CCNA
Canadian Consortium on Neurodegeneration in Aging

CCNV
Consortium canadien en neurodégénérescence associée au vieillissement

Hearing and Cognitive Health: Reducing Risk and Optimizing Functioning

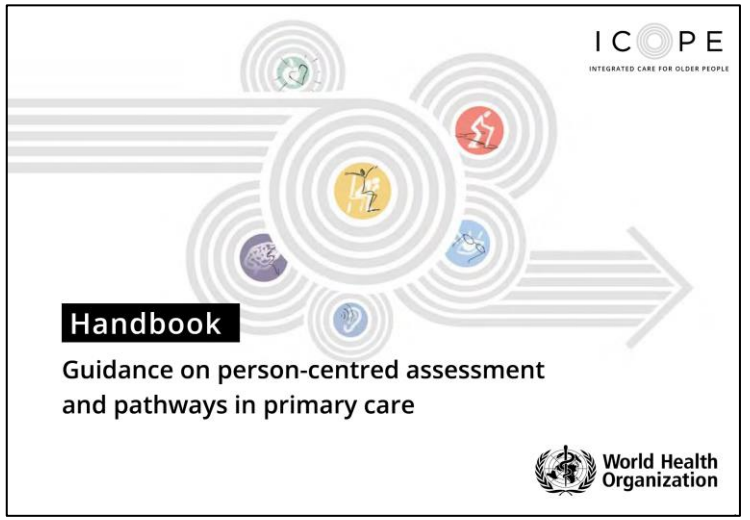
Kathy Pichora-Fuller

Professor Emerita, Department of Psychology, University of Toronto
Adjunct Professor, Department of Gerontology, Simon Fraser University

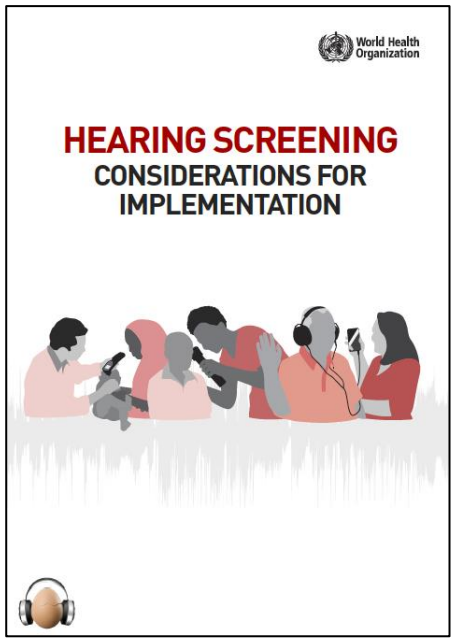
http://www.opto.umontreal.ca/wittichlab/ccna-team17/

TEAM 17:
Interventions at the sensory-cognitive interface

ÉQUIPE 17 :
Les interventions dans les interactions sensorielles at cognitives

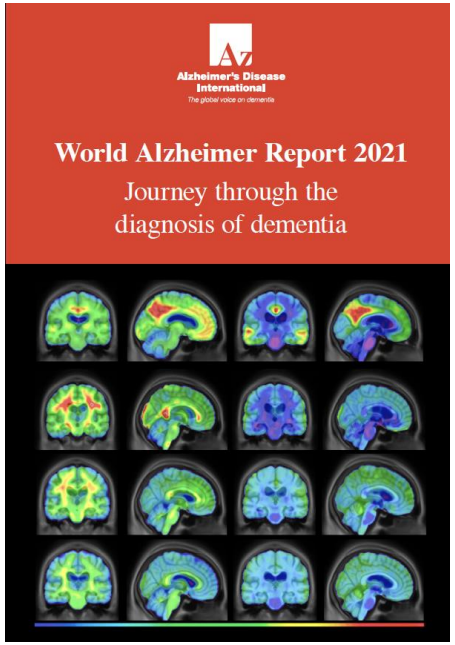


2019



March 2021

September 2021



Outline

- Auditory-cognitive (and other health) links
- Hearing screening
- Communication accessibility
- Integrated person-centered care

- CC live option on Zoom?

Outline

- **Auditory-cognitive (and other health) links**
- Hearing screening
- Communication accessibility
- Integrated person-centered care

2017 and 2020

Dementia prevention, intervention, and care: 2020 report of the *Lancet* Commission

Gill Livingston, Jonathan Huntley, Andrew Sommerlad, David Ames, Clive Ballard, Sube Banerjee, Carol Brayne, Alistair Burns, Jiska Cohen-Mansfield, Claudia Cooper, Sergi G Costafreda, Amit Dias, Nick Fox, Laura N Gitlin, Robert Howard, Helen C Kales, Mika Kivimäki, Eric B Larson, Adesola Ogunniyi, Vasiliki Orgeta, Karen Ritchie, Kenneth Rockwood, Elizabeth L Sampson, Quincy Samus, Lon S Schneider, Geir Selbæk, Linda Teri, Naaheed Mukadam

	Relative risk for dementia (95% CI)	Risk factor prevalence	Communality	Unweighted PAF	Weighted PAF*
Early life (<45 years)					
Less education	1·6 (1·3–2·0)	40·0%	61·2%	19·4%	7·1%
Midlife (age 45–65 years)					
Hearing loss	1·9 (1·4–2·7)	31·7%	45·6%	22·2%	8·2%
TBI	1·8 (1·5–2·2)	12·1%	55·2%	9·2%	3·4%
Hypertension	1·6 (1·2–2·2)	8·9%	68·3%	5·1%	1·9%
Alcohol (>21 units/week)	1·2 (1·1–1·3)	11·8%	73·3%	2·1%	0·8%
Obesity (body-mass index ≥30)	1·6 (1·3–1·9)	3·4%	58·5%	2·0%	0·7%
Later life (age >65 years)					
Smoking	1·6 (1·2–2·2)	27·4%	62·3%	14·1%	5·2%
Depression	1·9 (1·6–2·3)	13·2%	69·8%	10·6%	3·9%
Social isolation	1·6 (1·3–1·9)	11·0%	28·1%	4·2%	3·5%
Physical inactivity	1·4 (1·2–1·7)	17·7%	55·2%	9·6%	1·6%
Diabetes	1·5 (1·3–1·8)	6·4%	71·4%	3·1%	1·1%
Air pollution	1·1 (1·1–1·1)	75·0%	13·3%	6·3%	2·3%

Data are relative risk (95% CI) or %. Overall weighted PAF=39·7%. PAF=population attributable fraction. TBI=traumatic brain injury. *Weighted PAF is the relative contribution of each risk factor to the overall PAF when adjusted for communality.

Table 1: **PAF for 12 dementia risk factors**

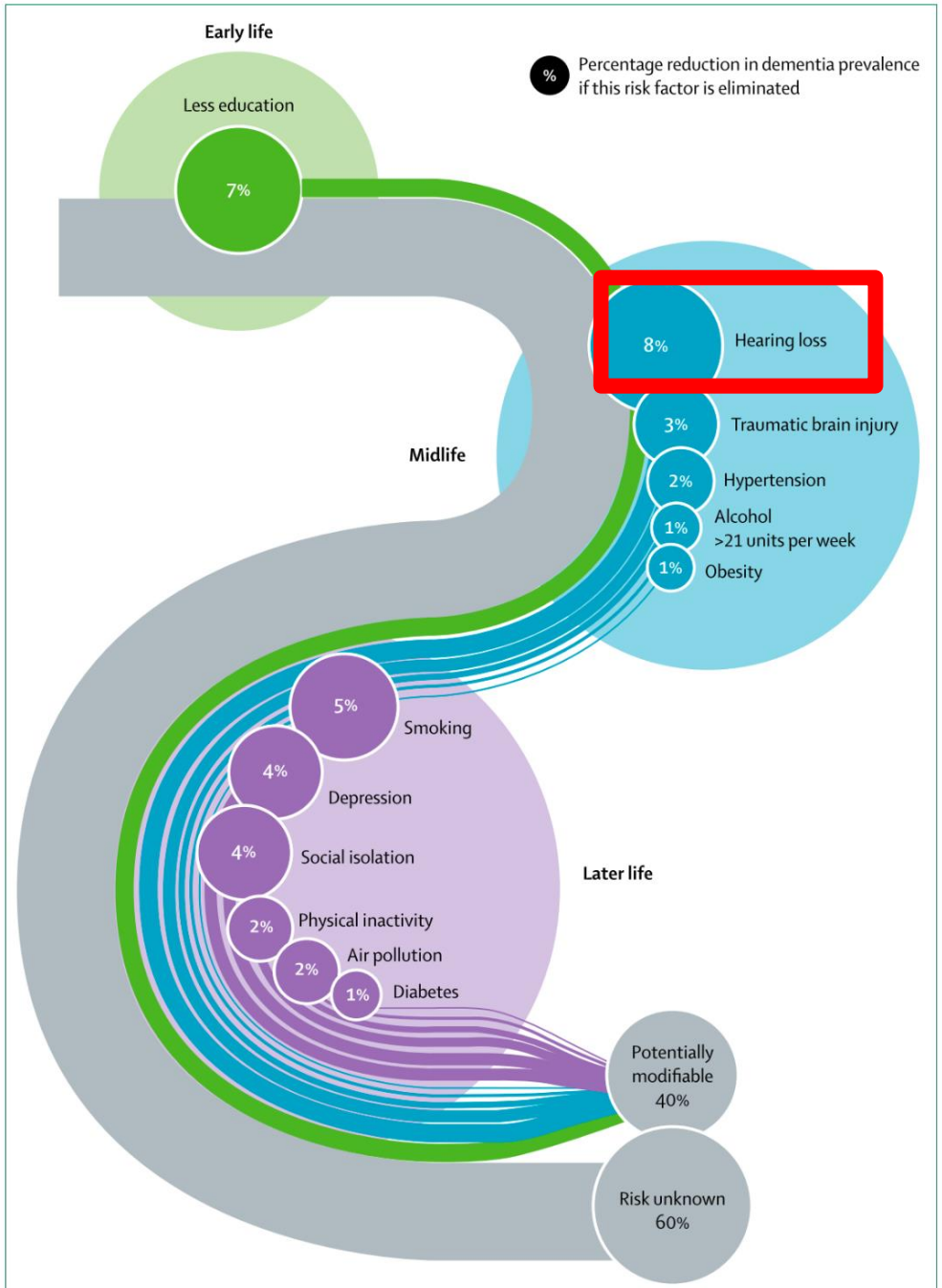


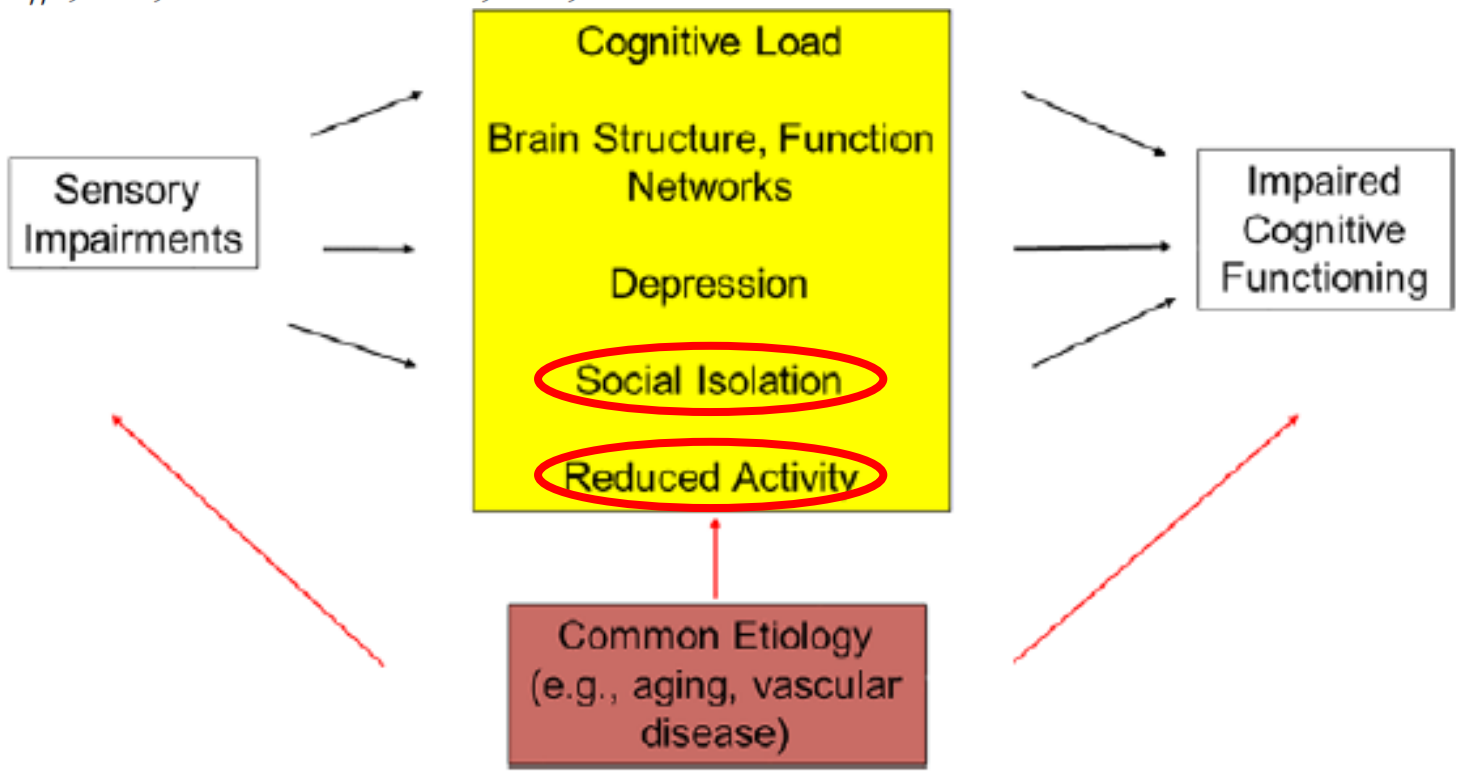
Figure 7: **Population attributable fraction of potentially modifiable risk factors for dementia**

SPECIAL ARTICLE

JAGS, 2018

American Geriatrics Society and National Institute on Aging Bench-to-Bedside Conference: Sensory Impairment and Cognitive Decline in Older Adults

Heather E. Whitson, MD, MHS,[*†] *Alice Cronin-Golomb, PhD,*[‡] *Karen J. Cruickshanks, PhD,*[§] *Grover C. Gilmore, PhD,*[¶] *Cynthia Owsley, PhD, MSPH,*[‖] *Jonathan E. Peelle, PhD,*[**] *Gregg Recanzone, PhD,*[††] *Anu Sharma, PhD,*[‡‡] *Bonnielin Swenor, PhD, MPH,*[§§] *Kristine Yaffe, MD,*[¶¶] *and Frank R. Lin, MD, PhD*[§§]



ELSEVIER

CrossMark

Alzheimer's & Dementia 11 (2015) 70-98

Alzheimer's & Dementia

2015

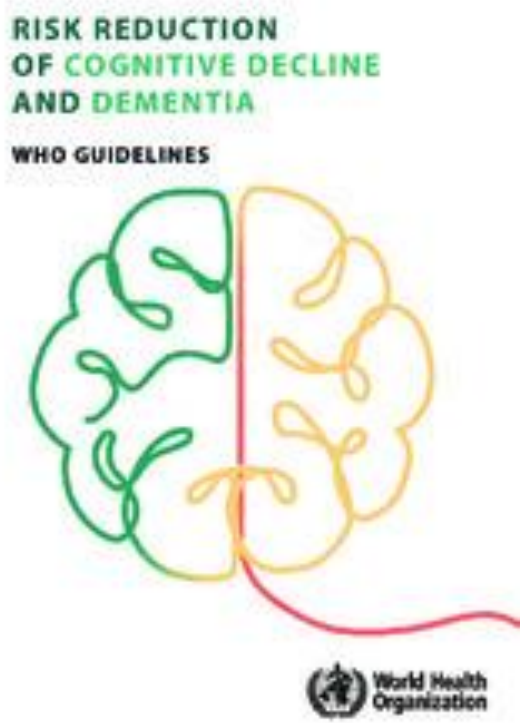
At the interface of sensory and motor dysfunctions and Alzheimer's disease

