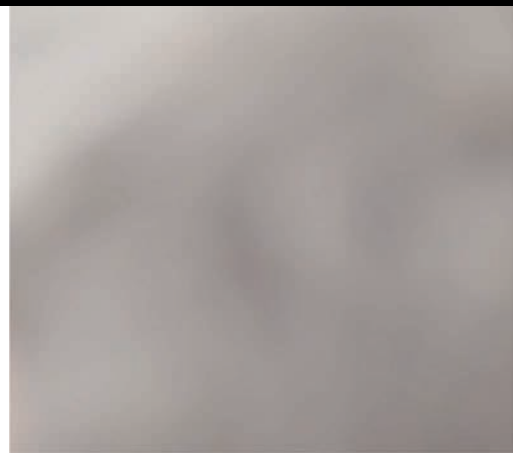
Associations with Hearing Loss

Safety & Balance

Tinnitus

Loneliness

Dementia



"Hearing loss may decrease older adults' **participation in social activities** and increase the likelihood of developing **depression and anxiety**. This in turn may **affect cognition, reduce physical activity and competence**, and **increase risk of falls**."

Agmon M, Lavie L, Doumas M. The Association between Hearing Loss, Postural Control, and Mobility in Older Adults: A Systematic Review. Journal of the American Academy of Audiology, 2017; 28(6),575–588.

For every 10 dB increase
in hearing loss, people spend

8.5 minutes

more per day being sedentary

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. https://doi.org/10.1001/jamanetworkopen.2021.5484

Adults 60+ spend 80% of life sitting down

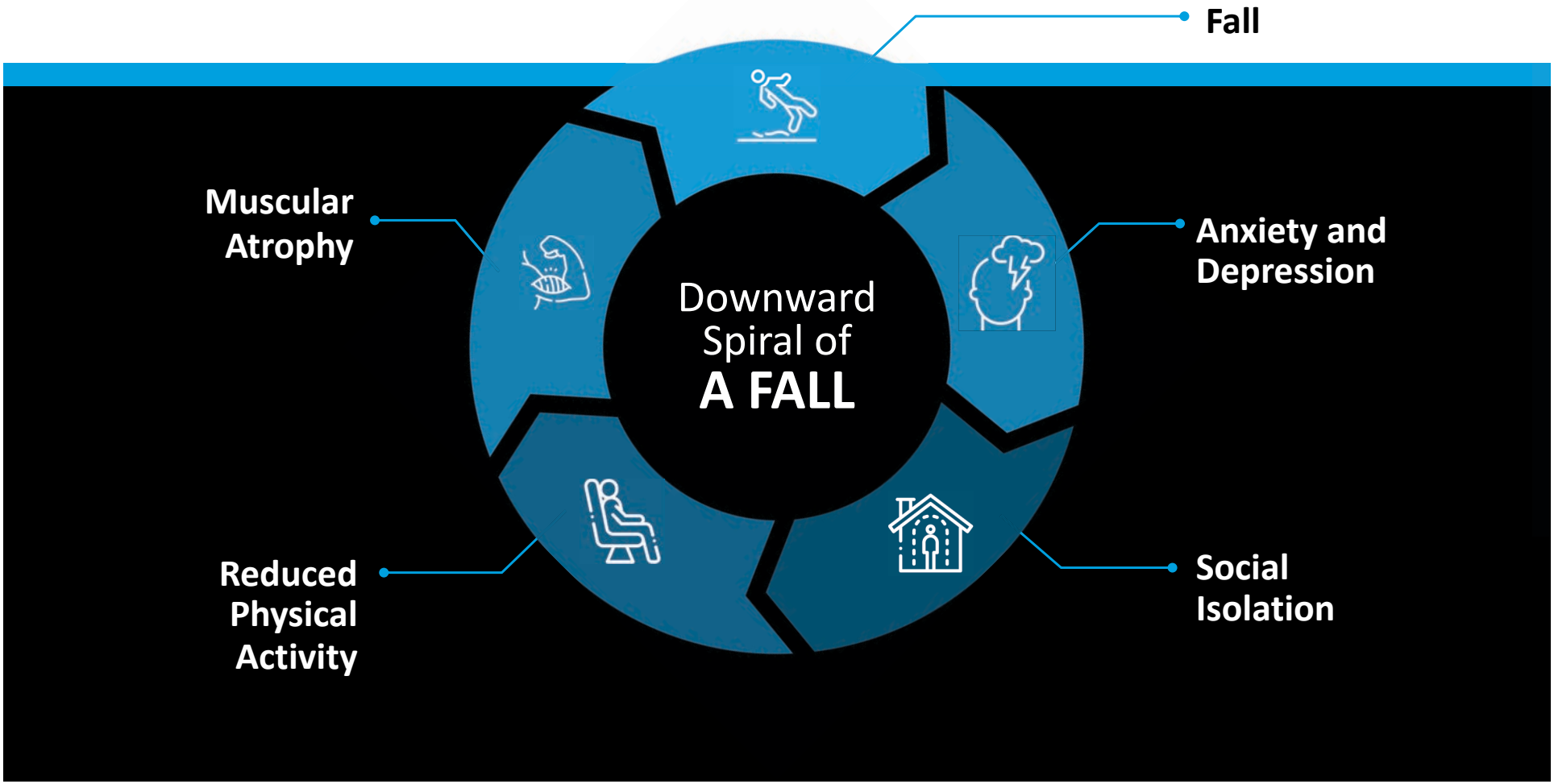
Sedentary lifestyle is risk for falls due to impact on muscle function and mobility

30+ minutes

of physical activity per day at age 65 ***can reduce 35-40% of falls*** when older

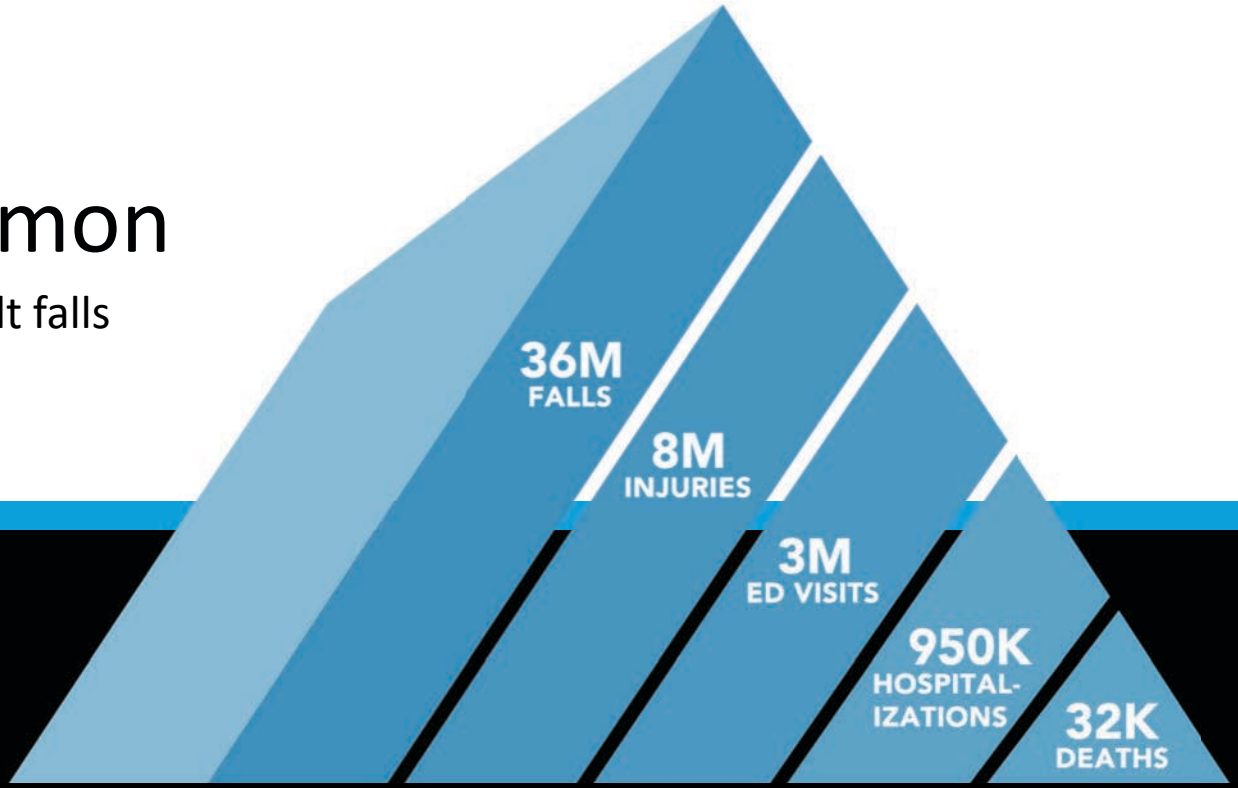
Harvey JA, Chastin SFM, Skelton, DA. How Sedentary Are Older People? A Systematic Review of the Amount of Sedentary Behavior. Journal of Aging and Physical Activity, 2015; 23(3),471–487. https://doi.org/10.1123/japa.2014-0164.

Paganini-Hill A, Greenia DE, Perry S, et al. Lower likelihood of falling at age 90+ is associated with daily exercise a quarter of a century earlier: The 90+ Study. Age and Ageing, 2017;46(6),951–957. https://doi.org/10.1093/ageing/afx039.


Fall
Anxiety and Depression
Social Isolation
Reduced Physical Activity
Muscular Atrophy
Downward Spiral of
A FALL

Falls are Common

Every **second** an older adult falls



Data sources: National Vital StatistiSystem, National Electronic Injury Surveillance System–All Injury Program, and Behavioral Risk Factor Surveillance System.

CDC. Web-based Injury Statistics Query and Reporting System (WISQARS) [online]. [cited 2020 July 10]. Available from URL: www.cdc.gov/injury/wisqars. Atlanta, GA: National Center for Injury Prevention and Control.

Moreland B, Kakara R, Henry A. Trends in Nonfatal Falls and Fall-Related Injuries Among Adults Aged ≥65 years—United States, 2012-2018, MMWR Morb Mortal Wkly Rep 2020;69(27):875-881. DOI; http://dx.doi.org/10.15585/mmwr.mm6927a5

Reasons Patients Do **Not** Talk to Their Doctor

Belief that falls are a normal part of aging

Fear that reporting a fall may lead to loss of independence

Not aware of common fall risk factors

Falls might not be a priority for patients

Less than half of older adults who fall, talk to their doctor about falls

Stevens JA, Ballesteros MF, Mack KA, Rudd RA, DeCaro E, Adler G. Gender Differences in Seeking Care for Falls in the Aged Medicare Population. Am J Prev Med 2012;43(1):59-62. DOI: 10.1016/j.amepre.2012.03.008

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Common Fall Risk Factors

Fall Risk Increases as the Number of Risk Factors Increase

Modifiable Risk Factors	Non-modifiable Risk Factors
Gait, strength, and balance deficits	Age
Medication side effects	Sex
Home hazards	Race/ethnicity
Orthostatic hypotension	History of falls
Vision problems	
Foot issues/inappropriate footwear	
Vitamin D deficiency	
Comorbidities	

Moreland B, Kakara R, Henry A. Trends in Nonfatal Falls and Fall-Related Injuries Among Adults Aged ≥65 years—United States, 2012-2018. MMWR Morb Mortal Wkly Rep 2020;69(27):875-881. DOI: 10.15585/mmwr.mm6927a5

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Visual Observations

Markers of Sarcopenia

Frailty

Slowed walking speed

Easily fatigued or winded

Use of walking aids, including relying on a companion

Shuffling of feet or short strides

Reliance on using hands when getting out of a chair

Reaching out to furniture or walls for stability or confidence when walking

Bruises or other injuries

Cognitive Mechanisms

Cognitive decline
Divided attention
Impaired central compensation
Reaction speed
Stroke and brain injuries
Medication side effects

Environmental Factors

Home hazards
Environmental awareness
Spatial orientation
Biofeedback

Behavioral Effects

Depression and anxiety
Social participation
Physical activity

Sensory Disturbances

Common-pathway pathologies
Conflicting inputs
Sensory organization
Stochastic resonance
Medication side effects

Falls Are Preventable

The **Stopping Elderly Accidents, Deaths, and Injuries (STEADI)** initiative was developed by the U.S. Centers for Disease Control and Prevention (CDC)

STEADI is based on the American and British Geriatrics Societies' Clinical Practice Guideline for Prevention of Falls in Older Persons and designed with input from healthcare providers

STEADI offers tools and resources to help healthcare providers **Screen**, **Assess**, and **Intervene** to reduce fall risk

STEADI: Stopping Elderly Accidents, Deaths, & Injuries

Have you fallen in the past year?

Do you feel unsteady when standing or walking?

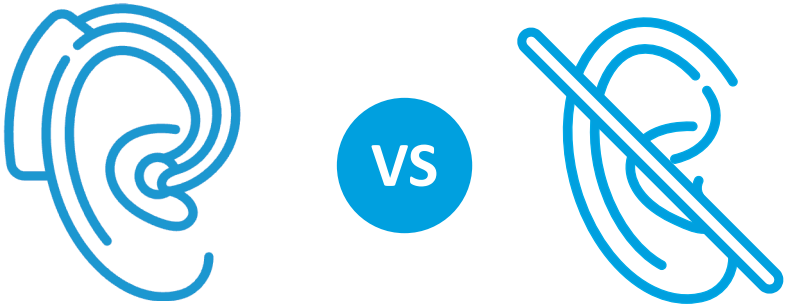
Do you worry about falling?