Mark W. Albers[a,*], Grover C. Gilmore[b], Jeffrey Kaye[c], Claire Murphy[d], Arthur Wingfield[e], David A. Bennett[f], Adam L. Boxer[g], Aron S. Buchman[f], Karen J. Cruickshanks[h,i], Davangere P. Devanand[j], Charles J. Duffy[k], Christine M. Gall[l], George A. Gates[m], Ann-Charlotte Granholm[n,o], Takao Hensch[p], Roee Holtzer[q], Bradley T. Hyman[a], Frank R. Lin[r], Ann C. McKee[s], John C. Morris[t], Ronald C. Petersen[u], Lisa C. Silbert[c], Robert G. Struble[v], John Q. Trojanowski[w], Joe Verghese[q], Donald A. Wilson[x], Shunbin Xu[f], Li I. Zhang[y]

"Based on the data presented and discussed at this workshop, it is clear that ***sensory and motor regions of the central nervous system are affected by AD pathology and that interventions targeting amelioration of sensory-motor deficits in AD may enhance patient function as AD progresses."***

WHO May 2019
Guidelines on Risk Reduction and Dementia

Intervention	General		Cognitive Impairment	
	Quality of Evidence	Strength of Recommendation	Quality of Evidence	Strength of Recommendation
Physical Activity	Moderate	Strong	**Low**	**Conditional**
Tobacco Cessation	Low	Strong		
Mediterranean Diet	Moderate	Conditional		
Alcohol Interventions	Moderate	Conditional		
Weight Management	Low-Moderate	Conditional		
Dyslipidaemia Management	Low	Conditional		
Cognitive Training	(Very) Low	Conditional		
Hypertension Management	Very Low	Conditional		
Diabetes Management	Very Low	Conditional		
Social Activity*	Insufficient			
Depression Management*	Insufficient			
Hearing Loss Management*	Insufficient			



ACHIEVE RCT

2017, feasibility study, N=40)

ELSEVIER

CrossMark

Alzheimer's & Dementia: Translational Research & Clinical Interventions 3 (2017) 410-415

Alzheimer's & Dementia

Short Report

A randomized feasibility pilot trial of hearing treatment for reducing cognitive decline: Results from the Aging and Cognitive Health Evaluation in Elders Pilot Study

Jennifer A. Deal[a,b,*], Marilyn S. Albert[c], Michelle Arnold[d], Shrikant I. Bangdiwala[e], Theresa Chisolm[d], Sonia Davis[e], Ann Eddins[d], Nancy W. Glynn[f], Adele M. Goman[b], Melissa Minotti[g], Thomas Mosley[h], George W. Rebok[i,j], Nicholas Reed[b], Elizabeth Rodgers[f], Victoria Sanchez[d], A. Richey Sharrett[a], Josef Coresh[a,g,k], Frank R. Lin[a,b,j]

ACHIEVE trial, a randomized controlled trial (N=850), began in late 2017 to investigate if gold standard hearing care slows cognitive decline in a healthy cohort of older adults with hearing loss (http://www.achievestudy.org/)

Why are sensory factors important?

- Help people to live their lives optimally

- Improve quality of life
- Connect to others, environment, self

- "Communication" is key to participation

- Help people ***AGE WELL***

Sensory loss is common

- A 2015 report on the **Global Burden of Disease** (Vos et al., 2016) estimated that

  hearing loss and vision loss, respectively, were the **2nd and 3rd most common** impairments

Marked increase after 60 years of age

Figure 1.6 Global prevalence of hearing loss (of moderate or higher grade) according to age

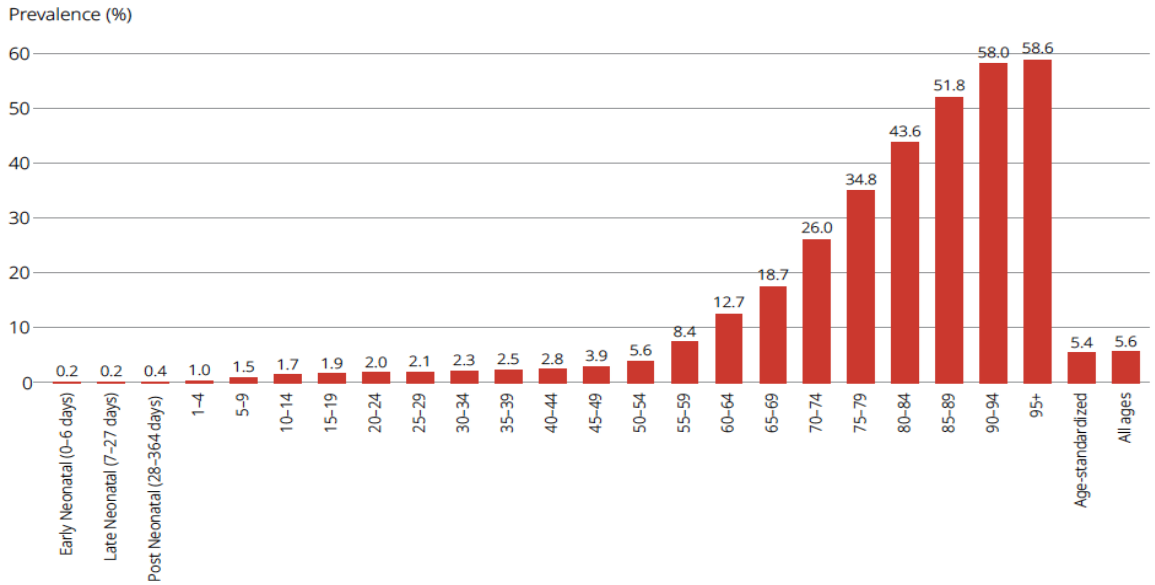
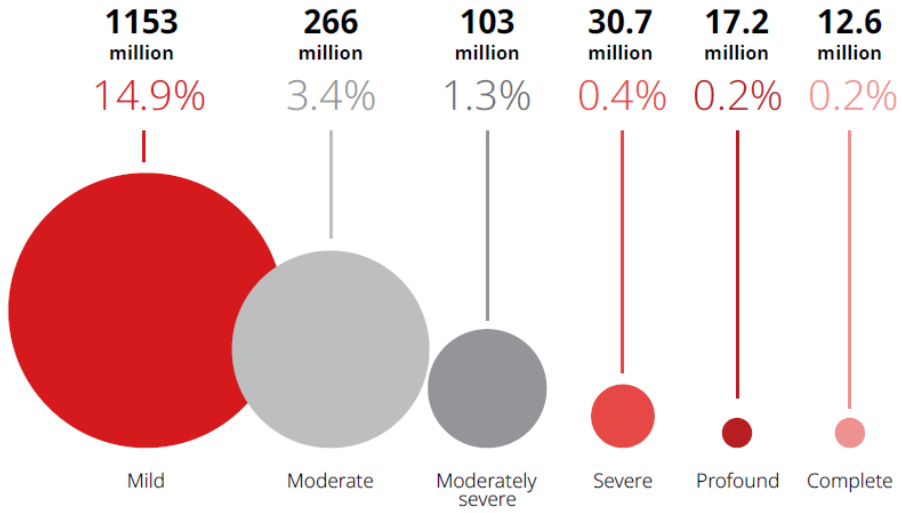


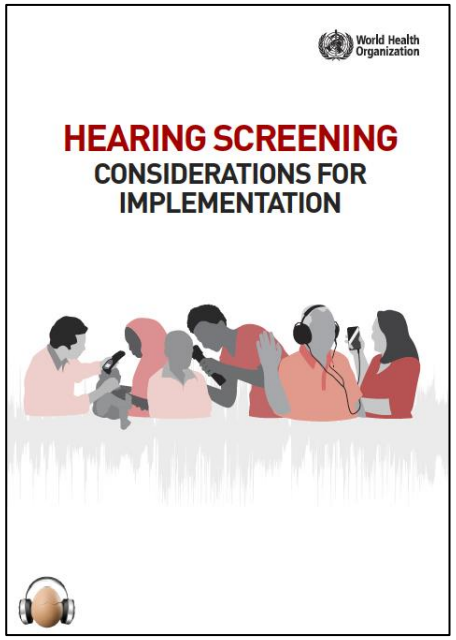
Figure 1.5 Number of people and percentage prevalence according to grades of hearing loss



Globally 1.5 billion people live with hearing loss

Mostly mild hearing loss

2021



10-20 year delay to seek help

Screen to identify earlier

Average age of first HA ~ 70 years

Hearing aids?
Only 20% use them

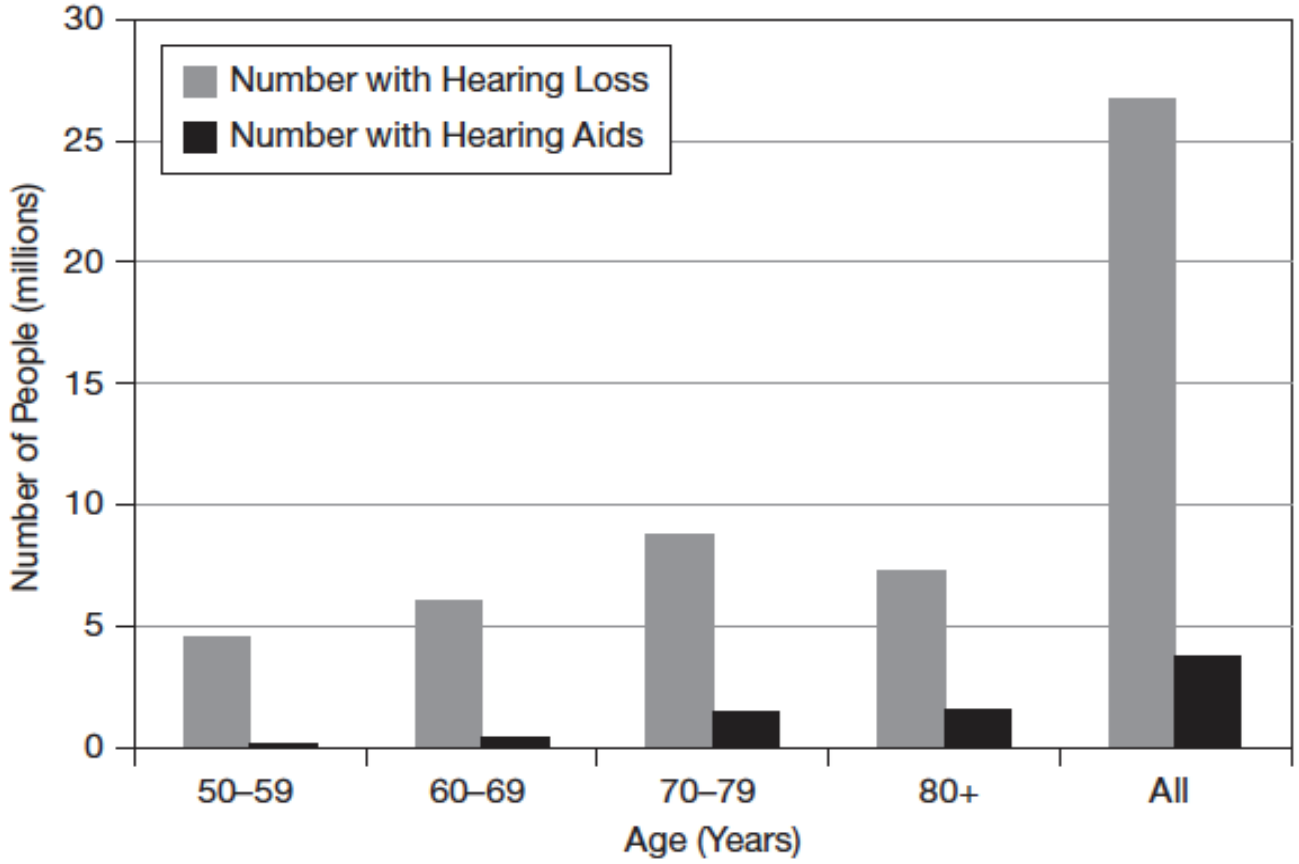
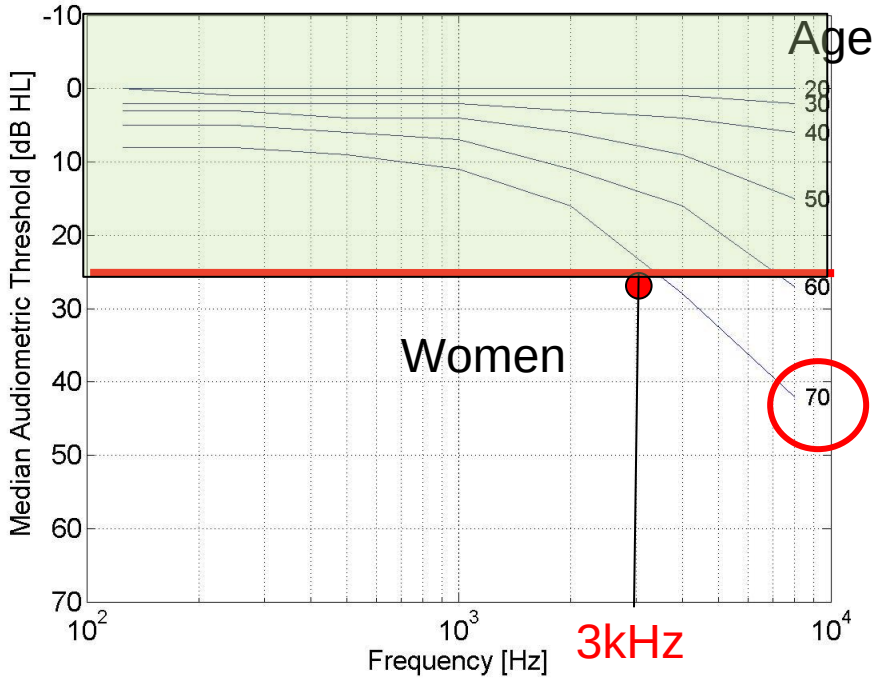
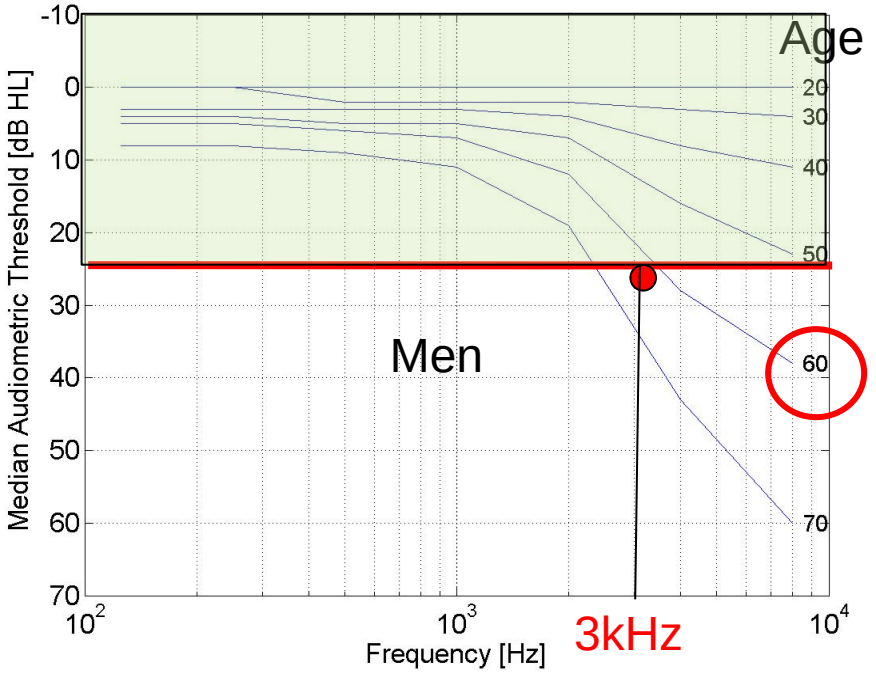


FIGURE 10.2 Prevalence and number of individuals 50 years or older with hearing loss using hearing aids in the United States.

Source: Adapted from Chien and Lin (2012) based on data from the 1999–2006 National Health and Nutrition Examination Survey.

Audiograms and age (ISO 7029)





- High-frequency audiometric threshold elevation
  - Outer Hair Cell loss (also noise-induced hearing loss)
  - Endocochlear potentials ~ stria vascularis
    - (Mills, Schmeidt, Schulte, & Dubno, 2006)
- Neural – loss of temporal synchrony
    - (Liberman & Kujawa, 2017)

Heterogeneity

Hearing Research 349 (2017) 138–147 **2017**

Contents lists available at ScienceDirect

Hearing Research

journal homepage: www.elsevier.com/locate/heares

Review Article

Cochlear synaptopathy in acquired sensorineural hearing loss: Manifestations and mechanisms

M. Charles Liberman [a, b], Sharon G. Kujawa [a, b, *]

[a] Department of Otology and Laryngology, Harvard Medical School, Boston MA, USA
[b] Eaton-Peabody Laboratories, Massachusetts Eye & Ear Infirmary, Boston MA, USA

"… well before overt hearing loss can be seen, a more insidious, but likely more common, process is taking place that permanently interrupts synaptic communication between sensory inner hair cells and subsets of cochlear nerve fibres.

The silencing of affected neurons alters auditory information processing,
whether accompanied by threshold elevations or not,

and is a likely contributor to a variety of perceptual abnormalities, including speech-in-noise difficulties, tinnitus and hyperacusis."

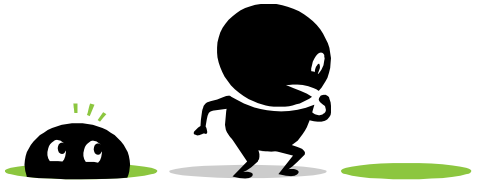
Speech Understanding in Noise

(CHABA, JASA, 1988)

- Little problem in ideal listening conditions
  - Quiet
  - One talker
  - Familiar person, topic, situation
  - Simple task, focused activity

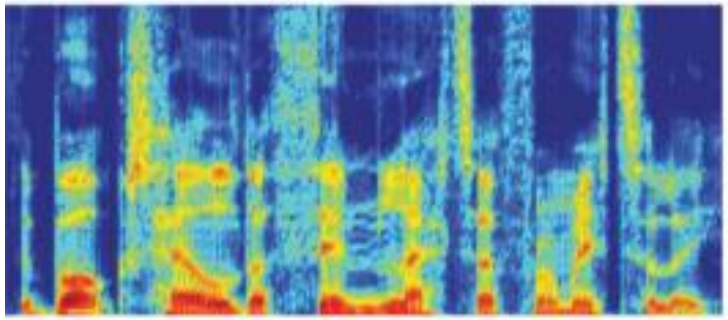
- Difficulty in challenging listening conditions
  - Noise
  - Multiple talkers
  - Strangers, accents, new topic, novel situation
  - Complex task, many concurrent activities
  - Fast pace

- Avoid by withdrawal from social interaction!

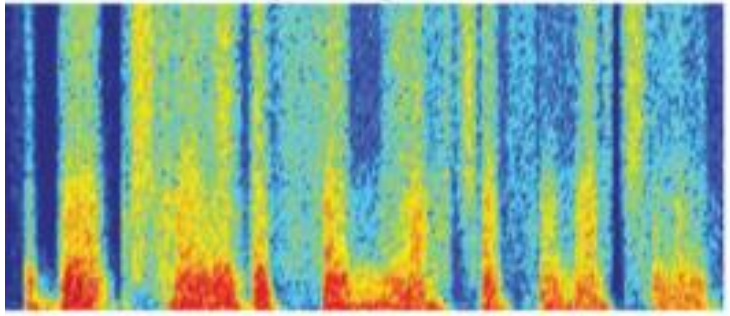


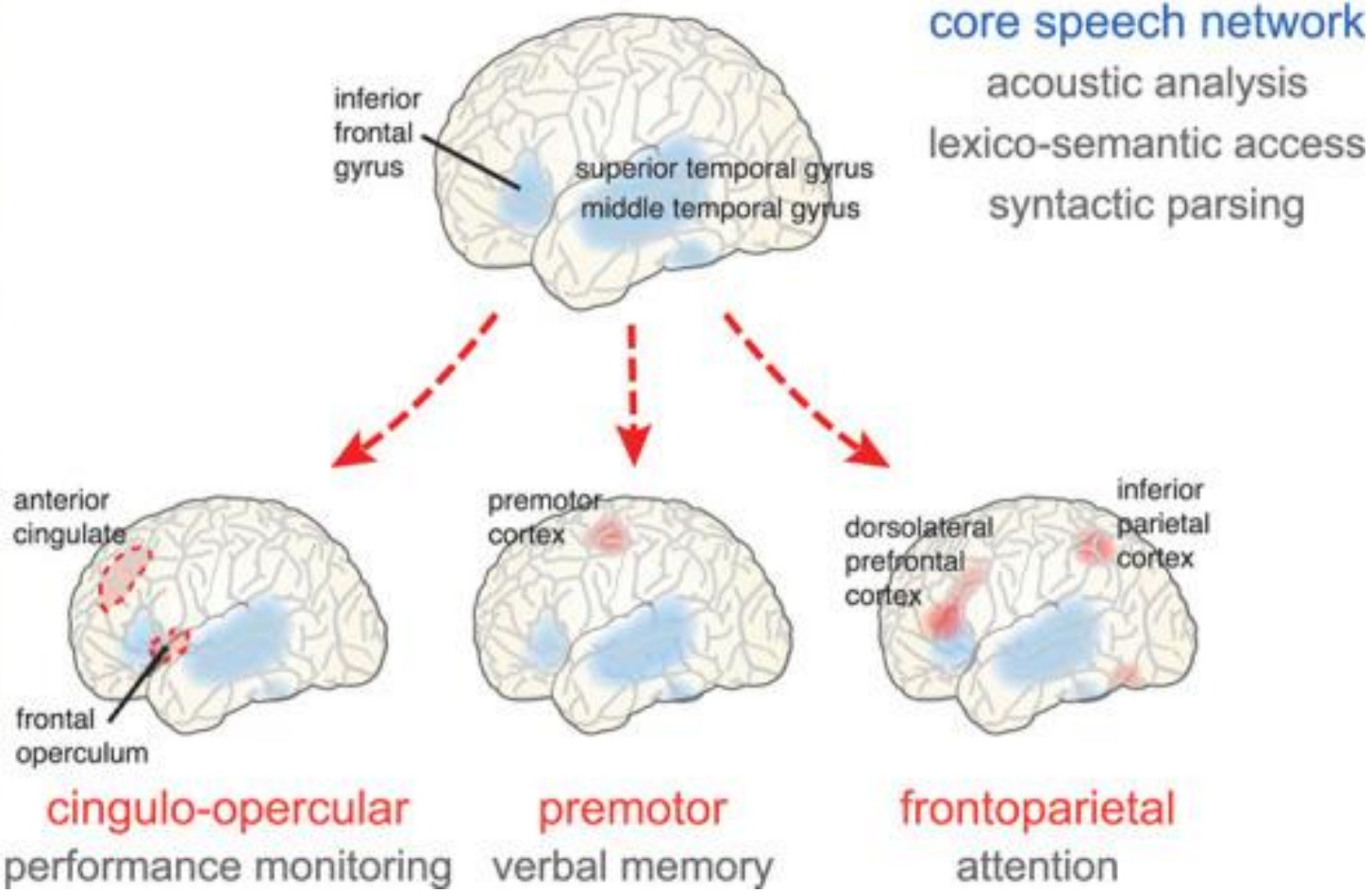
Brain activation when sound is degraded

Acoustically clear speech



Acoustically degraded speech





Peelle J. E. (2018). Listening effort: How the cognitive consequences of acoustic challenge are reflected in brain and behavior. *Ear and hearing*, *39*(2), 204-214.

CLSA: Hearing, Vision, Balance

- Age at baseline **45-85** years
- **30,000** community-dwelling participants
- **10 towns/cities** across Canada
- **No cognitive impairment** at baseline
- **Clinical, biological, social measures**
  - over 4000 variables recorded
- Baseline data collection finished in 2015
- Follow-ups every 3 years for 20 years

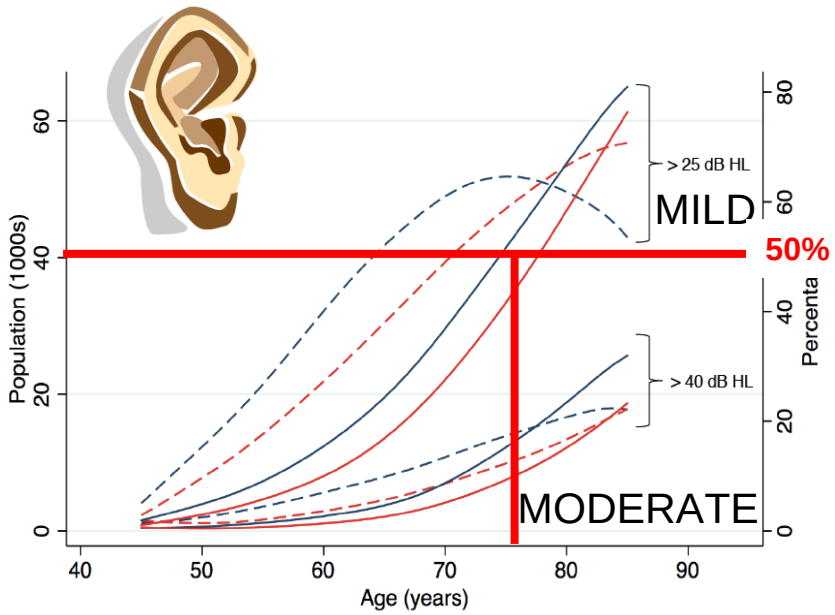
clsa élcv

https://www.clsa-elcv.ca/

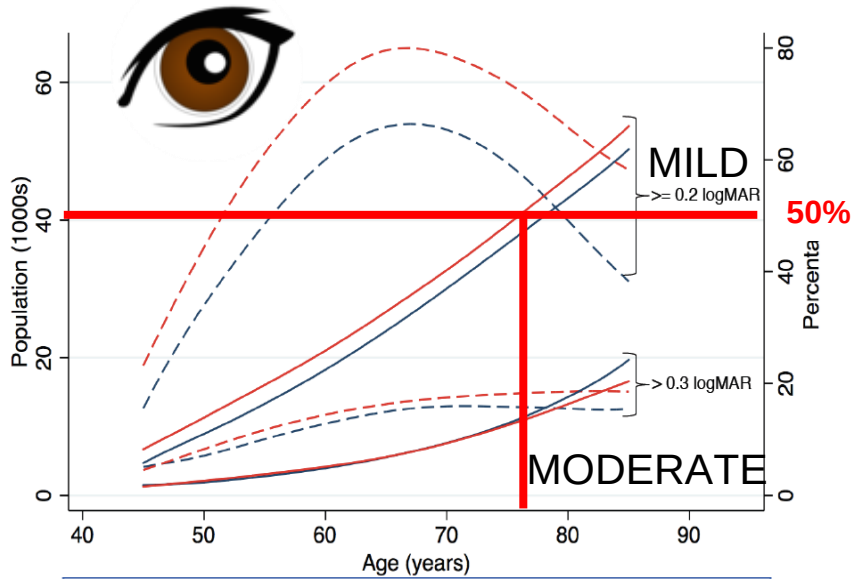
Criteria for Impairments

Hearing: mean better-ear pure-tone (1, 2, 3, 4 kHz) thresholds > 25 dB HL
Vision: retro-illuminated ETDRS at 2 m visual acuity < 0.2 logMAR
Balance: with eyes open, time standing on better foot balance < 5 seconds

Sensory loss increases with age



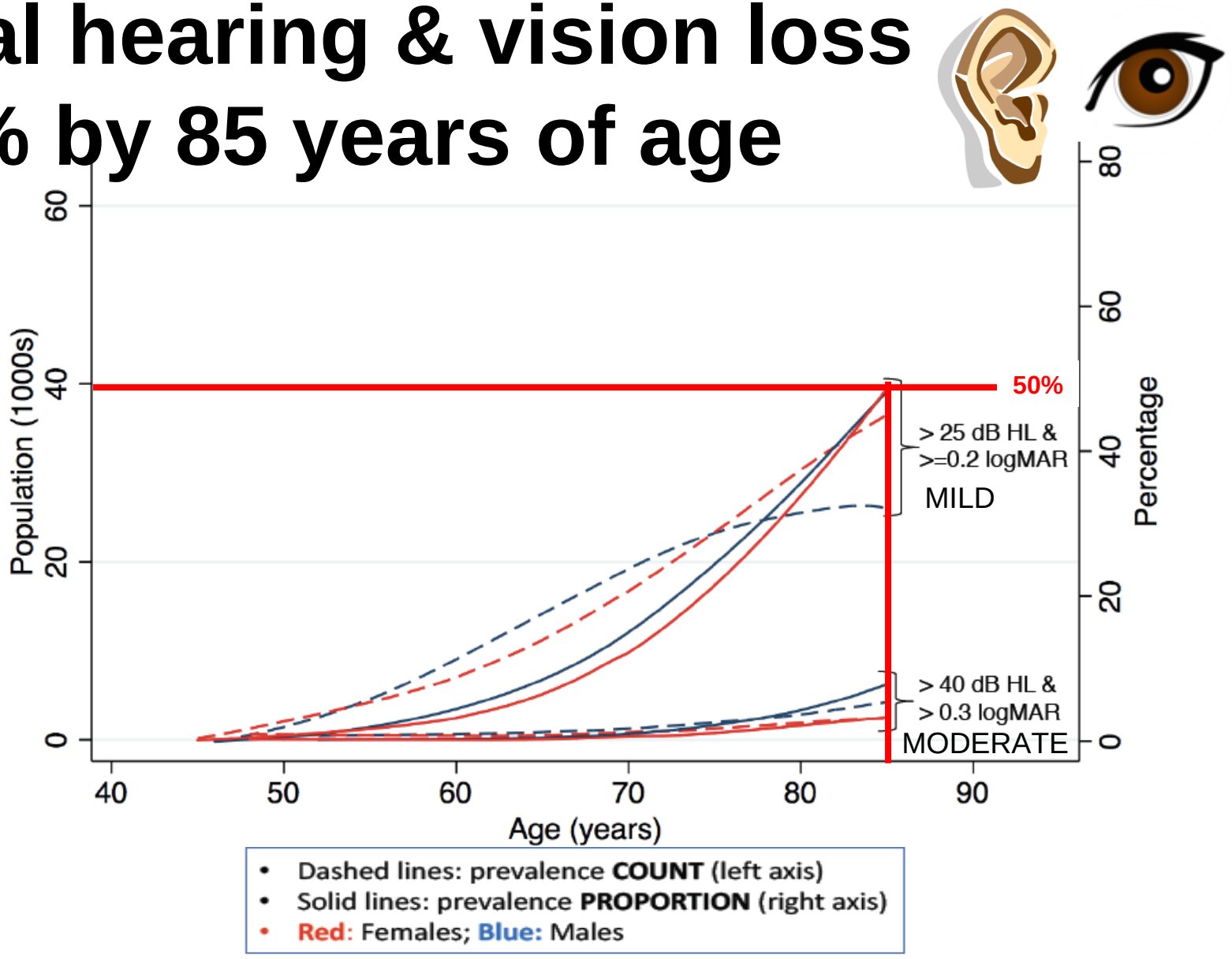
- Dashed lines: prevalence **COUNT** (left axis)
- Solid lines: prevalence **PROPORTION** (right axis)
- Red: Females; Blue: Males