"Our analysis showed that using only the three key questions identified 95% of these high-risk patients, potentially reducing the time needed to screen patients."

SCREEN	ASSESS	INTERVENE
		
Identify patient at risk for a fall	Identify modifiable risk factors	Use effective clinical and community strategies

Eckstrom E, Parker EM, Lambert GH, Winkler G, Dowler D, Casey CM. Implementing STEADI in Academic Primary Care to Address Older Adult Fall Risk. Innovation in Aging, 2017;1(2),igx028.

Hearing Loss is a **Modifiable** Risk Factor



Aided **Unaided**

2.7X
more likely to fall

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Hearing Loss is a Modifiable Risk Factor

"These findings suggest that adding hearing loss as a **modifiable risk factor** in risk assessment tools for falls and exploring the **use of amplification devices as an intervention may help to reduce falls in patients**."

Tiase, V. L., Tang, K., Vawdrey, D. K., Raso, R., Adelman, J. S., Yu, S. P., Applebaum, J. R., & Lalwani, A. K. (2020). Impact of Hearing Loss on Patient Falls in the Inpatient Setting. American Journal of Preventive Medicine, 58(6), 839–844.

VS

Aided

Normal Hearing

NOT more likely to fall than normal hearing

Referrals and Recommendations

Primary care/gerontology

Pharmacy

Use of ≥4 medications, sleep aids, diuretics, or anti-depressants warrants a therapeutic review

Pharmacists review and coordinate prescriptions from patients' multiple providers

Physical & occupational therapy

CDC & STEADI

Community based programs

Otago Exercise Program

Silver Sneakers

Tai chi

Stepping On

Stay Active & Independent for Life (SAIL)

Home Hazard Removal Program (HARP)

https://ncoa.org/evidence-based-programs

STEADI Tools and Resources

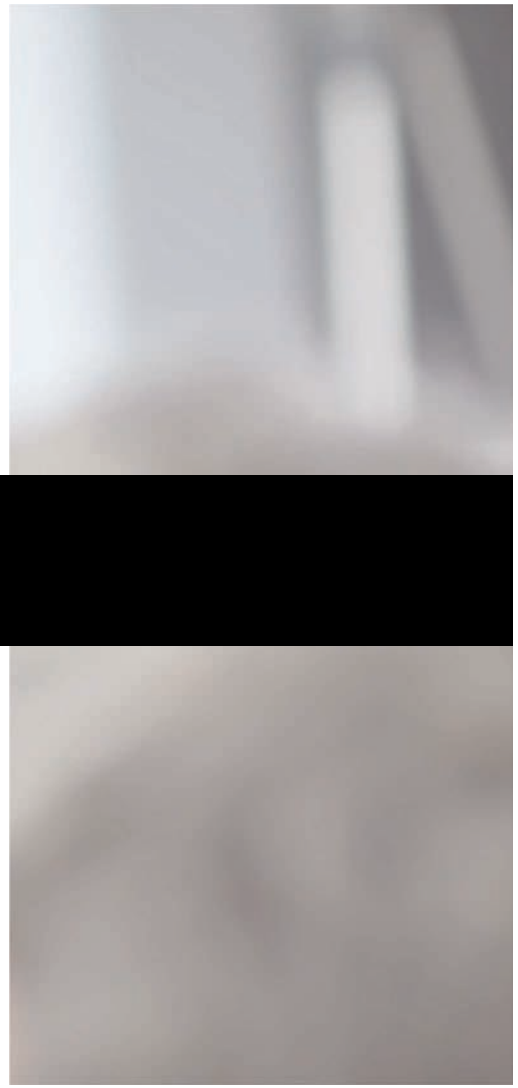
For clinicians

For patients

https://www.cdc.gov/steadi/

Associations with Hearing Loss

- Obesity
- Diabetes
- Hypertension
- Cardiovascular Disease
- Safety & Balance
- **Tinnitus**
- Loneliness
- Dementia



Tinnitus

One of the **most common health conditions** in the United States

American Academy of Otolaryngology found that **one in ten Americans** experience some form of tinnitus

The NIDCD estimates that approximately **two million Americans** experience debilitating tinnitus

American Tinnitus Association

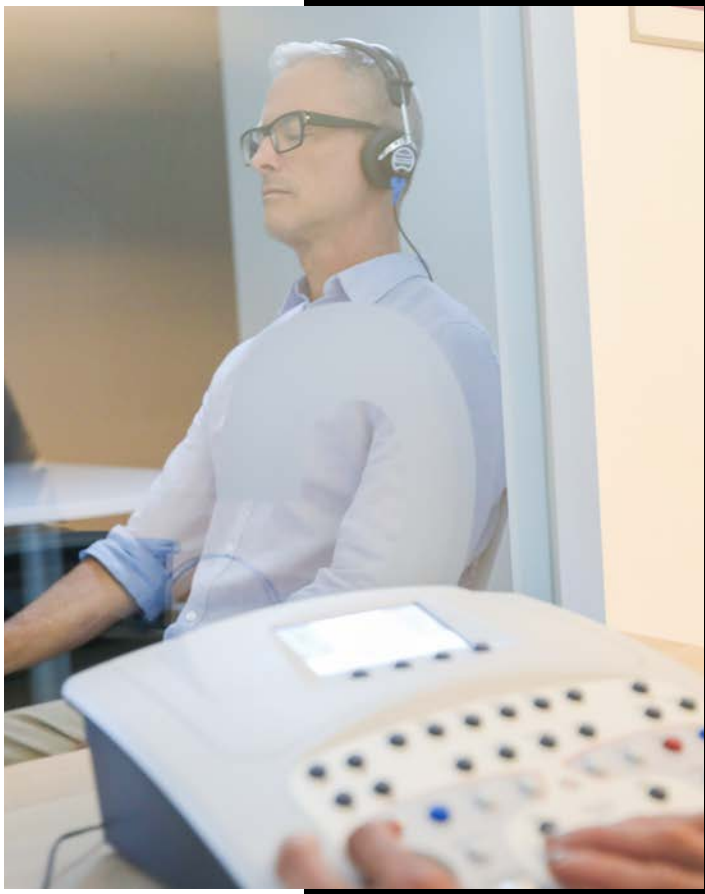
Tinnitus and Hearing Loss

Any degree of hearing loss

Any type of hearing loss

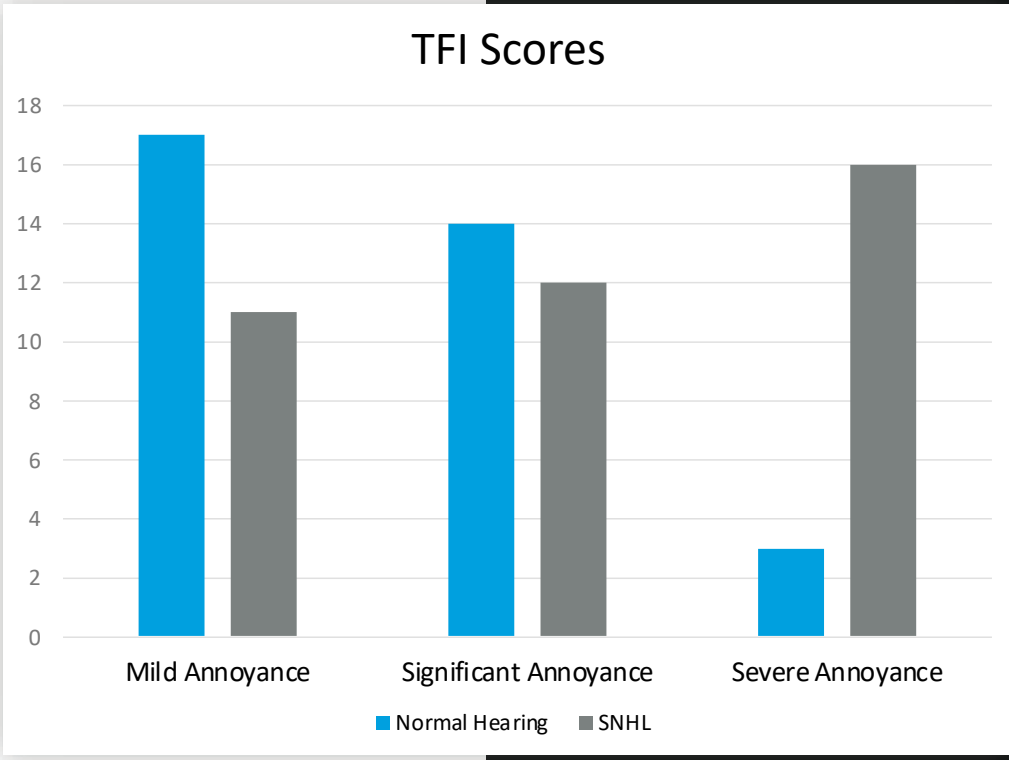
Any cause or type of onset

Changes in hearing loss and changes in tinnitus tend to occur independently of one another

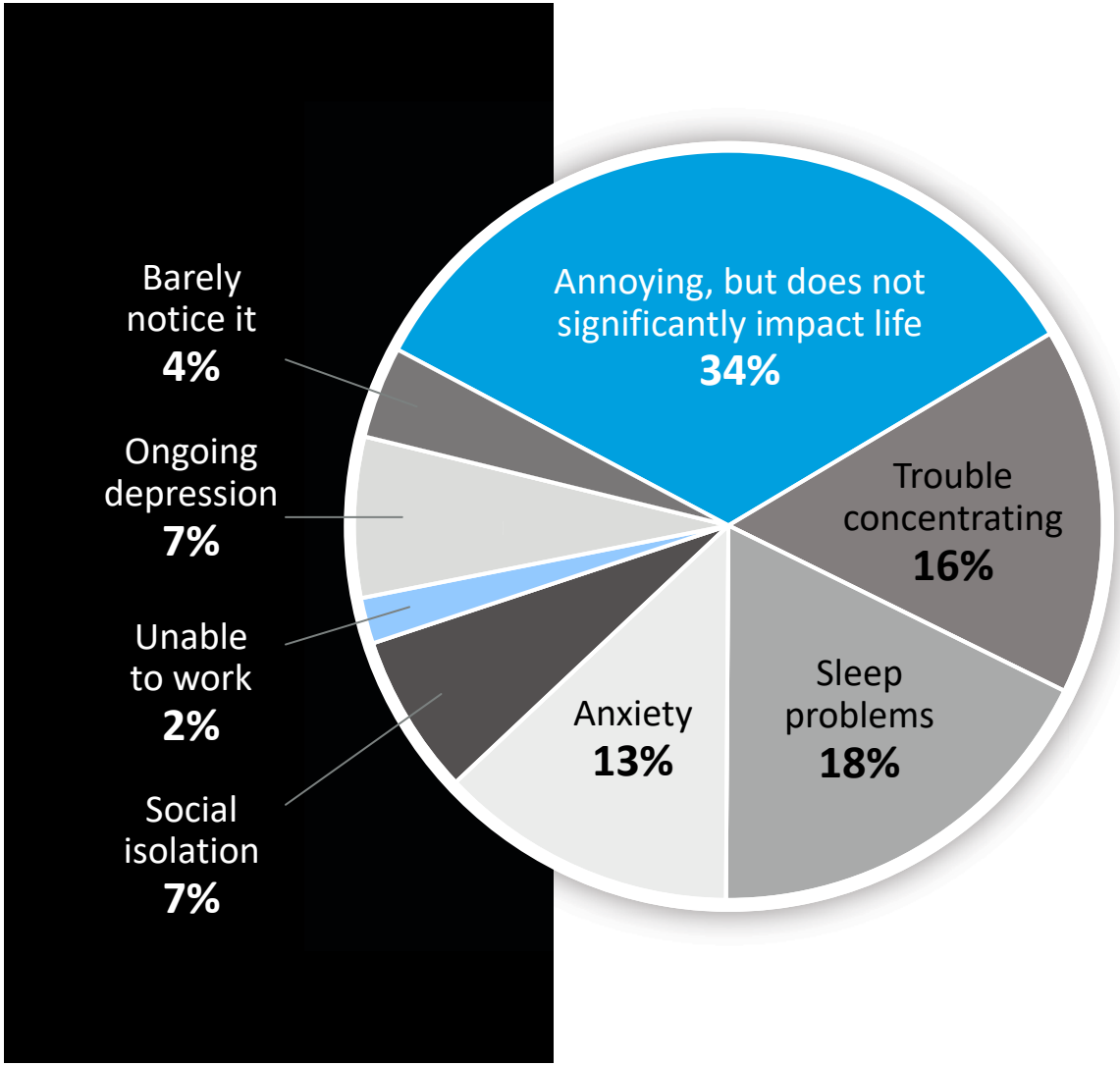


Tinnitus and Hearing Loss

No correlation between tinnitus severity and hearing threshold, though those with hearing loss are found to have a higher tinnitus severity



Mahafza N, Zhao F, El Refaie A, Chen F. *A comparison of the severity of tinnitus in patients with and without hearing loss using the tinnitus functional index (TFI). Int J Audiol.* 2021 Mar;60(3):220-226. doi: 10.1080/14992027.2020.1804081. Epub 2020 Aug 13. PMID: 32787604.