- Dashed lines: prevalence **COUNT** (left axis)
- Solid lines: prevalence **PROPORTION** (right axis)
- Red: Females; Blue: Males

50% before 75 years

Dual hearing & vision loss 50% by 85 years of age



Combined hearing, vision, balance

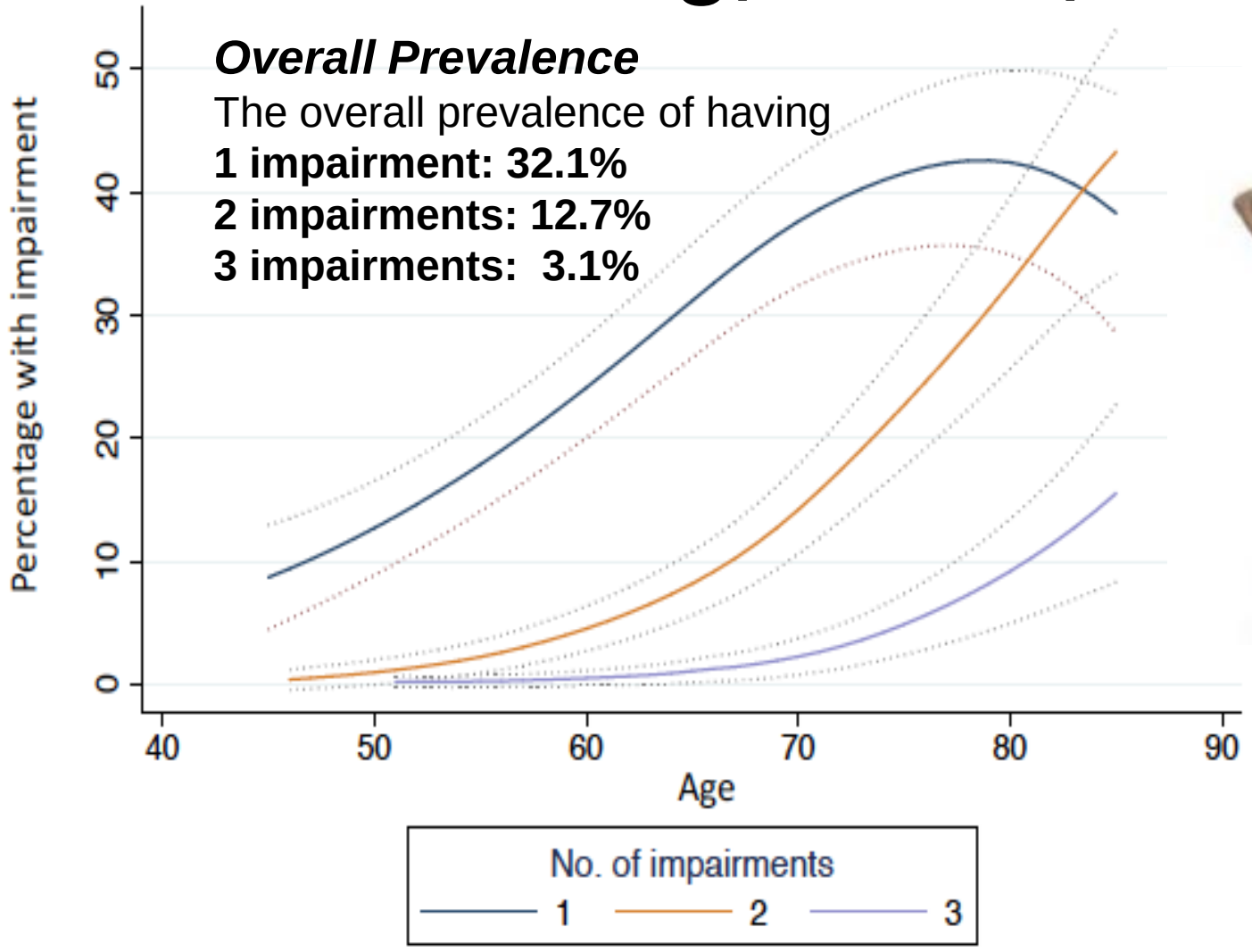
Overall Prevalence

The overall prevalence of having

1 impairment: 32.1%

2 impairments: 12.7%

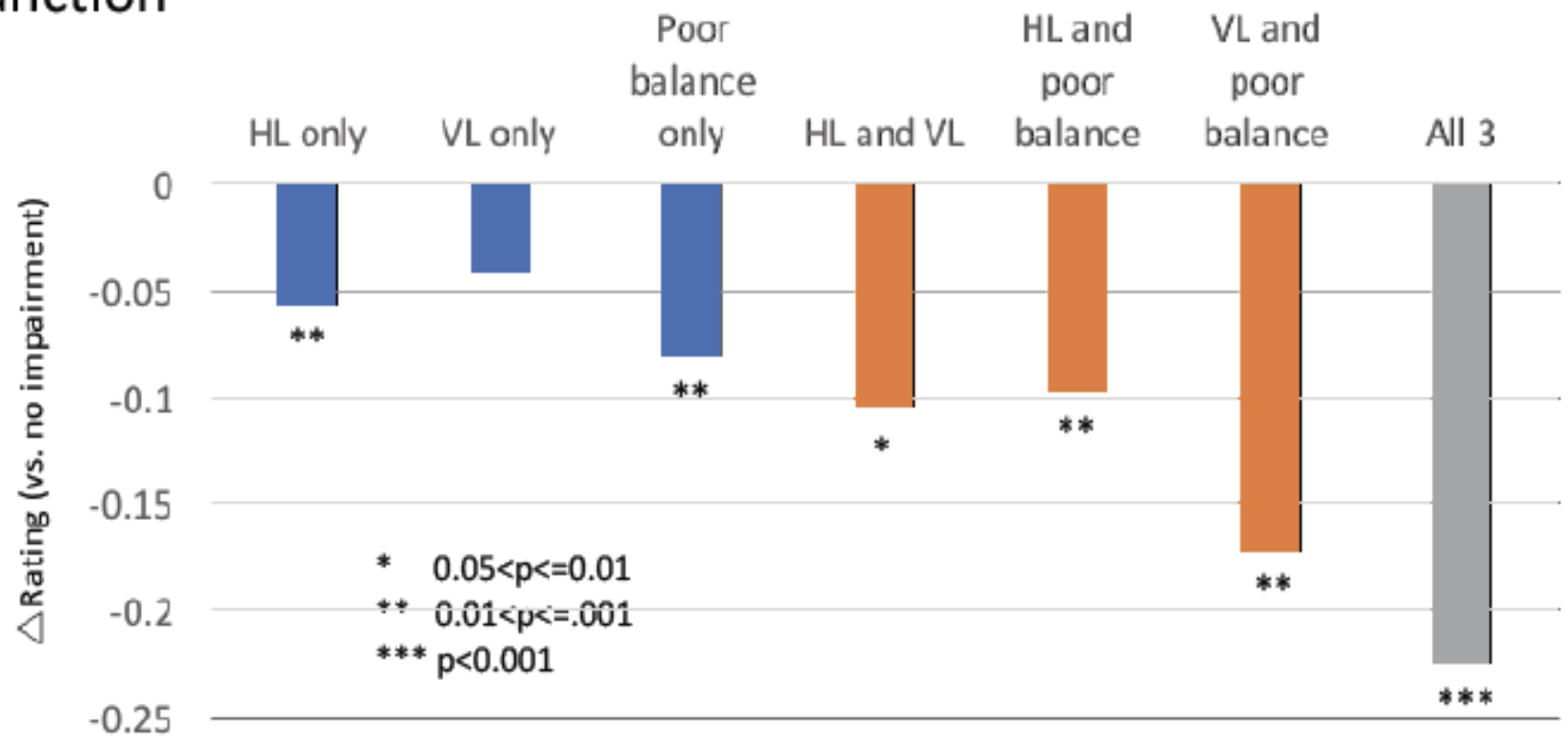
3 impairments: 3.1%



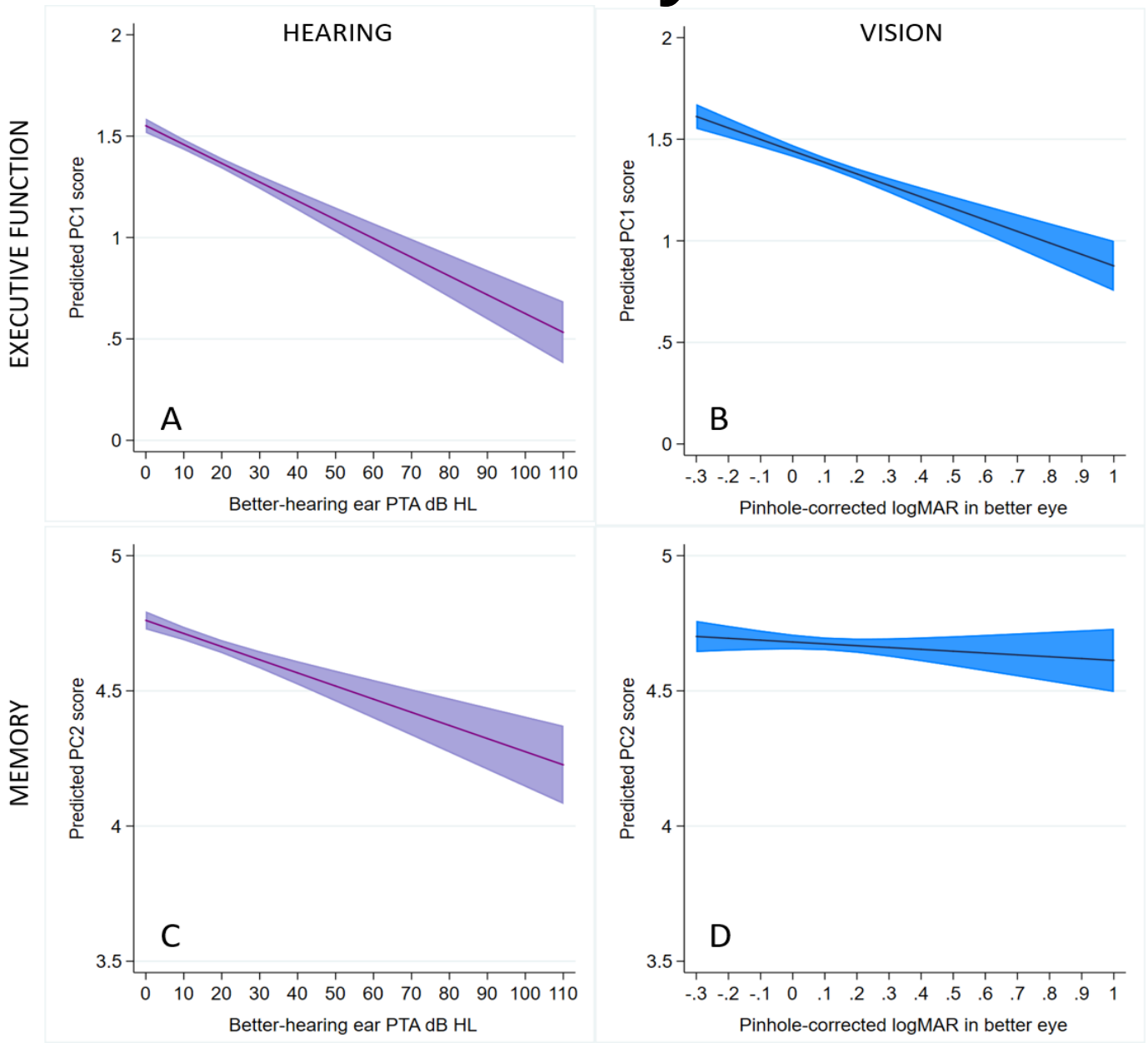
Sensory loss ~ health and cognition

Associations in which effect size increased with # of impairments (regardless of type of impairment)

- General health (shown)
- Executive function
- Memory



Sensory Function & Cognition



- Poorer sensory function is associated with lower cognitive performance
- Hearing → executive function
  → memory
- Vision → executive function

- Over and above age & other factors
- No sex differences

What does this mean?

Executive Function

- HEARING

a 20-dB difference in hearing
= 4.6 years of cognitive aging

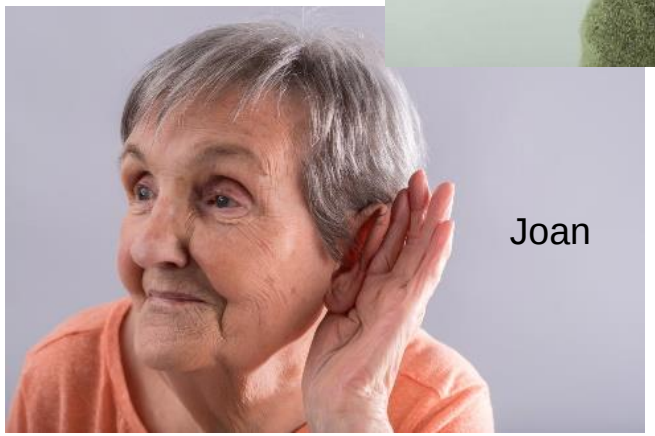
- VISION

a difference of 0.2 logMAR
(two lines of visual acuity)
= 4.2 years of cognitive aging

Memory

- HEARING

a 20-dB difference in hearing
= 3.4 years of cognitive aging

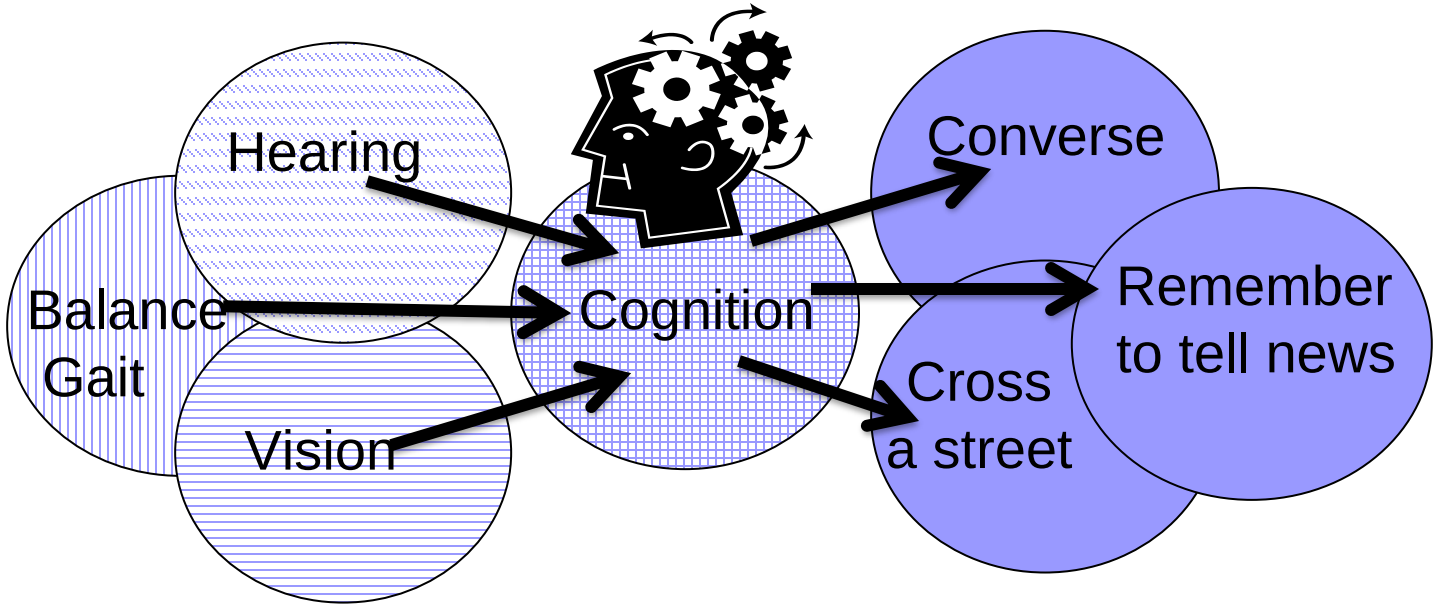


Consider Sally and Joan who are the same age, sex, education, health status, etc.

However, Joan has a moderate hearing loss.

Joan may perform as if she is 5 years older on a test of executive function, compared to Sally.

And 8.8 years older if she also has a mild vision loss.

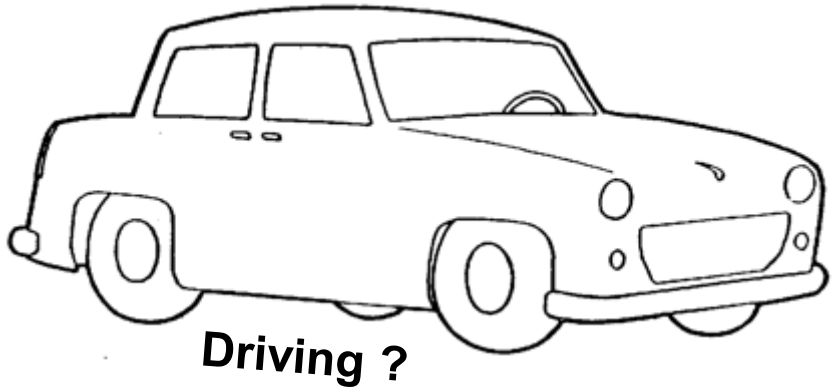


Senses - Cognition - Life

Increased perceptual effort drains cognitive resources available for other purposes

Hearing loss

Reduced perception of hazards



Driving ?

Falls ?

White Coat, Black Art: **Six overlooked risks of falls for seniors and how to prevent them**
CBC Radio · Posted: Oct 16, 2021
https://www.cbc.ca/radio/whitecoat/6-overlooked-risks-of-falls-for-seniors-and-how-to-prevent-them-1.6202152

Hearing Loss & Other Health Issues

Stam, Kostense, Lemke, Merkus, Smit, Festen, & Kramer. (2014). Comorbidity in adults with hearing difficulties: Which chronic medical conditions are related to hearing impairment? *International Journal of Audiology*, *53*(6), 392-401.

- N = 2000, 18-70 years old (Netherlands)
- 79% of individuals with self-reported hearing loss also reported at least one other chronic health condition
- More likely to report additional health conditions compared to those respondents with normal hearing

Hearing loss and health risks

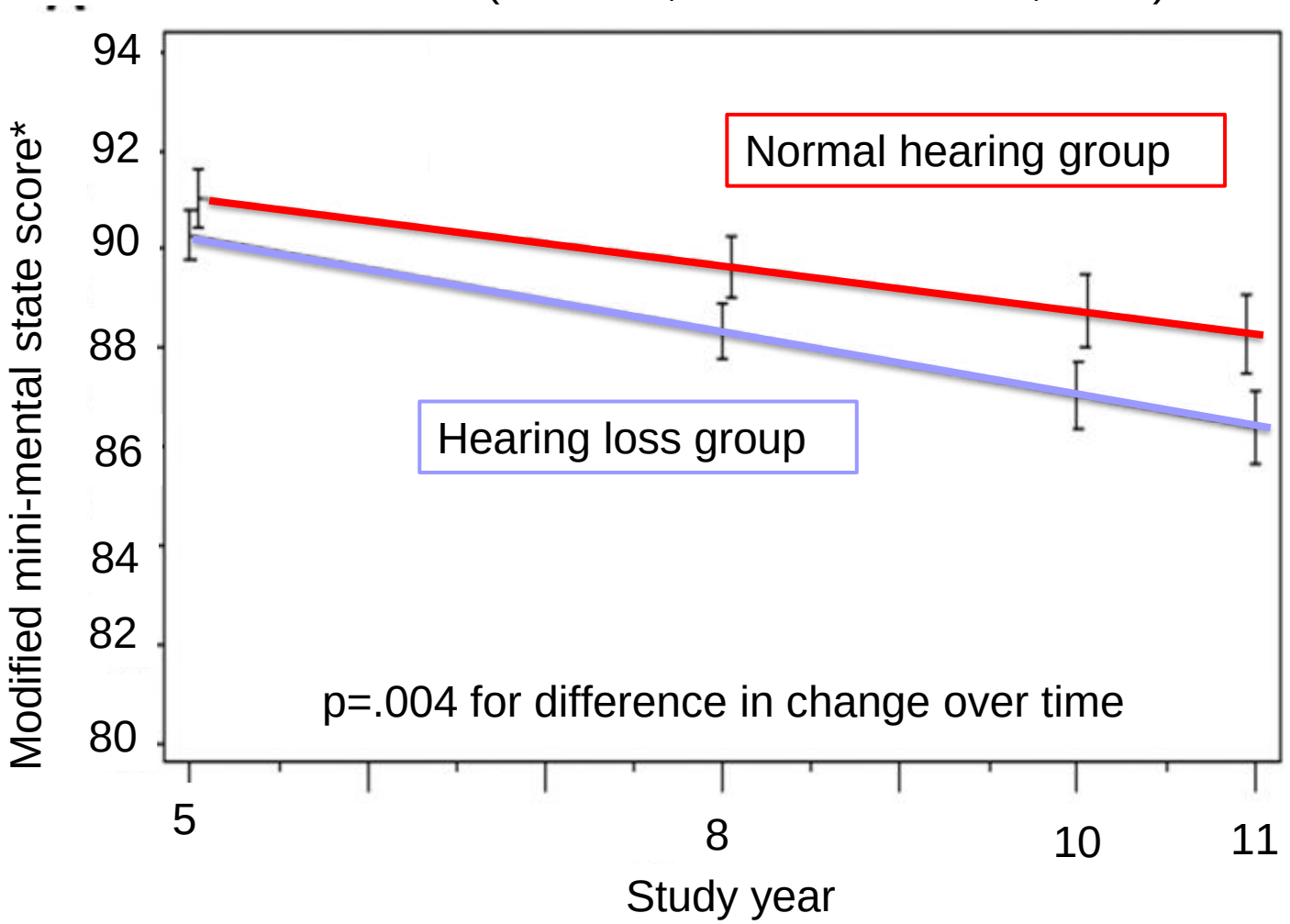
- Risk factors for hearing loss
  - Diabetes
  - Cardiovascular disease/hypertension

- Hearing loss increases risk for:
  - Cognitive decline & dementia (psychological)
  - Falls and injuries (physical)
  - Social isolation and loneliness (social)
  - Depression
  - Frailty
  - Mortality

Pichora-Fuller, M.K., Mick, P.T., Reed, M. (2015). Hearing, cognition, and healthy aging: Social and public health implications of the links between age-related declines in hearing and cognition. *Seminars in Hearing, 36,* 122-139.

Hearing loss and cognitive decline

Health ABC cohort (Lin et al., *JAMA Intern Med*, **2013**)



- Note: very similar results for a non-auditory test digit-symbol substitution)

JAMA Otolaryngology–Head & Neck Surgery | Original Investigation

Association of Age-Related Hearing Loss With Cognitive Function, Cognitive Impairment, and Dementia

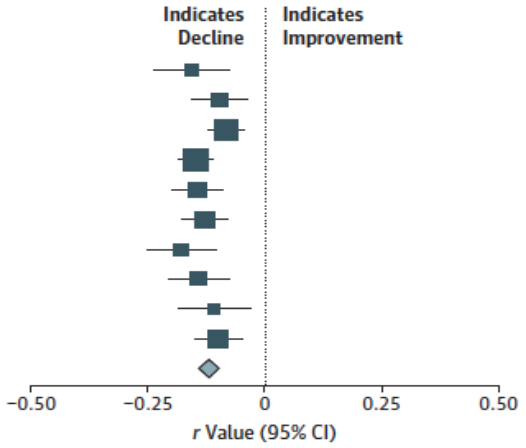
A Systematic Review and Meta-analysis

2018

David G. Loughrey, BA(Hons); Michelle E. Kelly, DPsychBAT; George A. Kelley, DA; Sabina Brennan, PhD; Brian A. Lawlor, MD, FRCPI, FRCPsych

Figure 2. Forest Plot of Correlations for Cognition Cross-sectional Outcomes

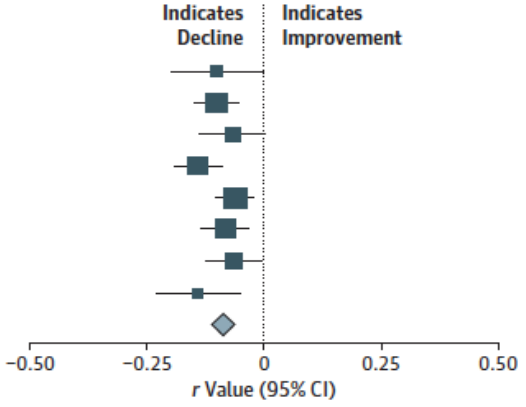
Outcome	No. of Participants/Events	*r* Value (95% CI)
Attention	5159/11	−0.16 (−0.24 to −0.07)
Delayed recall	3808/7	−0.10 (−0.16 to −0.04)
Fluency	4629/9	−0.08 (−0.12 to −0.04)
Global cognition	7702/15	−0.15 (−0.18 to −0.11)
Immediate recall	6747/15	−0.14 (−0.20 to −0.09)
Processing speed	10660/20	−0.13 (−0.18 to −0.08)
Reasoning	3128/12	−0.18 (−0.25 to −0.10)
Semantic memory	2906/10	−0.14 (−0.20 to −0.08)
Visuospatial ability	669/5	−0.11 (−0.19 to −0.03)
Working memory	4855/9	−0.10 (−0.15 to −0.05)
Summary	15620/113	−0.12 (−0.14 to −0.10)



Twenty-six studies were included in the analysis.[23-48] Squares represent correlation (*r* value); different sizes of markers, weight; diamond, overall correlation; and error bars, 95% CIs.

Figure 3. Forest Plot of Correlations for Cognition Cohort Outcomes

Outcome	No. of Participants/ Events	*r* Value (95% CI)
Attention	391/1	−0.10 (−0.20 to 0.00)
Delayed recall	1774/4	−0.10 (−0.15 to −0.05)
Fluency	1233/4	−0.07 (−0.14 to 0.01)
Global cognition	4227/6	−0.14 (−0.19 to −0.09)
Immediate recall	4225/6	−0.06 (−0.10 to −0.02)
Processing speed	6462/10	−0.08 (−0.14 to −0.03)
Reasoning	1057/1	−0.06 (−0.12 to 0.00)
Semantic memory	707/1	−0.14 (−0.23 to −0.05)
Summary	8233/33	−0.09 (−0.11 to −0.07)



Nine studies were included in the analysis.[7,29,36,40,46,48,51-53] Squares represent correlation (*r* value); different sizes of markers, weight; diamond, overall correlation; and error bars, 95% CIs.

Neurol Sci (2017) 38:233–239
DOI 10.1007/s10072-016-2779-3

REVIEW ARTICLE

2017

Hearing impairment and risk of Alzheimer's disease: a meta-analysis of prospective cohort studies

Yuqiu Zheng[1] · Shengnuo Fan[1] · Wang Liao[1] · Wenli Fang[1] · Songhua Xiao[1] · Jun Liu[1]

A recent meta-analysis showed that the overall combined relative risk of people with hearing impairment to develop Alzheimer's disease was almost five times greater compared to controls with normal hearing.

Home Care & Long-term Care

PLOS ONE 2018

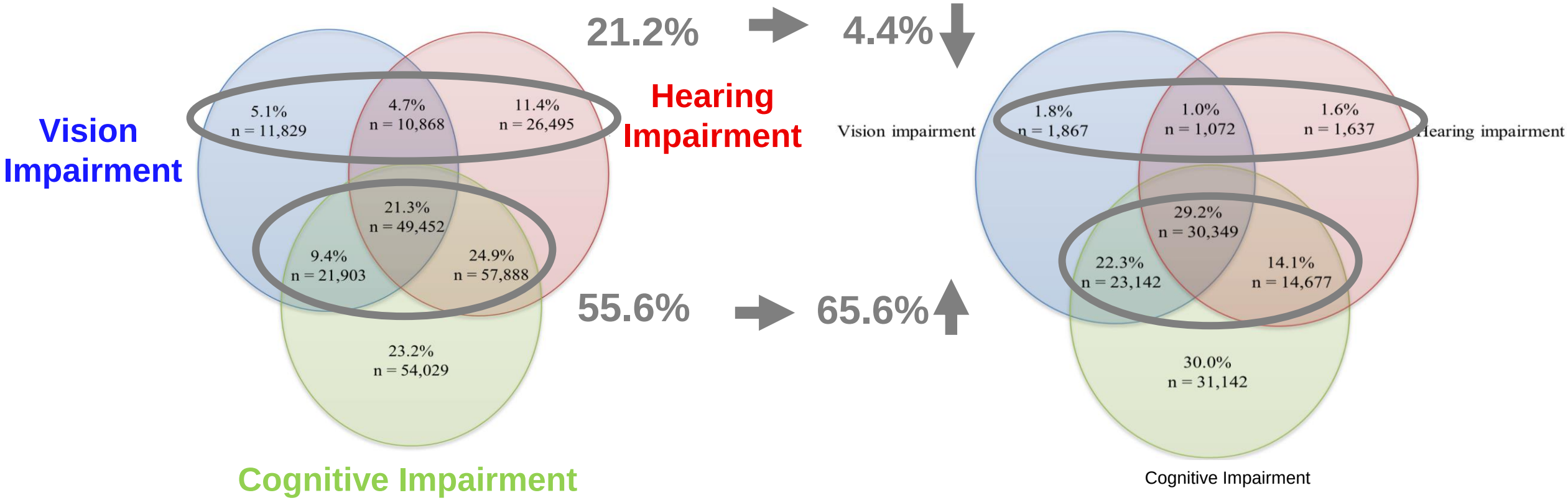
Dawn Guthrie
Wilfrid Laurier University
Waterloo, Ontario

RESEARCH ARTICLE

Combined impairments in vision, hearing and cognition are associated with greater levels of functional and communication difficulties than cognitive impairment alone: Analysis of interRAI data for home care and long-term care recipients in Ontario

Dawn M. Guthrie[1,2]*, Jacob G. S. Davidson[1], Nicole Williams[1], Jennifer Campos[3,4], Kathleen Hunter[5,6], Paul Mick[7], Joseph B. Orange[8], M. Kathleen Pichora-Fuller[9], Natalie A. Phillips[10], Marie Y. Savundranayagam[11], Walter Wittich[12,13,14]

Sensory & Cognitive Impairment [Ontario]



Home Care (n = 59,360)

Long-term Care (n = 6,692)