Quality of Life Impacts

Thoughts and emotions

Sleep

Concentration

Socialization

Physical health

Economic well-being

Treatment Options

Provider Driven

Sound Maskers

Patient Driven

Lifestyle Management

Referral

Cognitive Behavioral Therapy (CBT)

Maskers in Hearing Aids

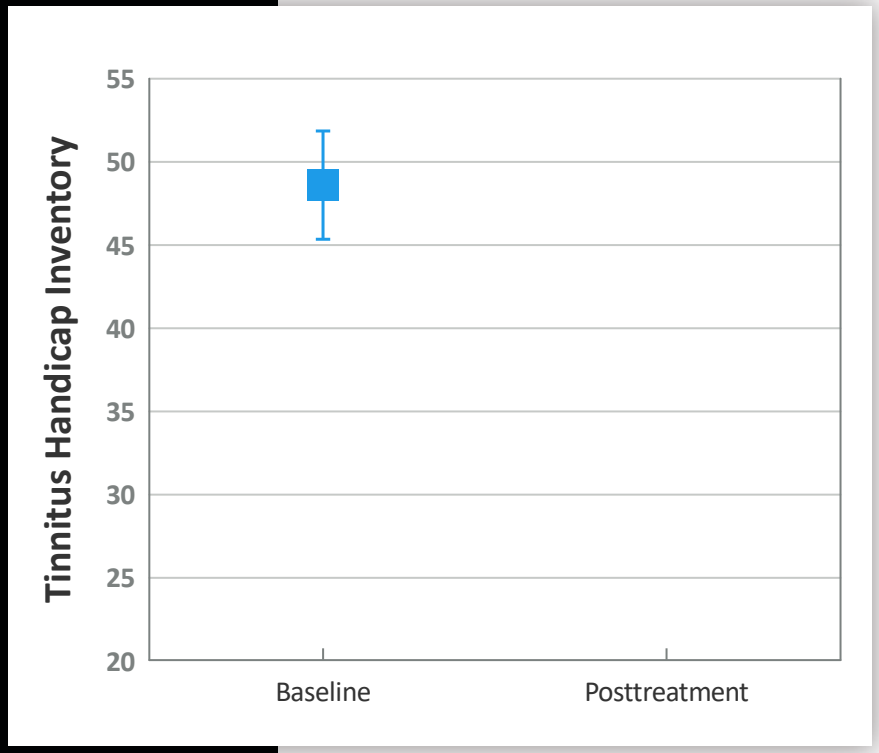
RESEARCH DATA

In this study, participants were provided multiple masker options to use at their discretion in order to achieve tinnitus relief.

Study was comprised of 26 individuals with hearing loss.

Participants completed an 8-week field trial wearing hearing aids providing acoustic therapy via three tinnitus masker options set just below minimum masking level.

Tinnitus Handicap Inventory was used before starting acoustic therapy and posttreatment to measure the patients' tinnitus handicap.



Source: *Journal of Speech, Language, and Hearing Research,* Vol. 64, 1415, Figure 2, April 2021.

Maskers in Hearing Aids

DATALOGGING RESULTS

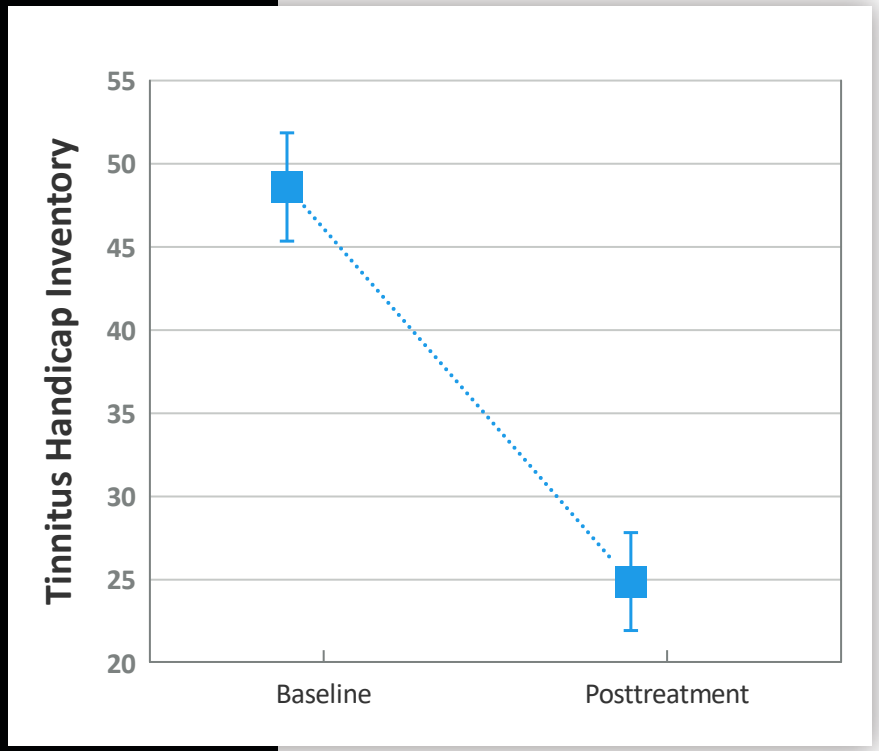
Average hearing aid use was 9.4 hr (SD = 4.2 hr) during the field trial, and

Average of 34.4% of that time was spent utilizing a tinnitus masker

13.8%
with white noise;

10.5%
with audiogram-shaped noise;

10.0%
with custom noise



Source: *Journal of Speech, Language, and Hearing Research,* Vol. 64, 1415, Figure 2, April 2021.

Sound/Sleep Apps

RESEARCH DATA:

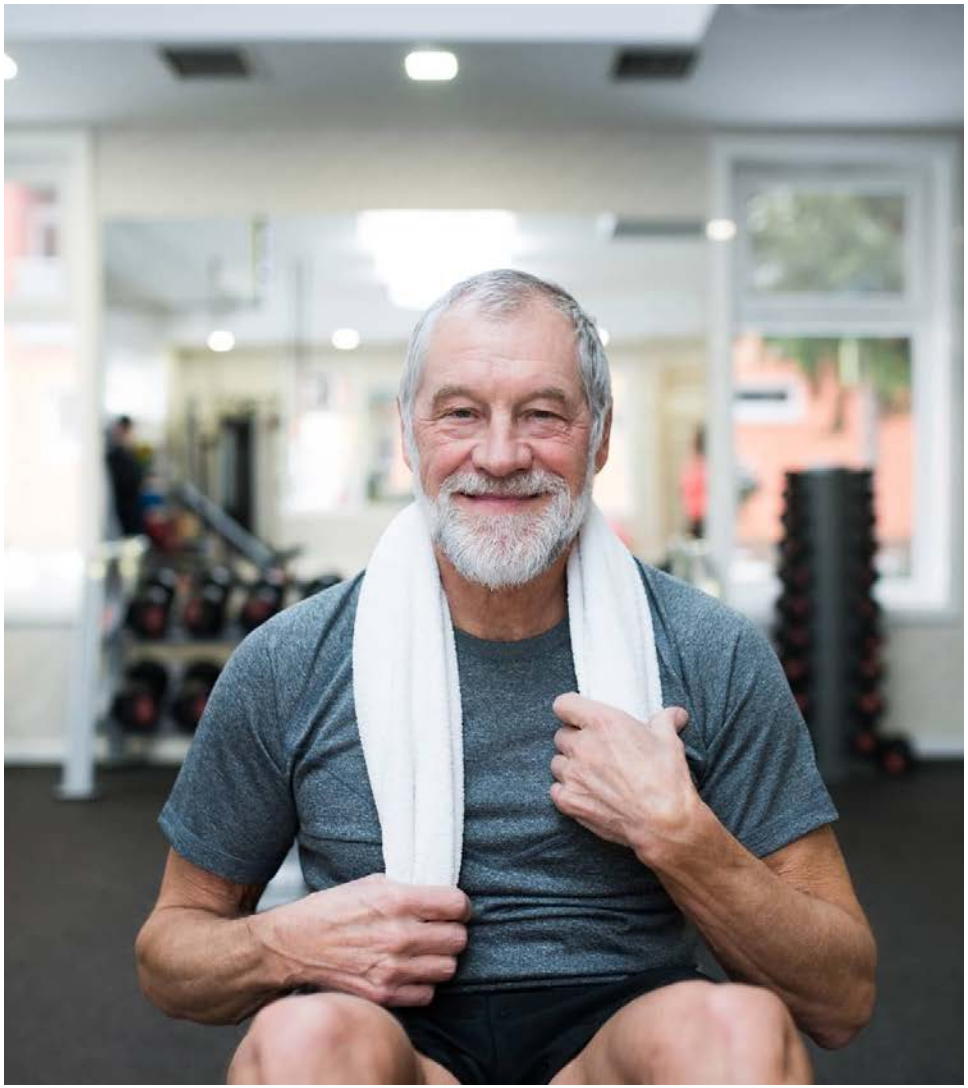
22 participants with subjective tinnitus

Used application for **6 months**

A significant reduction in subjective tinnitus loudness and annoyance and subjective stress level were observed. The THI scores were significantly decreased after 6 months.

Findings demonstrate the potential benefit of the tinnitus application for tinnitus improvement

Seol, H. Y., Jo, M., & Moon, I. J. (2023). *Healthcare*, 11(17)



Lifestyle Management

Quit Smoking

Diet Change

Getting a better night's rest

Relaxation/Meditation

Exercise

Support Groups

Cognitive Behavioral Therapy

Modify thoughts and beliefs to decrease negative behaviors

Cognitive Skills
Reduce negative thinking, develop a habituation perspective on tinnitus, and become an effective self-coach to guide yourself through the process

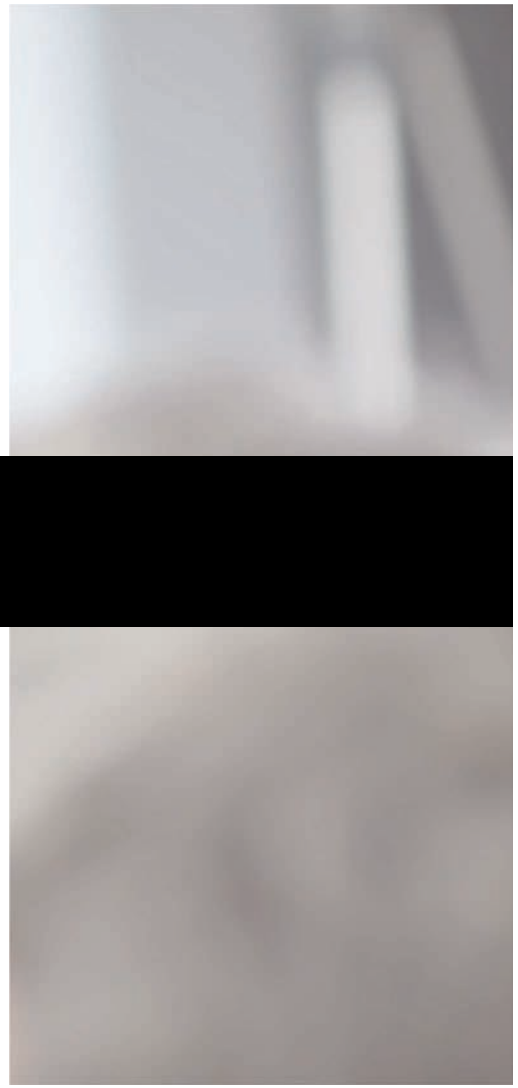
Mindfulness Skills
Calm down, promote tinnitus acceptance, and regain control of attention

Self-Guided Sound Enrichment
Soften your perception of tinnitus

Behavioral Skills
Take the courageous action needed to **fully** rejoin your life

Associations with Hearing Loss

- Obesity
- Diabetes
- Hypertension
- Cardiovascular Disease
- Safety & Balance
- Tinnitus
- Loneliness
- **Dementia**



Cognitive Decline Ranks High Among Boomer Concerns

70%

OF BOOMERS

Fear Dementia and Alzheimer's

more than any other life-threatening disease

OVER

50%

Say they would put off their retirement

if they thought that would protect their brain health

Source: Alzheimer's Association, Generation Alzheimer's

Cognitive Abilities

Cognitive Ability	What is it?
Working Memory	Holding information in memory while processing the same or new information at the same time Working memory capacity refers to the ability to simultaneously store and process information
Processing Speed	Rapidly responding to a simple stimulus presented through any sensory modality
Selective Attention	Focusing on and reacting to certain stimuli while ignoring irrelevant information
General Sequential Reasoning	Reaching a solution to a problem by taking multiple steps based on rules and conditions
Lexical Knowledge	Understanding the correct meaning for a word

Modified from Souza, P., Schoof, T., and Shen, J. (2017), "Can Individual Cognitive Abilities Direct Audiology Treatment?" Audiology Today, 29 (2), 25-31.

Cognitive Screening in the Audiology Clinic

Survey of **1,104** audiologists

Approximately **90%** worked in private practice, physicians' offices, hospitals, or universities

Black and Souza (2020). "Cognitive-Screening Practices Among Audiologists," Audiology Today, 32 (5), 44-51.

Practice Type	Percentage Administering Cognitive Screening
College or University	**29.6%**
Nonprofit clinic	**23.1%**
Hearing aid manufacturer	**17.4%**
Audiology private practice	**12.4%**
Hospital/medical center	**7.9%**
Veterans Administration or military	**7.5%**
Physician's office	**5.6%**
Franchise or retail chain	**4.2%**
Primary or secondary school	**0.0%**

Screening Instrument	Percentage Using the Screening Instrument
Mini-Mental State Exam (MMSE)	**42.3%**
Montreal Cognitive Assessment (MoCA)	**38.2%**
Clock-Drawing Test	**17.1%**
Mini-Cog Test	**16.3%**
Three-Word Recall Test	**13.8%**
Six-Item Cognitive Impairment Test (6CIT)	**10.6%**

AMERICAN ACADEMY OF AUDIOLOGY

"Audiologists develop and oversee screening programs for persons of all ages to detect individuals with changes in auditory and/or vestibular function… Audiologists may also perform speech/language screening, cognitive screening, or other screening measures as necessary to identify associated comorbid conditions or life circumstances that may impact treatment plans or patient welfare, or for the purpose of identification and referral to appropriate providers."

"Audiologists actively promote the awareness of hearing and balance disorders and educate the public about the importance of early identification and treatment, as well as promote cognitive health, social engagement, vocational success, and educational achievement across the life span."

Scope of Practice in Audiology (2023)

ASHA American Speech-Language-Hearing Association

"Clinical service delivery areas include all aspects of hearing, balance, and other related disorders that impact hearing and balance, including areas of tinnitus, cognition, and auditory processing for individuals across the lifespan."

"Administration and interpretation of diagnostic screening that includes measures to detect the presence of hearing, balance, and other related disorders. Additional screening measures of mental health and cognitive impairment should be used to assess, treat, and refer."

Scope of Practice in Audiology (2018)

ACHIEVE Study

Aging and Cognitive Health Evaluation in Elders

A landmark randomized controlled trial to determine how hearing intervention affects brain health in older adults

MAIN FOCUS

Cognitive decline

Brain structure

Mental health & well-being

OTHER AREAS

Physical function

Healthcare use

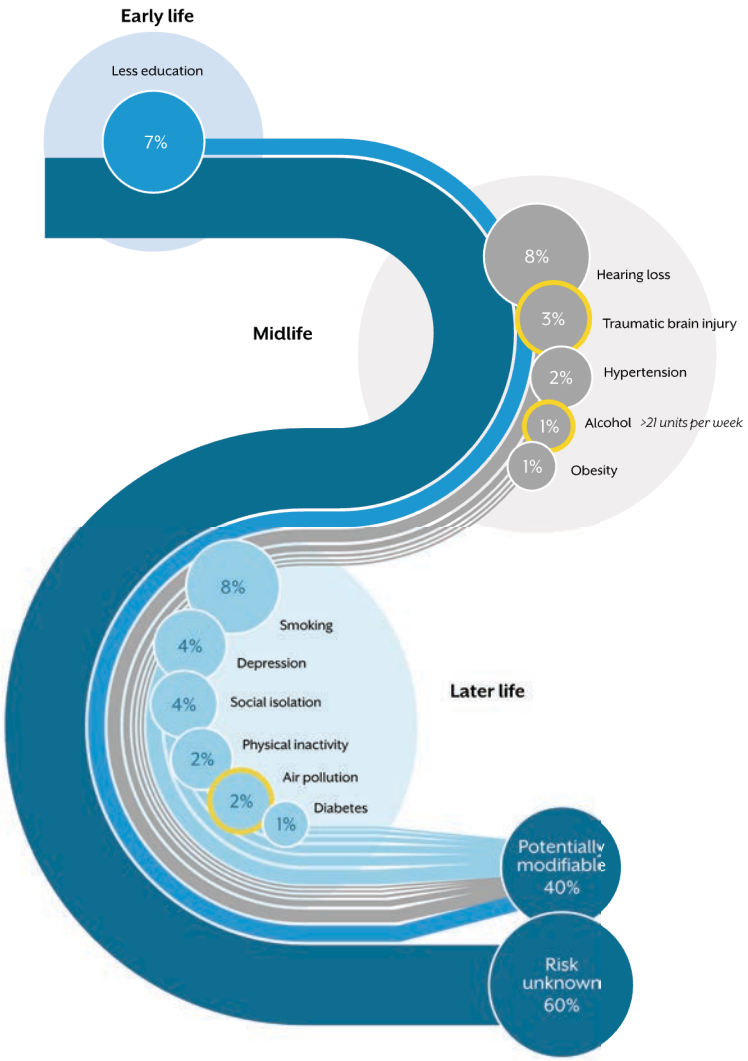
High adherence and satisfaction with hearing intervention sustained over 3 years

Positive effects* in communication impairment, loneliness, & social network size and diversity

Hearing intervention reduced 3-year global cognitive decline by 48% in the ARIC cohort†

**Self-perceived*

†Atherosclerosis Risk in Communities (ARIC) study is to investigate the causes of atherosclerosis and to measure how cardiovascular risk factors, medical care, and outcomes.



Dementia Prevention, Intervention, and Care

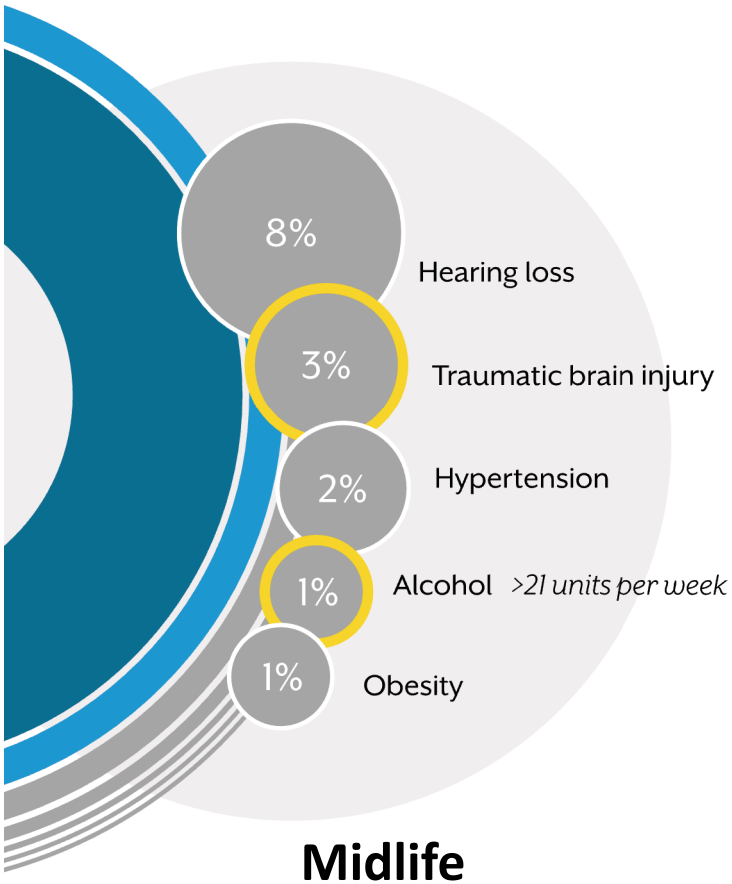
Lancet Commission 2020

40% of dementia

Potentially modifiable

12 risk factors

Education
Hypertension
Hearing impairment
Smoking
Obesity
Depression
Physical inactivity
Diabetes
Low social contact
Alcohol consumption
Traumatic brain injury
Air pollution



Midlife

Dementia Prevention, Intervention, and Care

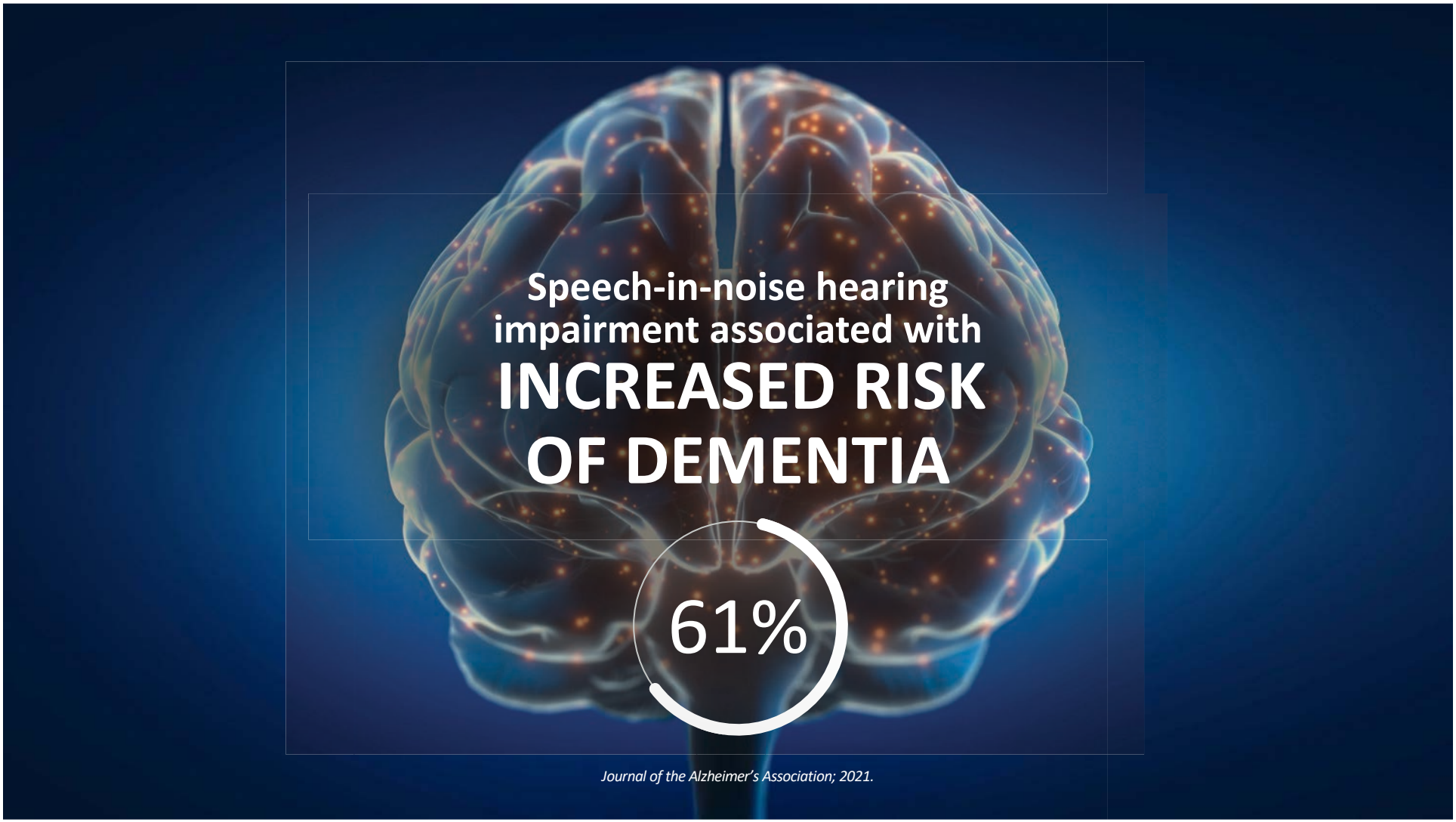
Lancet Commission 2020

40% of dementia
Potentially modifiable

Hearing impairment
Single largest modifiable risk factor

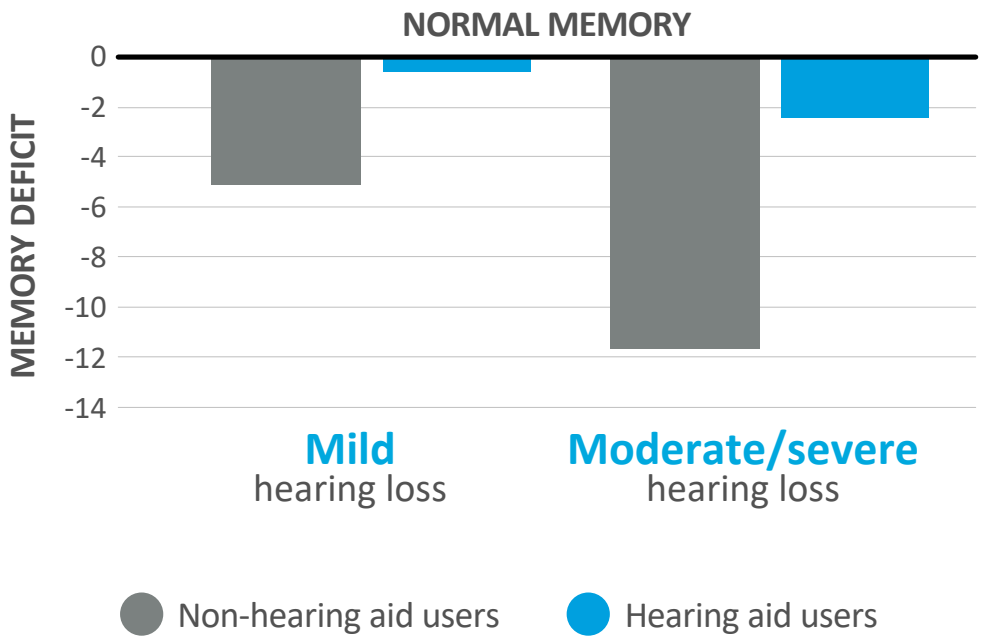
12 risk factors

Education
Hypertension
Hearing impairment
Smoking
Obesity
Depression
Physical inactivity
Diabetes
Low social contact
Alcohol consumption
Traumatic brain injury
Air pollution


Speech-in-noise hearing impairment associated with
INCREASED RISK OF DEMENTIA
61%
Journal of the Alzheimer's Association; 2021.