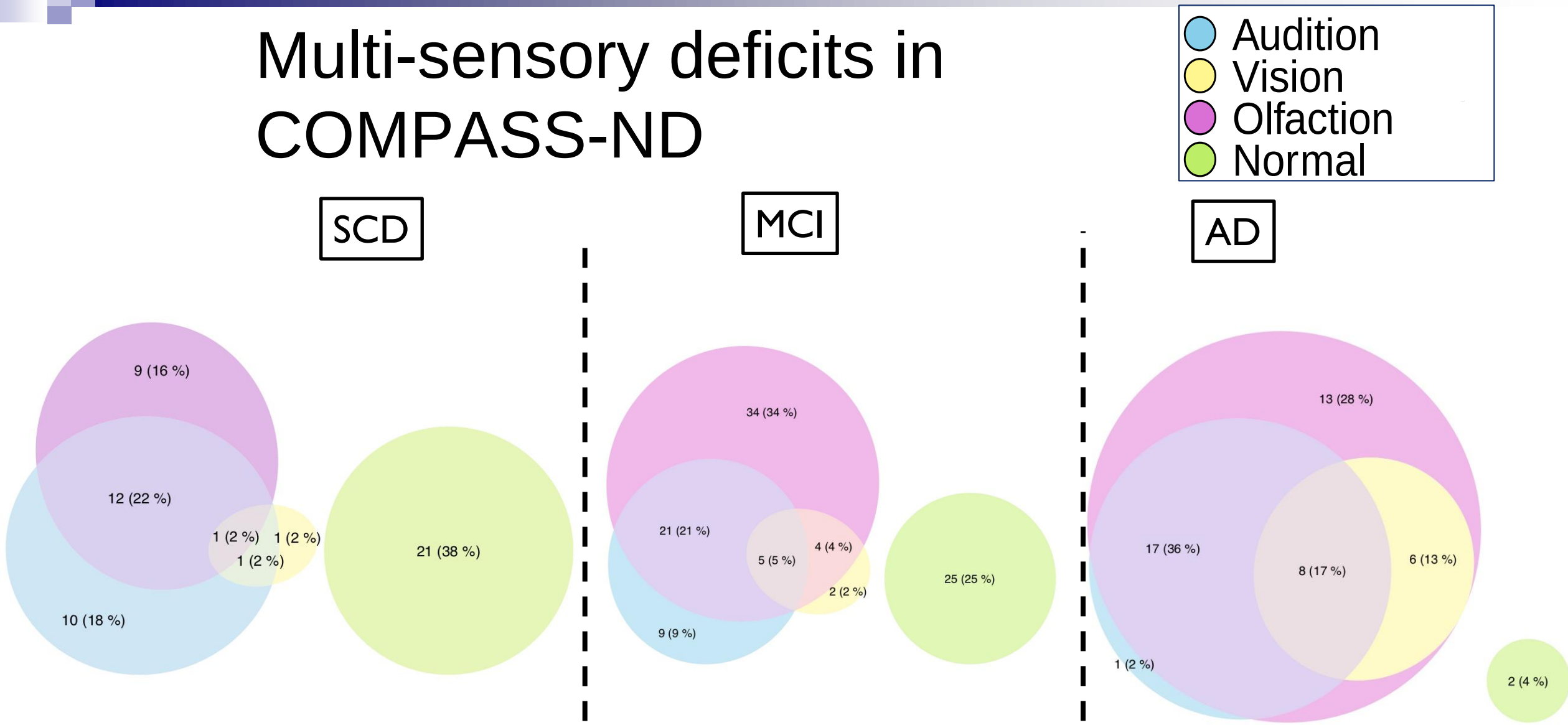
Guthrie, et al. (2018), *Plos One*, *13*(2), e0192971. https://doi.org/10.1371/journal.pone.0192971

CCNA Sensory Assessment

Tests completed by participants with MCI and dementia at COMPASS-ND sites

- Hearing
  - Self-report
  - Pure-tone hearing screening
  - Speech in noise test
    - **Canadian Digit Triplet Test**
      - French and English
    - Developed with U of Ottawa
  - Participants failing audiometry use a Pocket Talker during assessments
- Vision
  - Self-report
  - Reading-based visual acuity
  - Contrast sensitivity

Multi-sensory deficits in COMPASS-ND



Outline

- Auditory-cognitive (and other health) links
- **Hearing screening**
- Communication accessibility
- Integrated person-centered care

Received: 12 February 2020 | Revised: 3 March 2020 | Accepted: 9 April 2020

DOI: 10.1002/alz.12105

Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

PERSPECTIVE

Recommendations of the 5th Canadian Consensus Conference on the diagnosis and treatment of dementia

Zahinoor Ismail[1] | Sandra E. Black[2] | Richard Camicioli[3] | Howard Chertkow[4] | Nathan Herrmann[5] | Robert Laforce Jr.[6] | Manuel Montero-Odasso[7,8] | Kenneth Rockwood[9] | Pedro Rosa-Neto[10] | Dallas Seitz[11] | Saskia Sivananthan[12] | Eric E. Smith[11] | Jean-Paul Soucy[13] | Isabelle Vedel[14] | Serge Gauthier[15] | the CCCDTD5 participants

TABLE 5 Non-cognitive markers of dementia

6. There is enough observational evidence that hearing impairment is associated with the development of dementia.

We recommend assessing and recording hearing impairment in primary clinics as a dementia risk factor..

TABLE 6 Risk reduction

Hearing

5a. Persons with cognitive complaints, MCI, or dementia (and their care partner, if there is one) should be questioned about symptoms of hearing loss to improve cognitive outcomes and risk reduction.

It is recommended that persons are asked if they have any difficulty hearing in their everyday life (rather than asking if they have a hearing loss).

5b. If symptoms of hearing loss are reported, then hearing loss should be **confirmed by audiometry** conducted by an audiologist meeting provincial regulations for the practice of audiology.

If confirmed, audiologic rehabilitation may be recommended. This may include behavioral counselling and techniques, and may or may not include the recommended use of a hearing aid or other device.

6. We recommend following the World Health Organization 2019 guidelines for risk reduction of cognitive decline and dementia including: (a) **audiological examination and/or otoscopic examination**; (b) the review of medications for potential **ototoxicity**; (c) referral to otolaryngology for persons with chronic otitis media or **who fail otoscopy**.

September 15, 2021

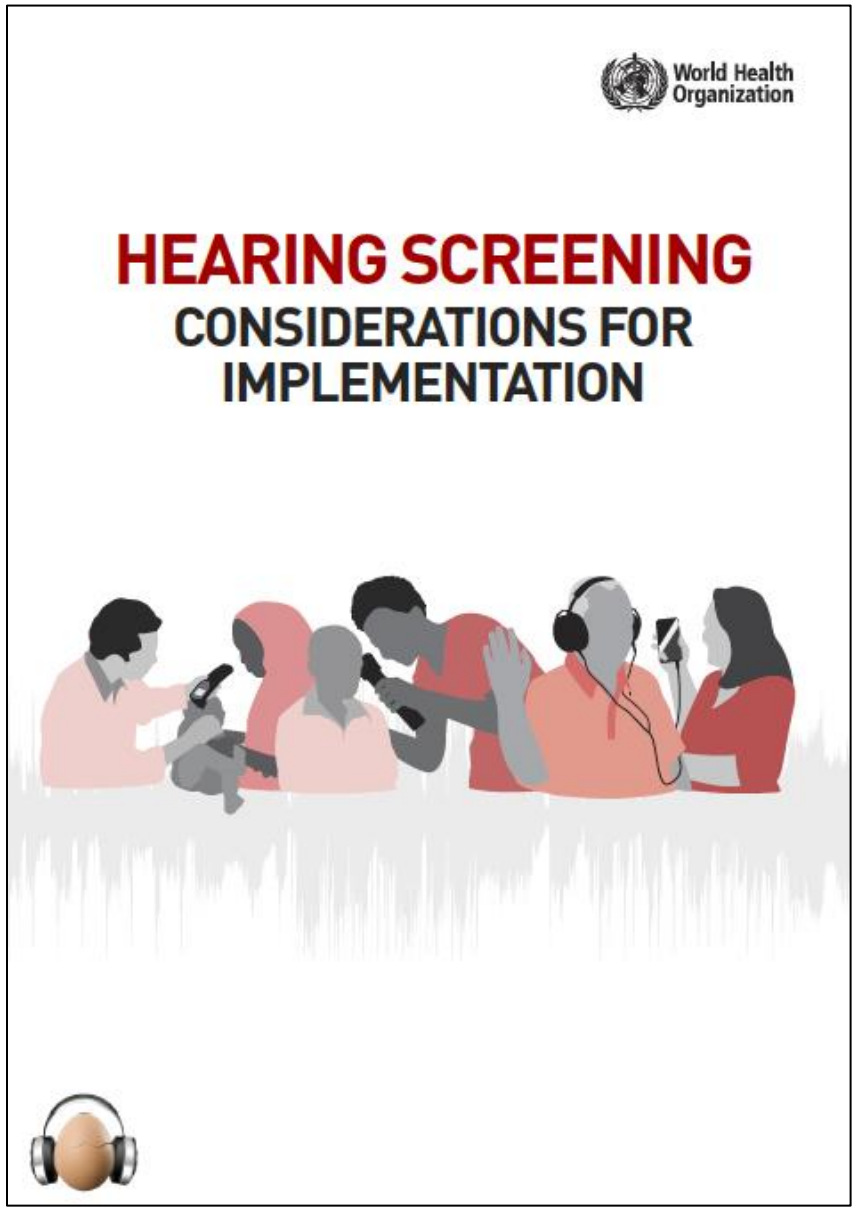
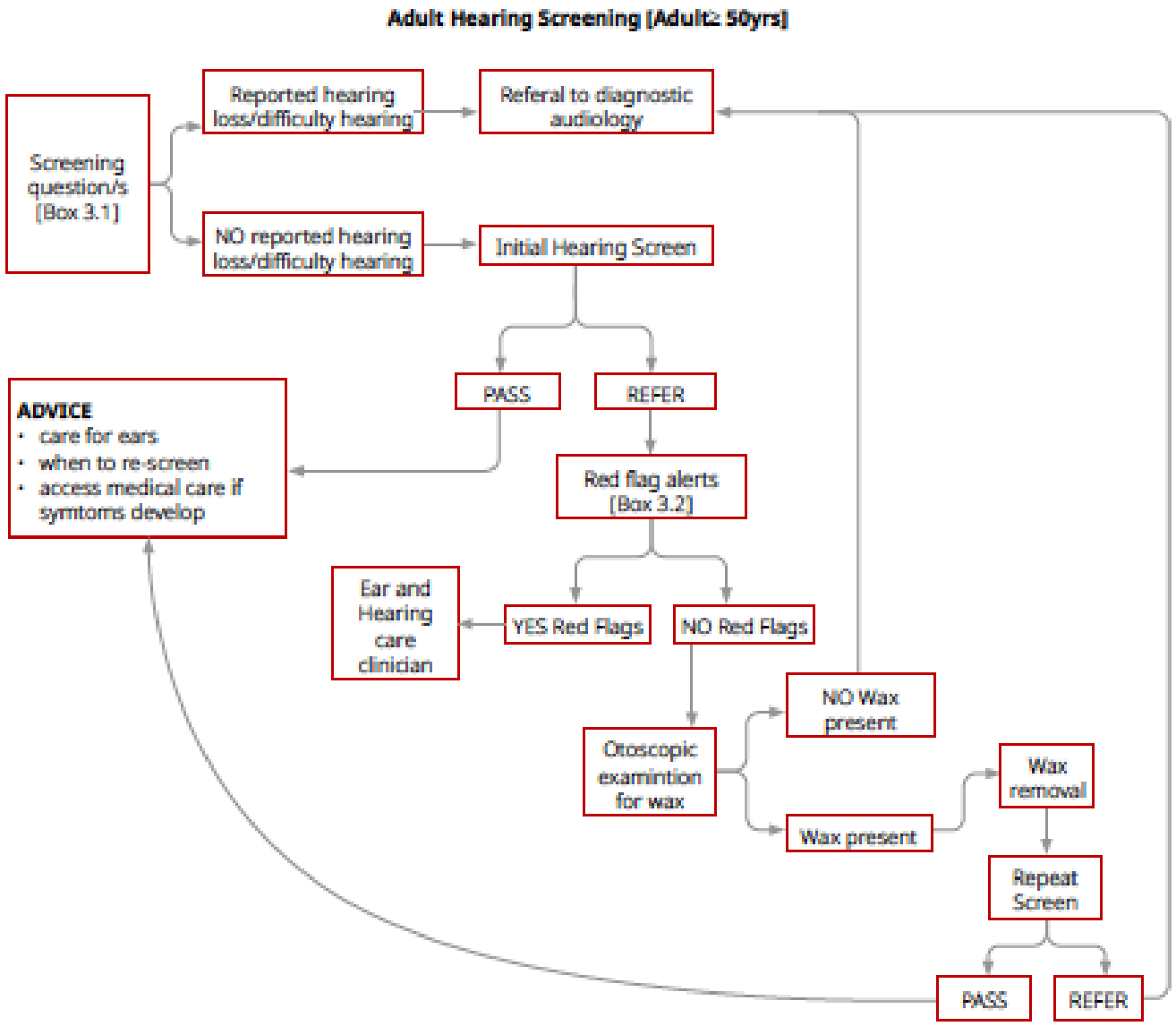


Figure 3.1 Steps in hearing screening and follow-up of older people* (17)



*Adapted from **the WHO Integrated care for older people (ICOPE): guidance for person-centred assessment and pathways in primary care.** See: https://apps.who.int/iris/handle/10665/326843.

Prevalence of Hearing Loss

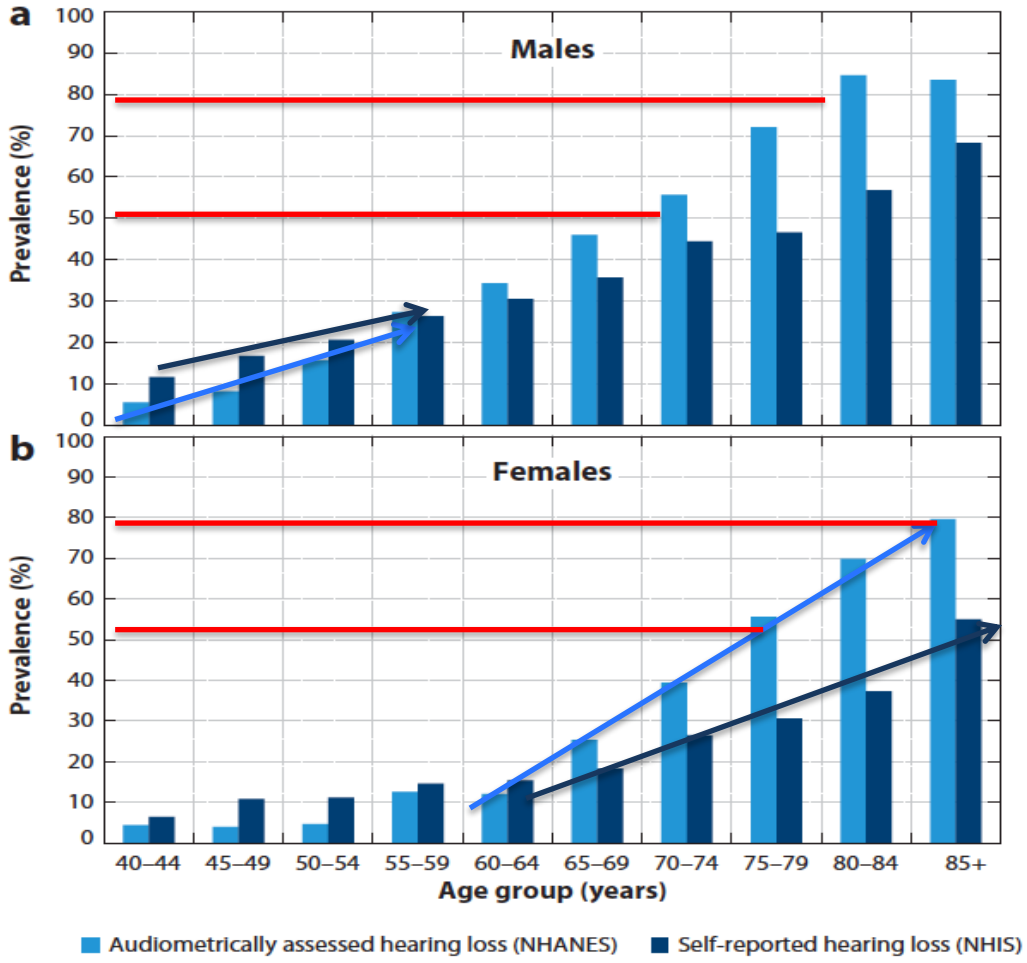
- Increases with age
- 50% ~ 70-75 years
- 80% ~ 80+ years

Self-report vs. Audiometry:

- <u>Older adults</u>:
audiometry >
self-reported HL

- <u>Middle-aged adults</u>:
self-reported HL >
audiometry

Bainbridge, K. E., & Wallhagen, M. I. (2014). Hearing loss in an aging American population: Extent, impact, and management. *The Annual Review of Public Health, 35,* 139-52.