Silent Risk of Hearing Loss

Value of Hearing Aids



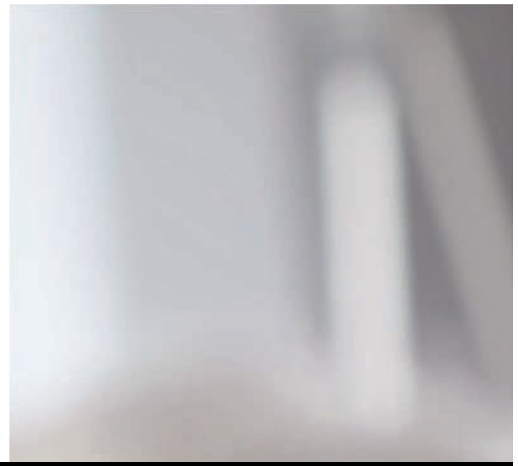
Source: *JAMA Otolaryngol Head Neck Surg*. 2018 Oct; 144(10): 876–882.

Obesity

Diabetes

Hypertension

Cardiovascular Disease



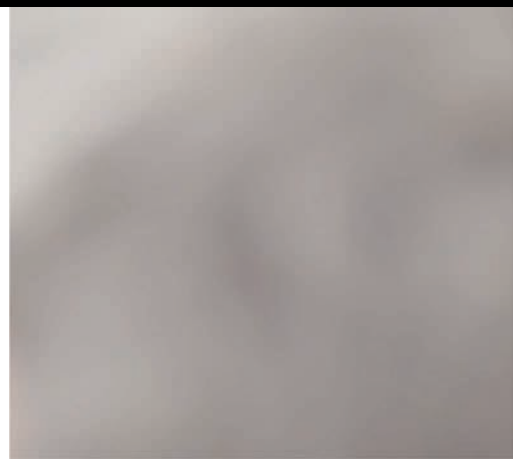
Associations with Hearing Loss

Safety & Balance

Tinnitus

Loneliness

Dementia



“Loneliness is a health crisis.”

— Dr. Vivek Murthy, Former U.S. Surgeon General

Loneliness

IMPACTS

35%

of adults ages 45+

45%

INCREASED RISK OF

premature death

As harmful as

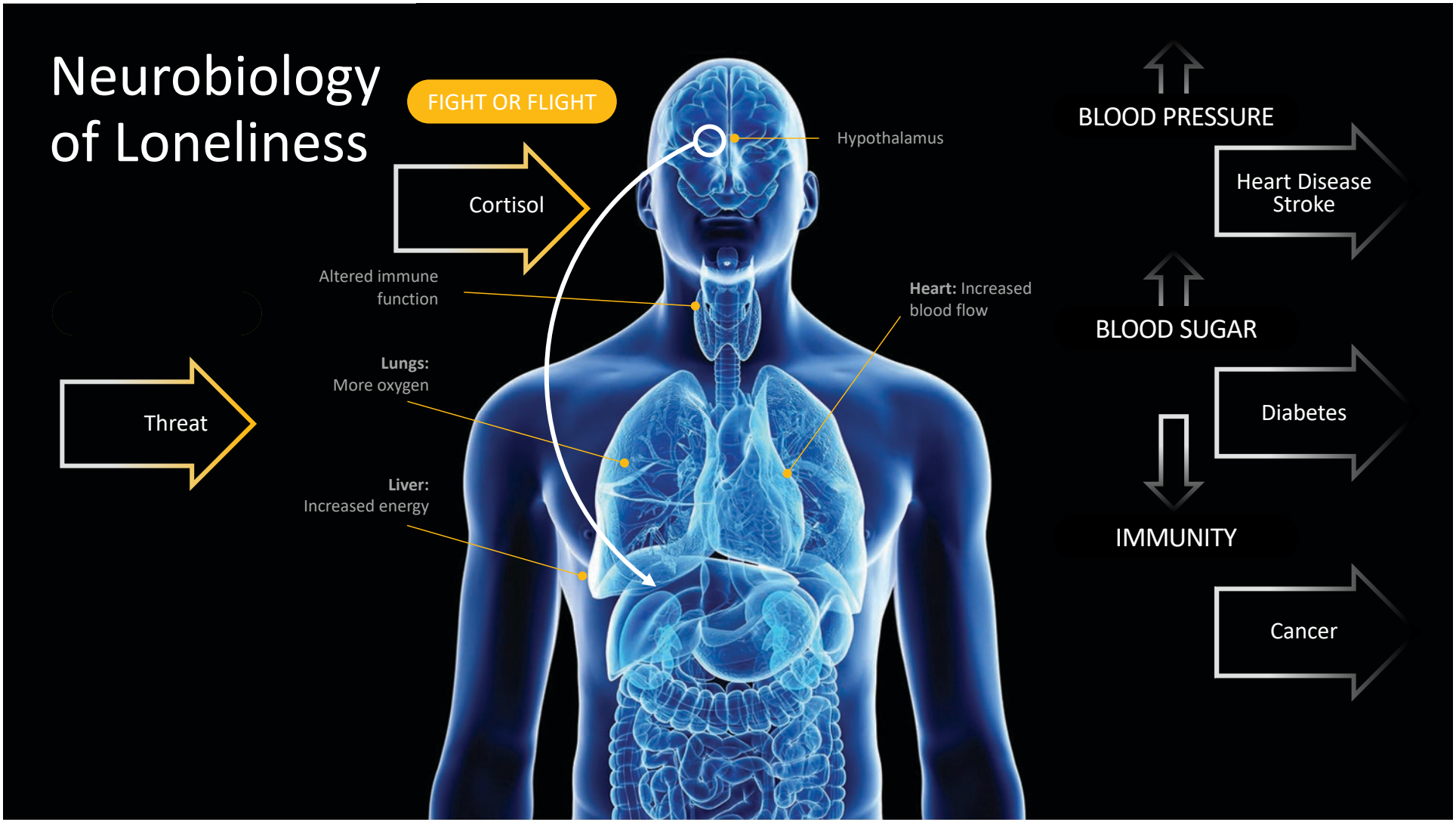
15 cigarettes

PER DAY

Perissinotto, C. M., Stijacic Cenzer, I., & Covinsky, K. E. (2012). Loneliness in older persons: a predictor of functional decline and death. Archives of internal medicine, 172(14), 1078–1083. https://doi.org/10.1001/archinternmed.2012.1993

But why?

Water. Food. People.


Neurobiology of Loneliness
FIGHT OR FLIGHT
Cortisol
Threat
Hypothalamus
Altered immune function
Lungs: More oxygen
Liver: Increased energy
Heart: Increased blood flow
BLOOD PRESSURE
Heart Disease
Stroke
BLOOD SUGAR
Diabetes
IMMUNITY
Cancer

Distrust | Aggression | Decreased Pleasure

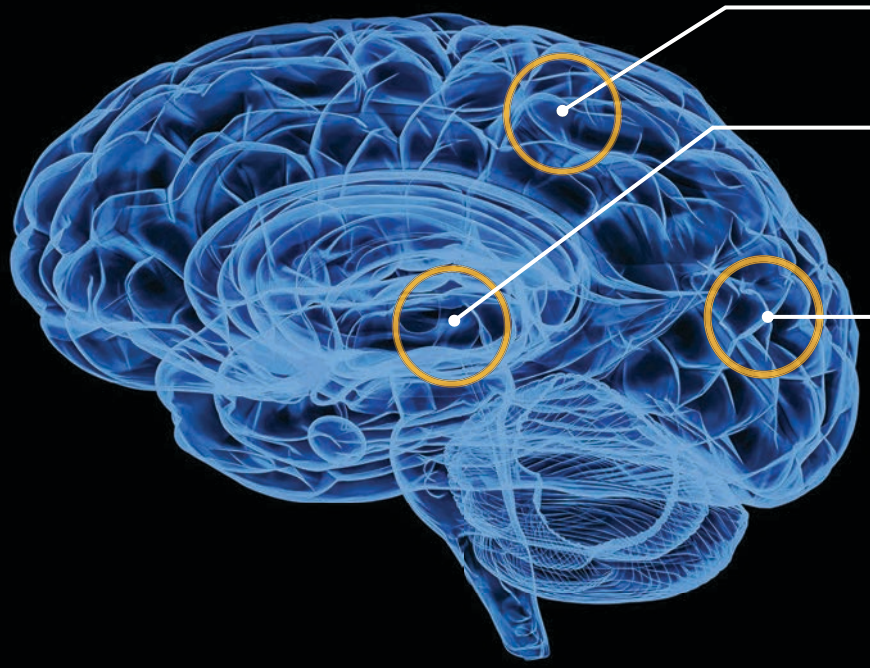
Fight or Flight

INCREASED
Social Isolation

Cortisol

Dementia

Brain Volume



Loneliness Risk Factors

Education

Income

Health Status

Widowed

Rural Living

Age

Vision

Hearing

Female

Medical Non-Adherence and Hearing Loss

12%

Have difficulty communicating with their provider

$22,000

Increased medical cost over 10 years

Chang, J.E., Weinstein, B., Chodosh, J. and Blustein, J. (2018), Hospital Readmission Risk for Patients with Self-Reported Hearing Loss and Communication Trouble. J Am Geriatr Soc, 66: 2227-2228. https://doi.org/10.1111/jgs.15545

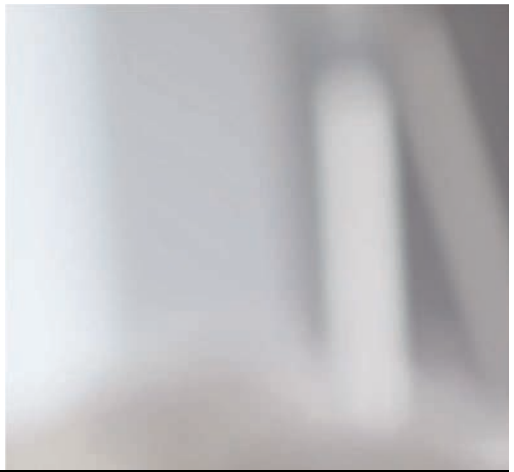
Hearing intervention has been associated with retaining a mean of **1 additional person** in a participant's social network in **3 years**

"Hearing intervention is a **scalable**, **low-risk** strategy that if implemented broadly may allow for a large population-level **reduction in social isolation** and loneliness

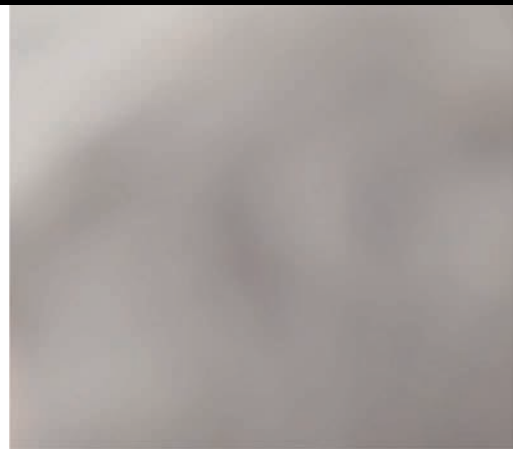
Reed NS, Chen J, Huang AR, et al. Hearing Intervention, Social Isolation, and Loneliness: A Secondary Analysis of the ACHIEVE Randomized Clinical Trial. JAMA Intern Med. 2025;185(7):797–806. doi:10.1001/jamainternmed.2025.1140

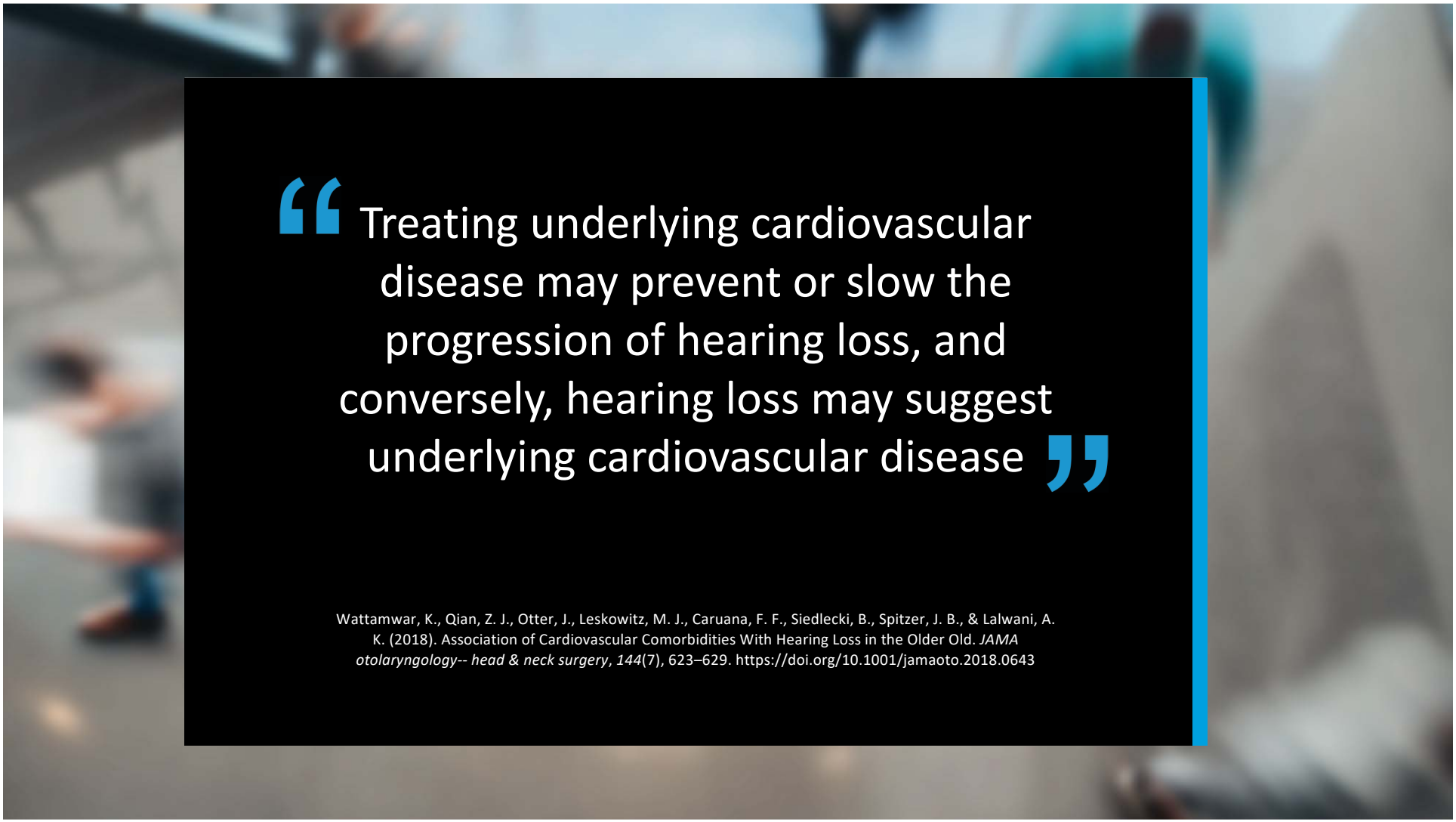
Associations with Hearing Loss

- Obesity
- Diabetes
- Hypertension
- Cardiovascular Disease



- Safety & Balance
- Tinnitus
- Loneliness
- Dementia





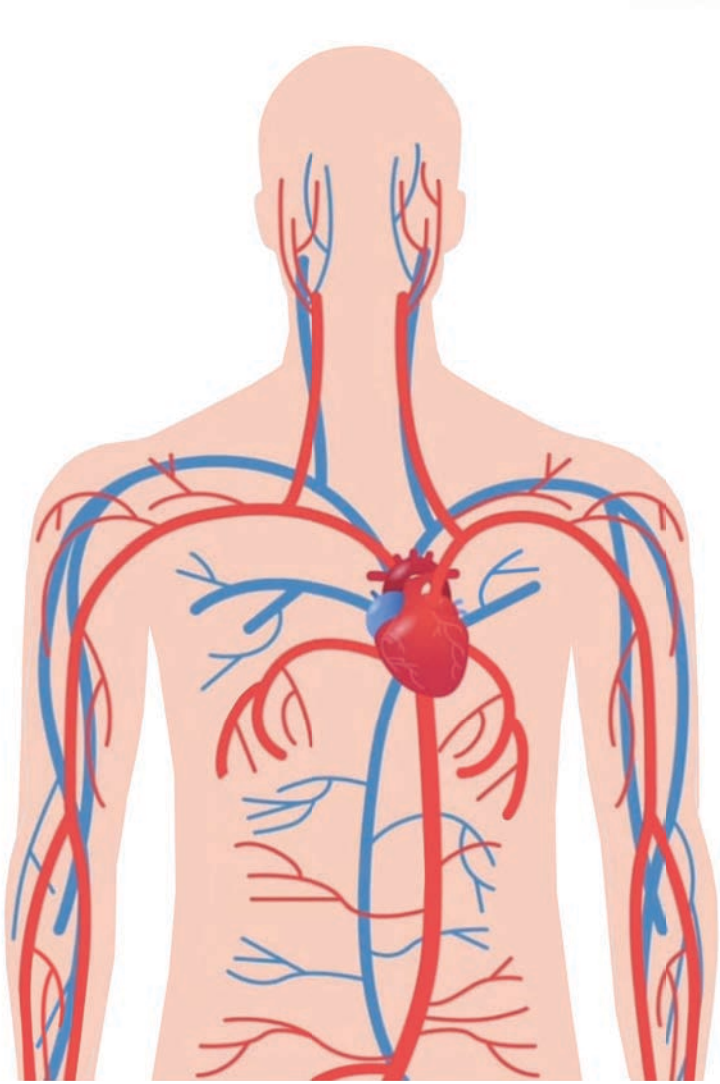
Wattamwar, K., Qian, Z. J., Otter, J., Leskowitz, M. J., Caruana, F. F., Siedlecki, B., Spitzer, J. B., & Lalwani, A. K. (2018). Association of Cardiovascular Comorbidities With Hearing Loss in the Older Old. *JAMA otolaryngology-- head & neck surgery*, *144*(7), 623–629. https://doi.org/10.1001/jamaoto.2018.0643

Cardiovascular Disease and Hearing Loss

and How They're Linked

Healthy blood flow is important for hearing health

Heart disease increases your risk of hearing loss and tinnitus



Tan, C. J., Koh, J. W. T., Tan, B. K. J., Woon, C. Y., Teo, Y. H., Ng, L. S., & Loh, W. S. (2024). Association Between Hearing Loss and Cardiovascular Disease: A Meta-analysis. Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery, 170(3), 694–707. https://doi.org/10.1002/ohn.599

Cardiovascular Disease

Adults with poor cardiovascular (CV) fitness **have worse hearing at 2 and 4 kHz**

Hutchinson, K. M., Alessio, H., & Baiduc, R. R. Association Between Cardiovascular Health and Hearing Function: Pure-Tone and Distortion Product Otoacoustic Emission Measures. American Journal of Audiology, 2010;19(1), 26–35.

People with low-frequency hearing loss are considered **at risk for cardiovascular events**

Source: The Laryngoscope

Hearing loss occurs **54 percent more often** in people with heart disease than the general population

Source: Harvard University

Adopting a Healthy Lifestyle

can Lower Your Risk of Hearing Loss

Research has found that those with higher cardiovascular fitness levels had better hearing, especially among those age 50 and older

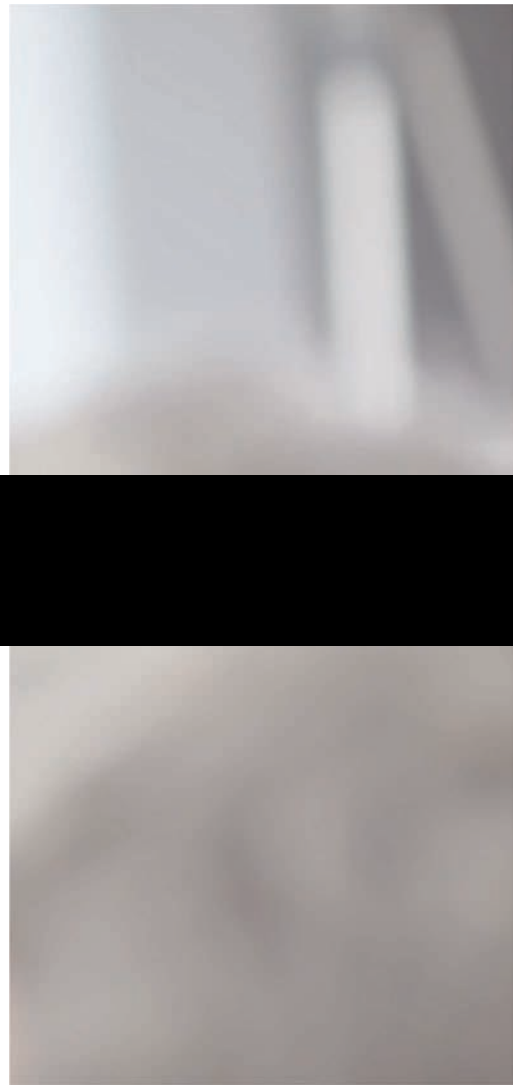
Hutchinson, Kathleen & Alessio, Helaine & Baiduc, Rachael. (2010). Association Between Cardiovascular Health and Hearing Function: Pure-Tone and Distortion Product Otoacoustic Emission Measures. American Journal of Audiology. 19. 26-35. 10.1044/1059-0889(2009/09-0009).

Eat More…

Consume Less…

Associations with Hearing Loss

- Obesity
- Diabetes
- **Hypertension**
- Cardiovascular Disease
- Safety & Balance
- Tinnitus
- Loneliness
- Dementia



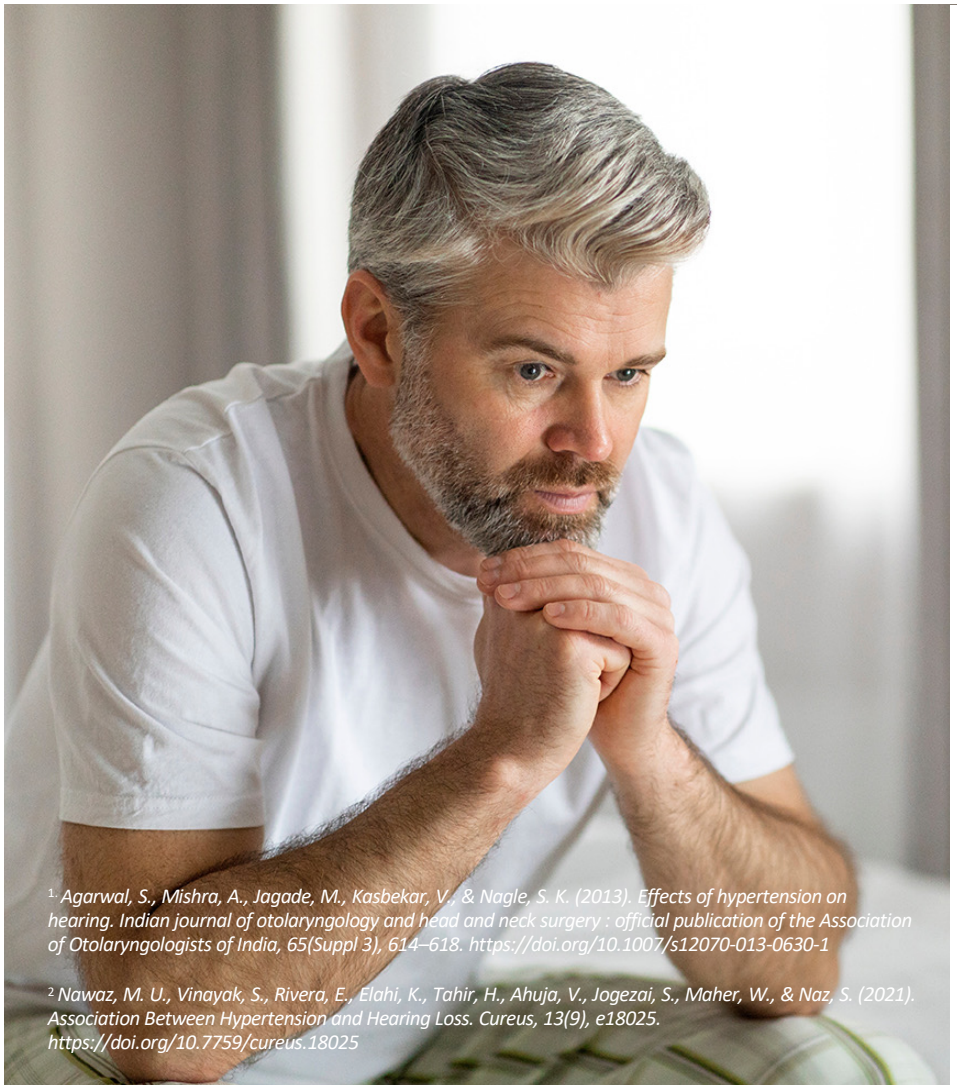
Hypertension is Associated with Ear-Related Health Challenges

Hypertension and Hearing Loss

High blood pressure can impact many parts of your body, **including your ears**

Parts of the ear are highly vascularized with a complex network of tiny vessels

With high blood pressure, the changes in blood flow and **pressure can cause damage to the ear and disruption in its functions**



Studies show an existence of an association between hearing loss and arterial hypertension in **individuals between 45 and 64 years old**[1]