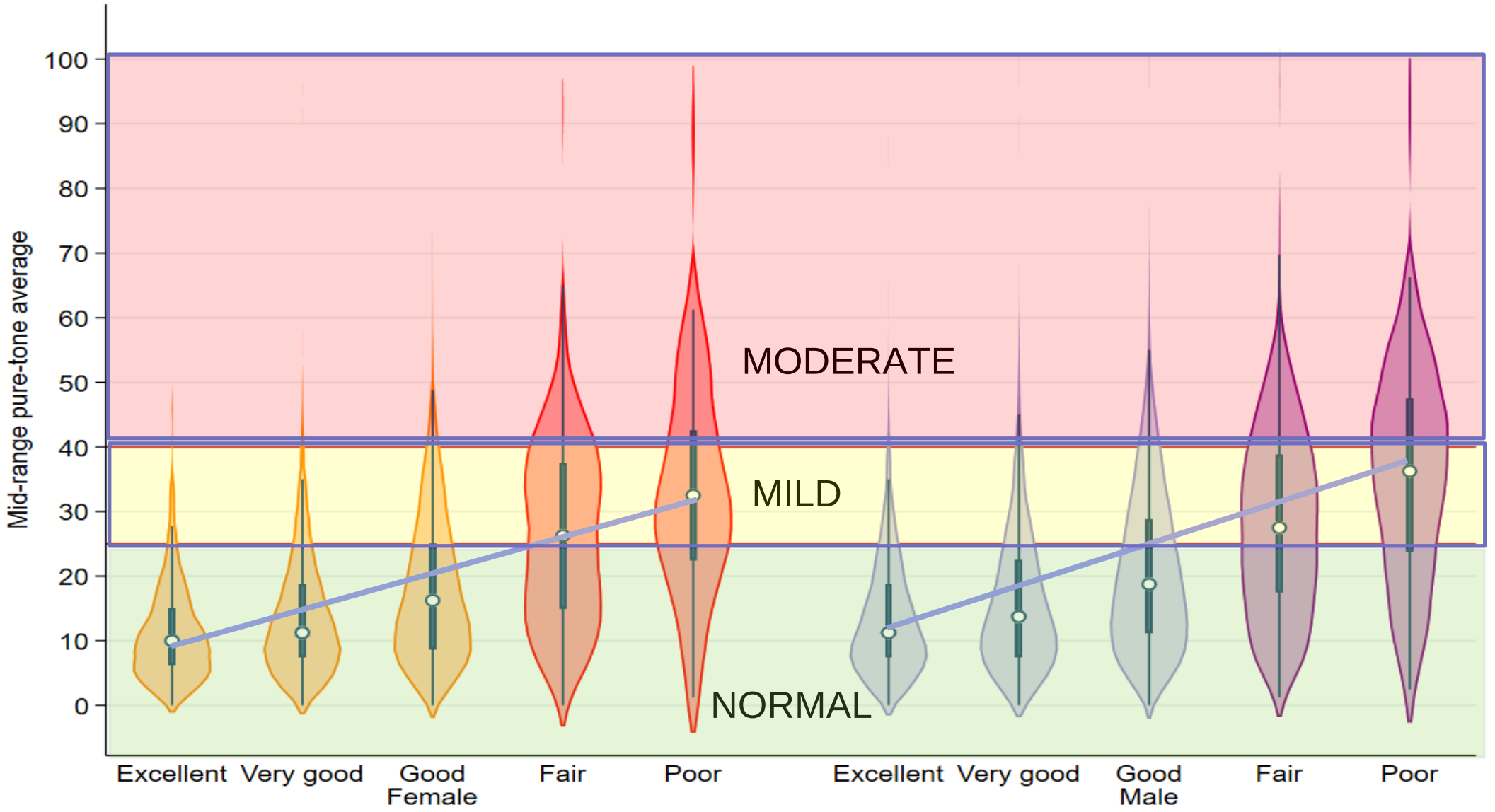
Audiometry

Self-report

Figure 1

(*a*) Age-specific prevalence for noninstitutionalized US males reporting at least a little trouble hearing based on the 2007 National Health Interview Survey (NHIS), and audiometrically assessed, bilateral hearing loss of mild or worse severity based on the National Health and Nutrition Examination Survey (NHANES) 1999–2006 (for ages 40–69 years), 2005–2006 and 2009–2010 (for ages 70–79 years), and 2005–2006 (for ages 80 years and older). (*b*) Age-specific prevalence for noninstitutionalized US females reporting at least a little trouble hearing based on the 2007 National Health Interview Survey (NHIS), and audiometrically assessed bilateral hearing loss of mild or worse severity, based on the National Health and Nutrition Examination Survey (NHANES) 1999–2006 (for ages 40–69 years), 2005–2006 and 2009–2010 (for ages 70–79 years), and 2005–2006 (for ages 80 years and older).

Canadian Longitudinal Study of Aging



Hearing Screening & Health

Mick, P.T., & Pichora-Fuller, M.K. (2016).
Is hearing loss associated with poorer health in older adults who might benefit from hearing screening? *Ear and Hearing.*

- The 60-69 year olds with
  unacknowledged or unaddressed hearing loss
  had significantly increased risk of prevalent
  lower cognitive scores and social isolation .

Evaluation of Hearing Status at the Time of Dementia Diagnosis

BY LINDSEY JORGENSEN, CATHERINE PALMER, AND GARY FISCHER

Jan/Feb 2014 **AUDIOLOGY TODAY**

Hearing loss and dementia often affect similar populations; specifically, both conditions occur more frequently in individuals over the age of 65. Since the majority of routine tests used to diagnose dementia are presented verbally, a significant hearing loss might impact the test results. The results of this investigation reveal that hearing status is not routinely considered during the diagnosis of dementia in a large medical center clinic.

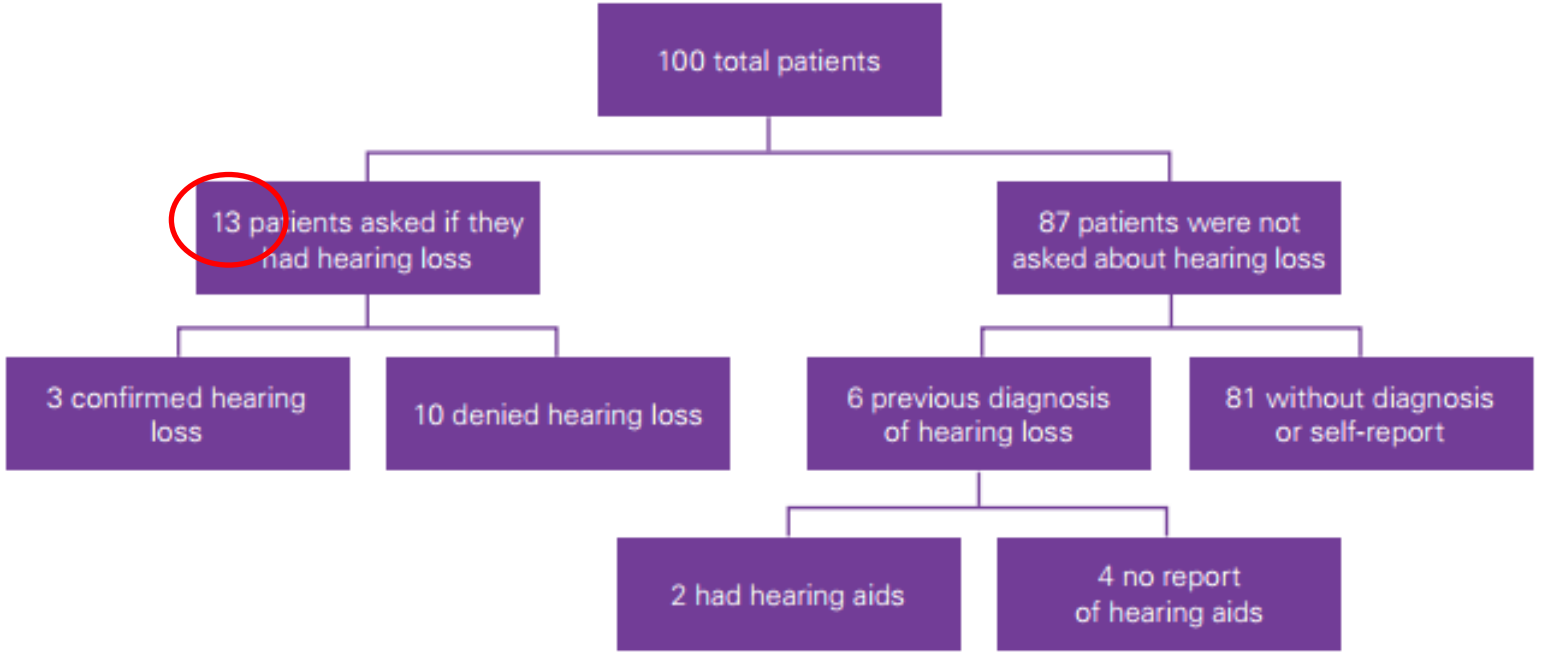


FIGURE 1. Patients with confirmed hearing loss.

Hearing aid use reduced problem behaviors
judged by caregivers of adults with dementia (Palmer et al., JSHLR, 1998)

The effect of decreased audibility on MMSE performance: A measure commonly used for diagnosing dementia (Jorgensen et al., JAAA, 2016).

https://www.who.int/health-topics/hearing-loss/hearwho

Outline

- Auditory-cognitive (and other health) links
- Hearing screening
- **Communication accessibility**
- Integrated person-centered care

Health is…

"…*the capacity of people to adapt to, respond to, or control life's challenges and changes.*"
(Frankish et al., 1997)

Social interaction
communication

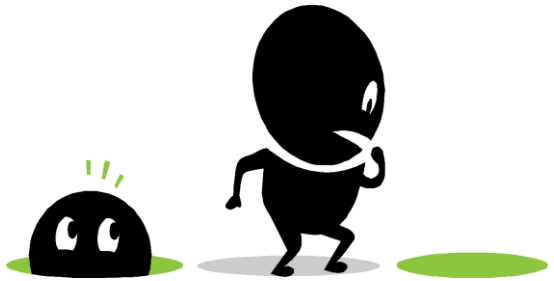
Words of an older woman with hearing loss...

"*When you are hard of hearing you struggle to hear;*
When you struggle to hear you get tired;
When you get tired you get frustrated;
When you get frustrated you get bored;
When you get bored you quit.
-- ***I didn't quit today***."

Coping with challenge:

Quit (Avoid) ~ risk of social isolation

Persist (Control) ~ maintain social interactions



Associations between sensory loss and social networks, participation, support, and loneliness

Analysis of the Canadian Longitudinal Study on Aging

Paul Mick MD MPH Maksim Parfyonov MD Walter Wittich PhD
Natalie Phillips PhD M. Kathleen Pichora-Fuller MSc PhD

Canadian Family Physician, 2018

Abstract

Objective To determine if hearing loss, vision loss, and dual sensory loss were associated with social network diversity, social participation, availability of social support, and loneliness, respectively, in a population-based sample of older Canadians and to determine whether age or sex modified the associations.

Design Cross-sectional population-based study.

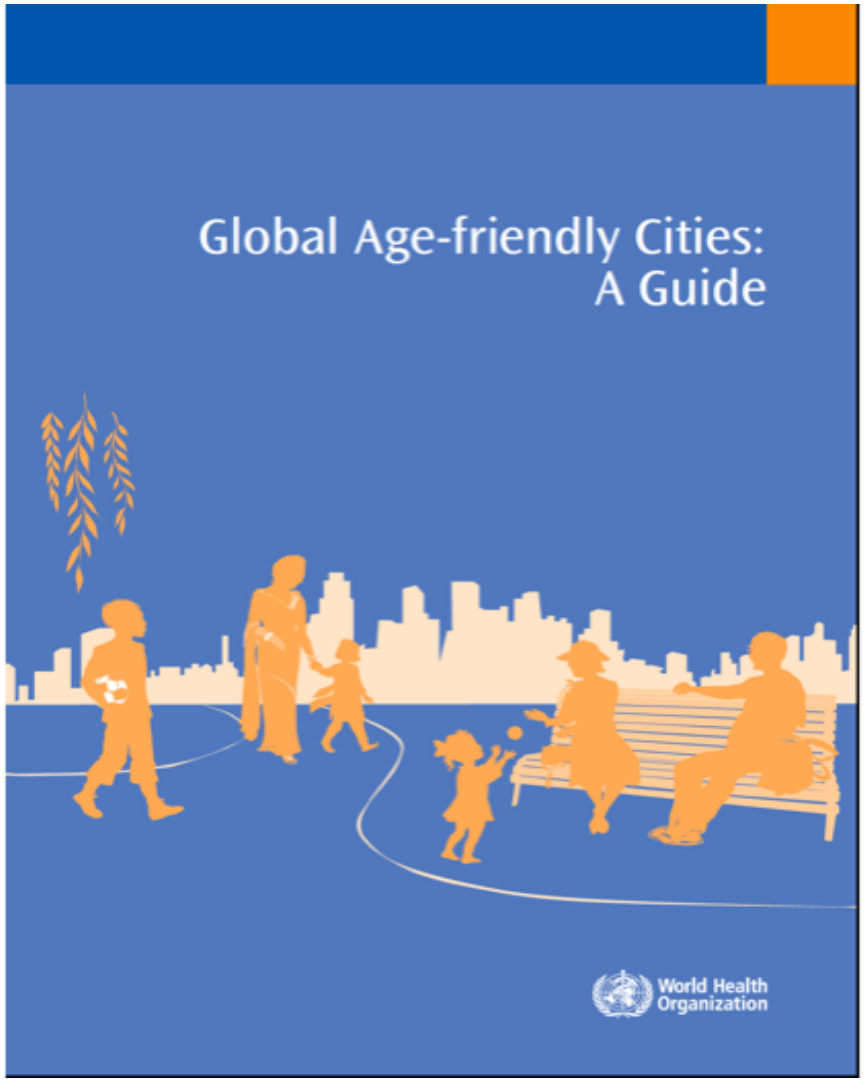
Setting Canada.