A 2021 cross-sectional study found that **participants who had had hypertension for more than 5 years had significantly greater levels of hearing loss** than those without hypertension[2]

[1] *Agarwal, S., Mishra, A., Jagade, M., Kasbekar, V., & Nagle, S. K. (2013). Effects of hypertension on hearing. Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India, 65(Suppl 3), 614–618. https://doi.org/10.1007/s12070-013-0630-1*

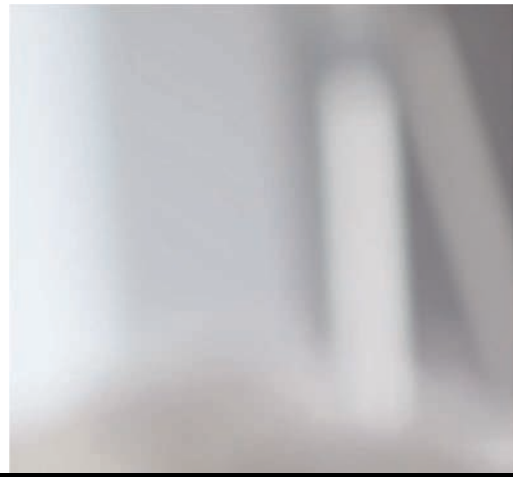
[2] *Nawaz, M. U., Vinayak, S., Rivera, E., Elahi, K., Tahir, H., Ahuja, V., Jogezai, S., Maher, W., & Naz, S. (2021). Association Between Hypertension and Hearing Loss. Cureus, 13(9), e18025. https://doi.org/10.7759/cureus.18025*

Obesity

Diabetes

Hypertension

Cardiovascular Disease



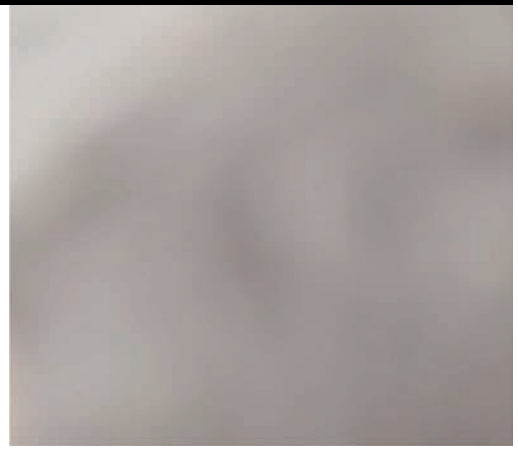
Associations with Hearing Loss

Safety & Balance

Tinnitus

Loneliness

Dementia



Diabetes and Hearing Loss

HIGH BLOOD SUGAR

can damage small blood vessels and nerves in the inner ear over time

LOW BLOOD SUGAR

over time can damage how nerve signals travel from the inner ear to your brain

Diabetes and Hearing Loss

HIGH BLOOD SUGAR

can damage small blood vessels and nerves in the inner ear over time

LOW BLOOD SUGAR

over time can damage how nerve signals travel from the inner ear to your brain

Both types of nerve damage can lead to hearing loss

Of the **115 million adults** in the U.S. who have **prediabetes** the rate of hearing loss is

30% HIGHER

than in those with **normal blood glucose**

40,000,000
PEOPLE IN THE US
HAVE DIABETES

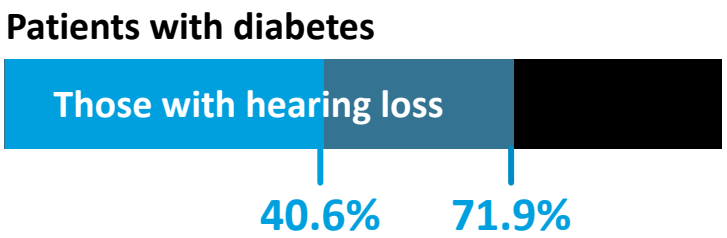
&

HEARING LOSS IS
2X MORE COMMON

Source: American Diabetes Association & CDC

Diabetes and Hearing Loss

The prevalence of hearing loss among patients with type 2 diabetes ranges **from 40.6% to 71.9%**, and compared to the control group, the risk of hearing loss is **4.19x higher** in those with diabetes



Hearing loss is predominantly observed at higher frequencies, with the mean pure-tone audiometric thresholds of the diabetic group 3.19 dB higher than controls

3.19 dB
HIGHER

Caballero-Borrego, M. and Andujar-Lara, I. (2025), Type 2 Diabetes Mellitus and Hearing Loss: A Prisma Systematic Review and Meta-Analysis. Otolaryngol Head Neck Surg, 173: 1041-1053. https://doi.org/10.1002/ohn.1346

Associations with Hearing Loss

- Obesity
- Diabetes
- Hypertension
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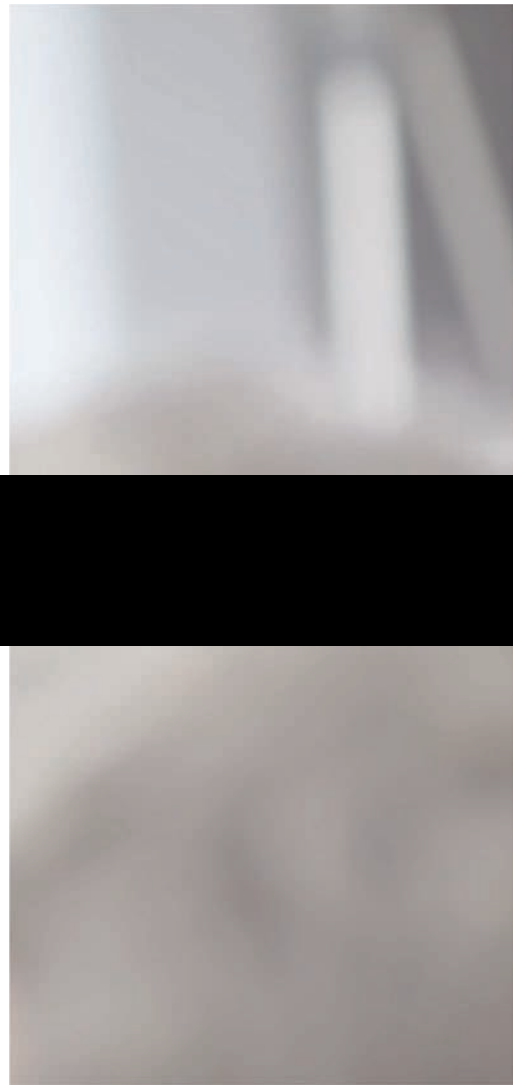
- Dementia



Obesity doesn’t directly cause hearing loss…

but it can lead to it

Obesity and Hearing Loss

Obesity raised the odds of hearing loss by **40%**

Bump BMI up by five points, and risk ticked up another **14%**

Yang, J.R., Hidayat, K., Chen, C.L. et al. "Body mass index, waist circumference, and risk of hearing loss: a meta-analysis and systematic review of observational study." Environmental Health and Preventive Medicine, 25, 25 (2020).

Findings showed that obese adolescents had increased hearing loss across all frequencies and were **almost twice as likely** to have unilateral low frequency hearing loss

2X
AS LIKELY

Lalwani, Anil K et al. "Obesity is associated with sensorineural hearing loss in adolescents." *The Laryngoscope* vol. 123,12 (2013): 3178-84. doi:10.1002/lary.24244

Consequences of Untreated Hearing Loss

Avoidance or withdrawal
from social situations

Reduced alertness
and increased risk to personal safety

Impaired memory
and ability to learn new tasks

Mood changes
including irritability, negativism and anger

Fatigue, tension, stress and depression

Diminished psychological and overall health

Higher healthcare costs

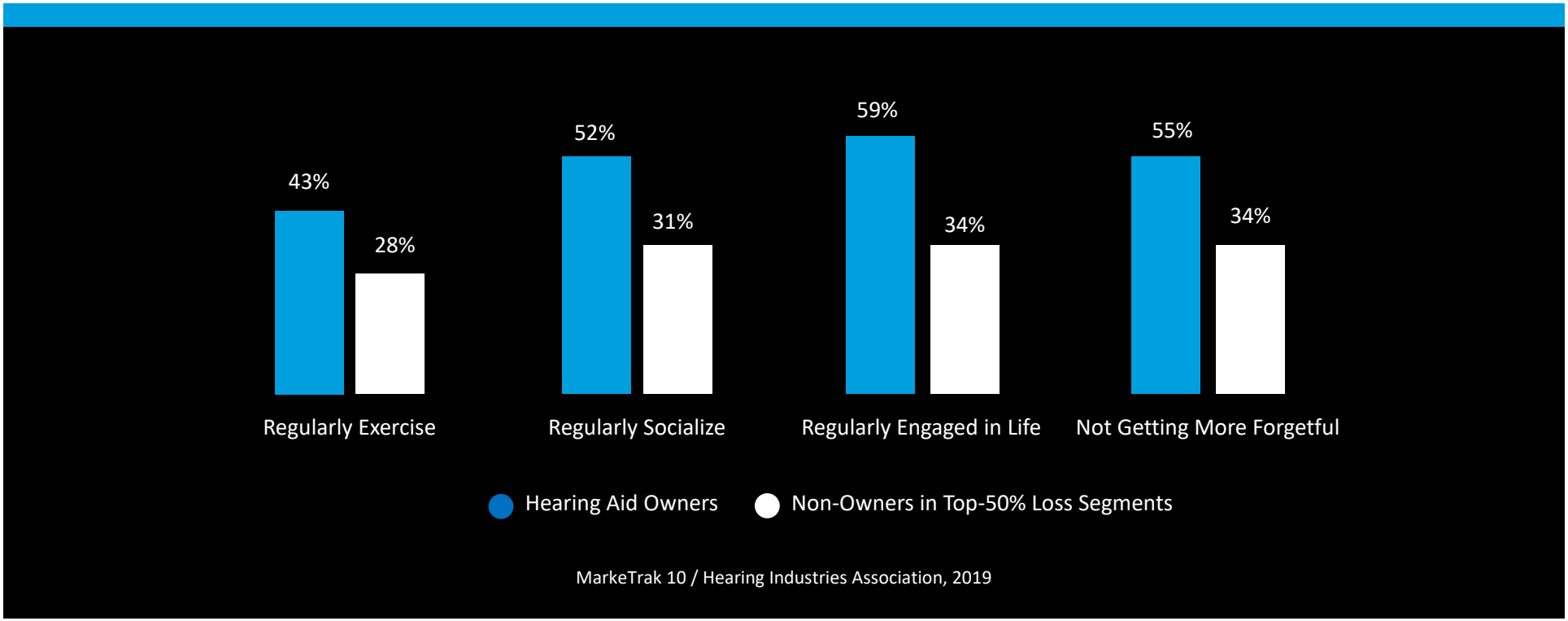
Reduced job performance
and earning power

For Every 20 Patients You See...


For Every 20 Patients You See...

Living More Fully

Hearing aid owners show more signs of living fully compared to non-owners with comparable levels of hearing loss



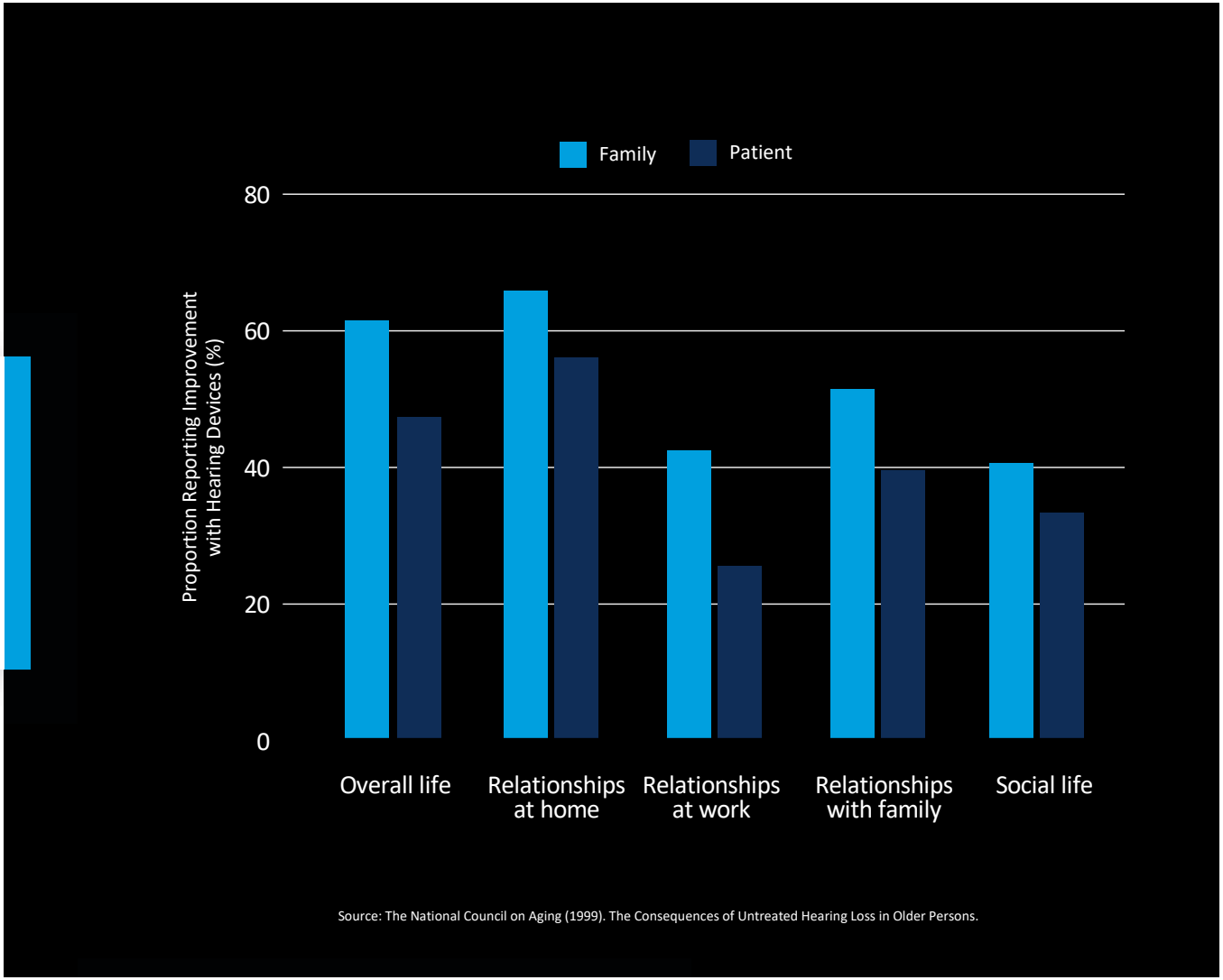
MarkeTrak 10 / Hearing Industries Association, 2019

Include the Caregiver

Patients and Family

DISAGREE

on Improvement

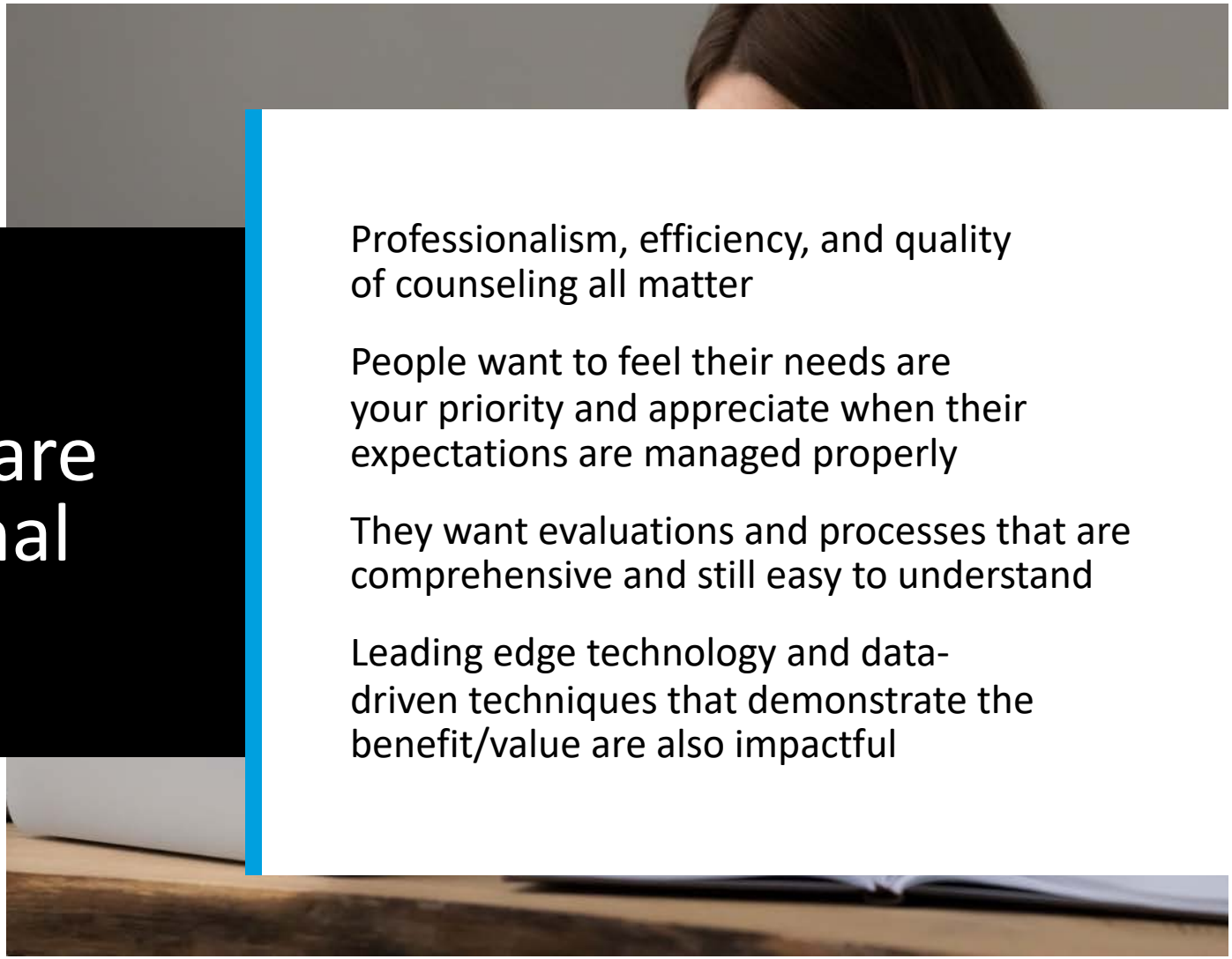


Source: The National Council on Aging (1999). The Consequences of Untreated Hearing Loss in Older Persons.

HEAR Share

Provide peace of mind for caregivers and more independence for hearing aid wearers

Hearing Care Professional



Professionalism, efficiency, and quality of counseling all matter

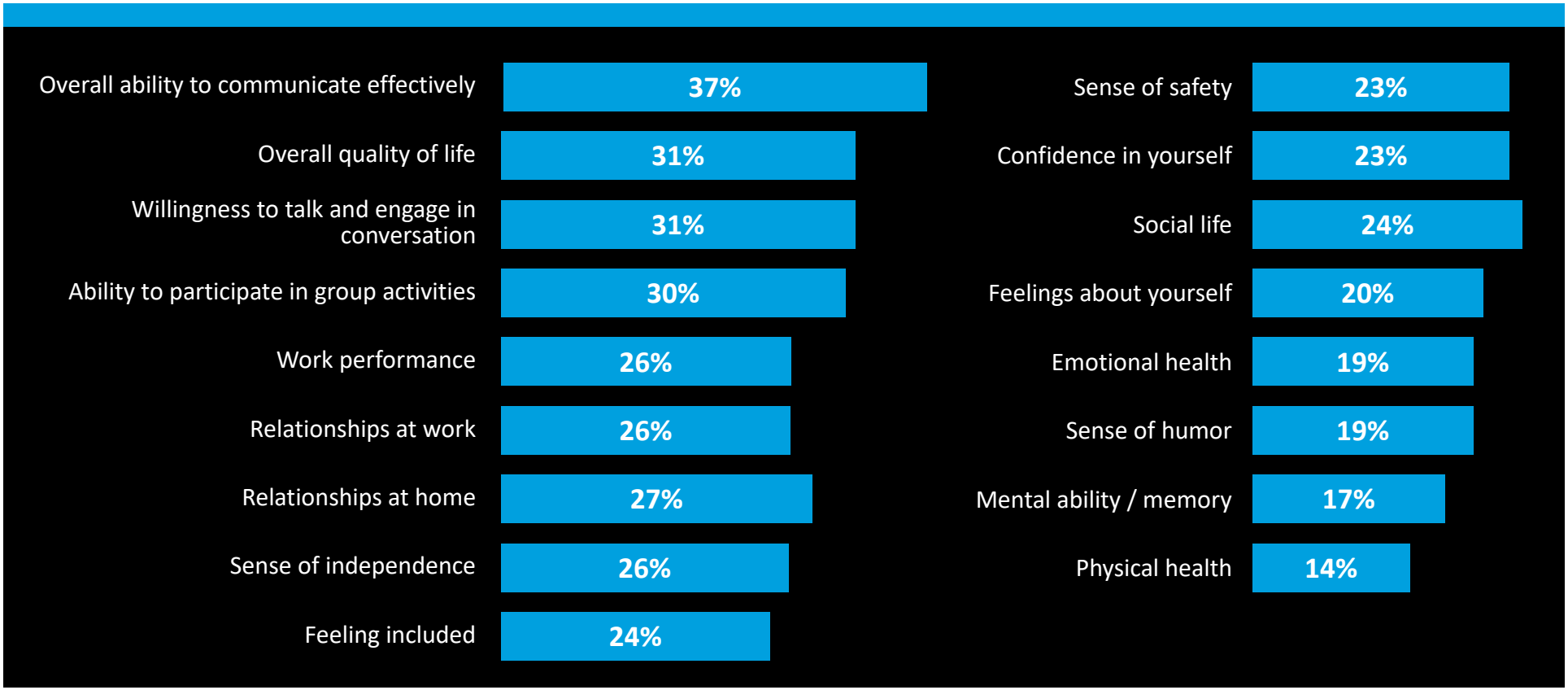
People want to feel their needs are your priority and appreciate when their expectations are managed properly

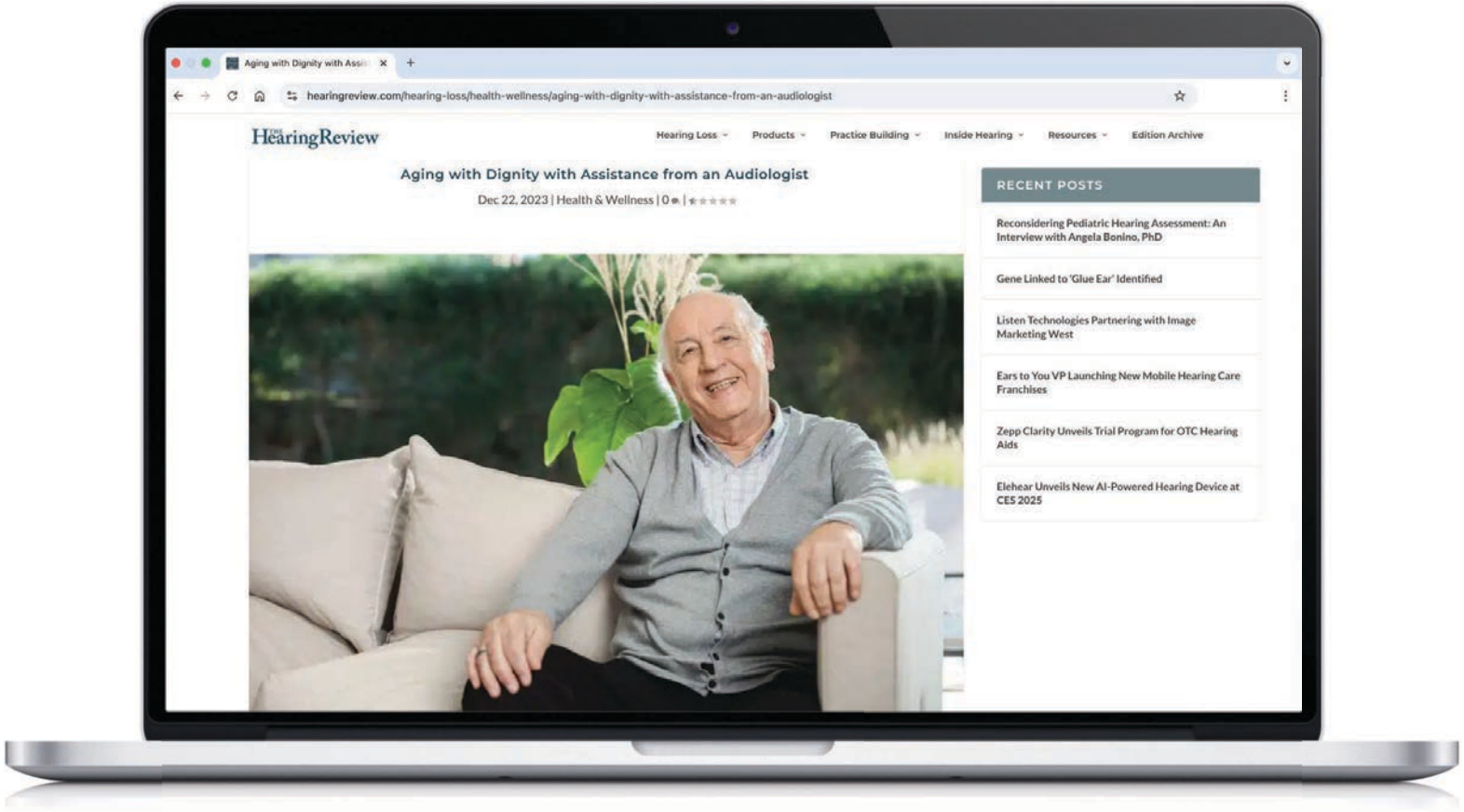
They want evaluations and processes that are comprehensive and still easy to understand

Leading edge technology and data-driven techniques that demonstrate the benefit/value are also impactful

Positive Changes with Hearing Aid Use

*MarkeTrak 10 / Hearing Industries Association, 2019

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Thank you!