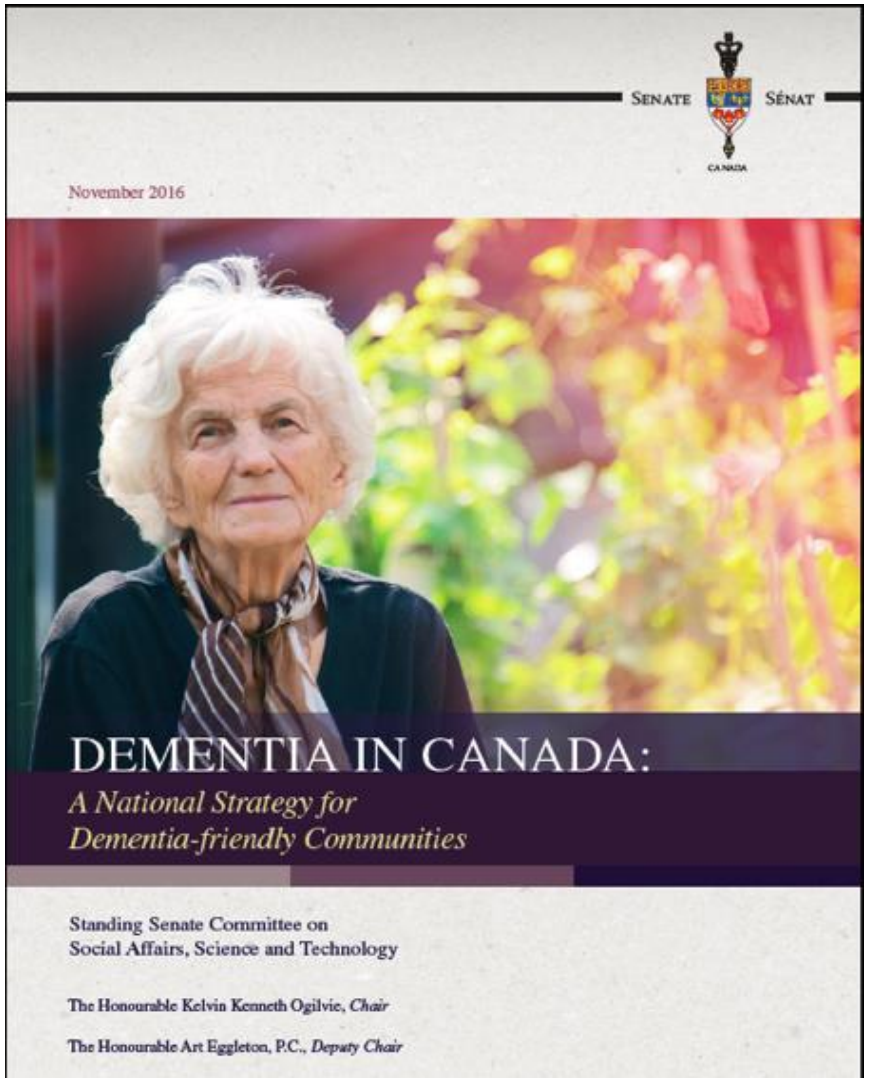
Participants The sample included 21 241 participants in the Canadian Longitudinal Study on Aging tracking cohort. The sample was nationally

Editor's key points

- In this analysis of data from the Canadian Longitudinal Study on Aging, vision loss (in men) and dual sensory loss (in 65- to 85-year-olds) were independently associated with low social network diversity. Vision loss and dual sensory loss (in 65- to 85-year-olds) were independently associated with low social participation. Hearing, vision, and dual sensory losses were each independently associated with loneliness and reduced availability of social support, respectively.
- These findings are concerning because social support facilitates positive coping mechanisms that mitigate the effects of sensory loss and other chronic disabling conditions. Living with a chronic health condition often entails relying on others for help with instrumental tasks and emotional support. Unfortunately, individuals with clinically diagnosed sensory loss typically receive little, if any, relationship and communication counseling.

Age-friendly, dementia-friendly… sensory-friendly….





Hearing accessibility

A place or activity is hearing accessible if participation in it is not compromised by difficulty hearing….

….regardless of hearing ability.

(Health and Welfare Canada Interdisciplinary Task Force on Hearing Impairment in the Adult, 1987)

Accessibility in Integrated Care

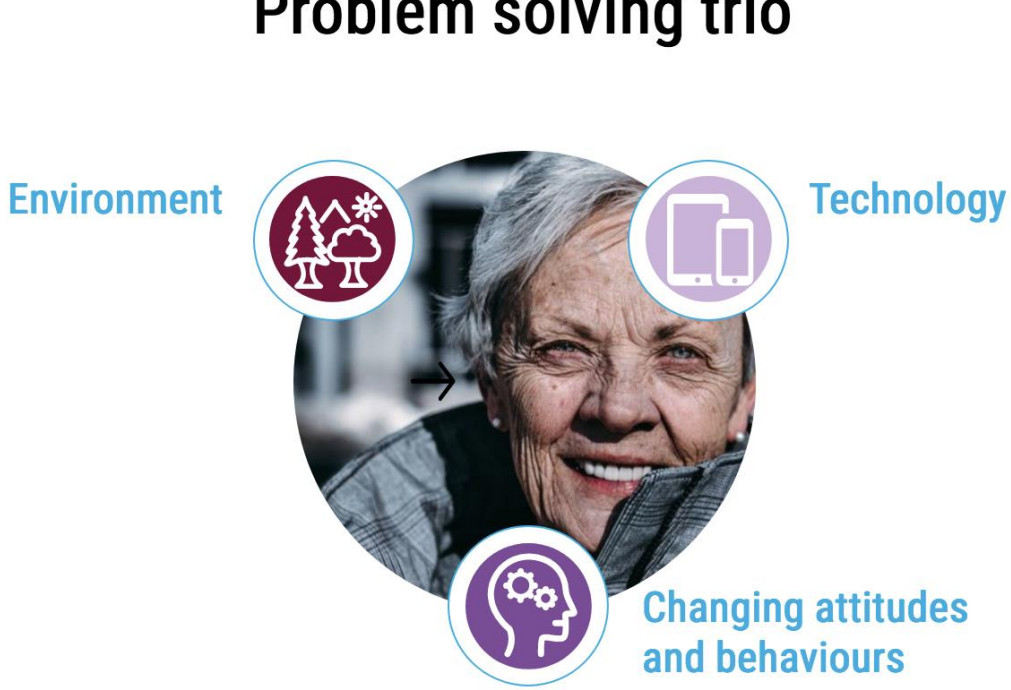
- **Communication accessibility in healthcare** for those with hearing loss in best health care for age-related health issues
  - Accurate diagnoses (e.g., dementia)
  - Optimal interventions (e.g., diabetes education; falls rehabilitation)

- **Tailor hearing solutions**

~ other health conditions
  - Vision (e.g., macular degeneration)
  - Dexterity (e.g., arthritis)
  - Mobility (e.g., walking devices)
  - Mental health (e.g., depression)
  - Dementia

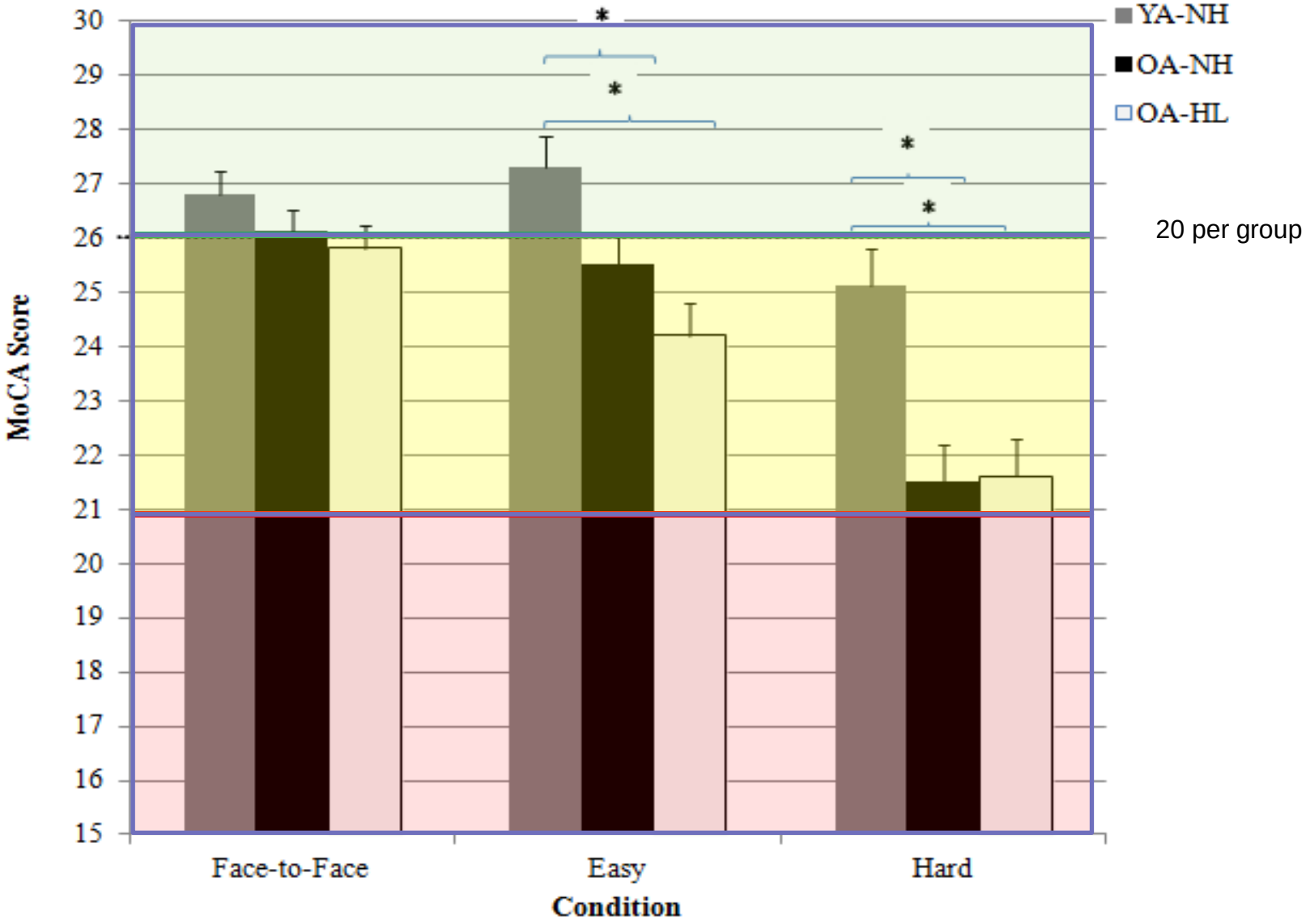
Problem Solving Map: How to age well, adapt to sensory challenges and help everyday cognition

- Environments
  - Physical – noise, lighting
  - Social – time, context, materials
- Attitudes and Behaviours
  - Person living with sensory loss (stigma)
  - Other individuals' (friends, family)
  - Institutions – public places and services
  - Laws, standards, rights to accessibility
- Technologies
  - Personal and public devices
  - Specialized and universal solutions



Effect of Background Noise on MoCA Scores

(Dupuis, Marchuk, & Pichora-Fuller, *Canadian J Aging*, 2016)



20 per group

Speech 50 dBHL

Babble 30 dBHL
Babble 62 dBHL

Generic Amplifiers

Basic Components

- Headset or earbuds
- Microphone
- Transmission method
- Volume control

Oct 18
Airpods

For Immediate Release: October 19, 2021

FDA Issues Landmark Proposal to Improve Access to Hearing Aid Technology for Millions of Americans

Proposed Rule Would Establish New Category of Over-the-Counter Hearing Aids

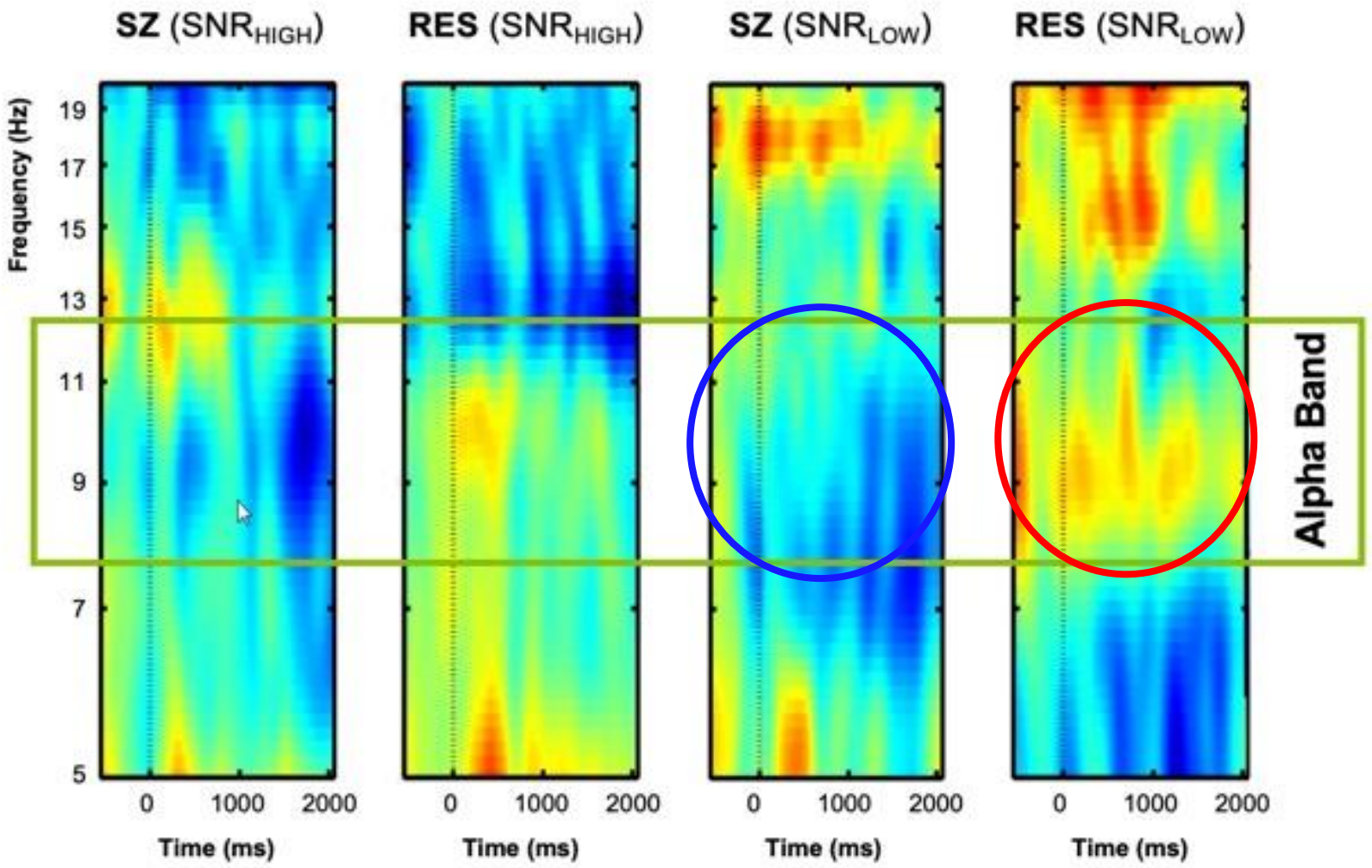
Pocketalker

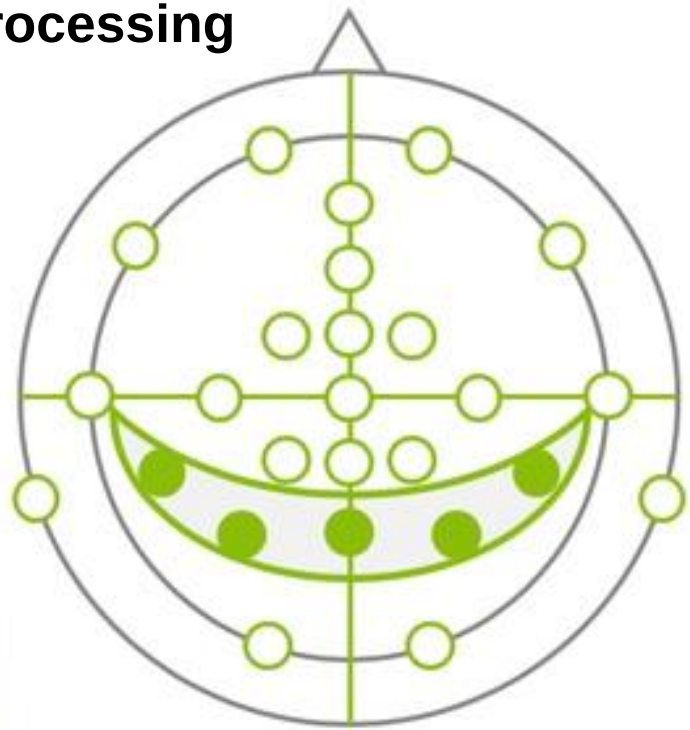
Personal Room System Devices to Reduce Noise and Cross Distance

**Communication Accessibility in LTC: https://www.facebook.com/intfedageing/videos/1160969994361038/

https://soundfield.pacificaudiologygroup.com/

Brain Activity - Effects of Different Hearing Aid Processing





Less Background Noise **More Background Noise**

SZ: Stereo Zoom ~ speech in loud noise

RES: Real Ear Sound – calm

Outline

- Auditory-cognitive (and other health) links
- Hearing screening
- Communication accessibility
- **Integrated person-centered care**

ICOPE

2019

Integrated Care for Older People

1 As people grow older, their health needs are likely to become ***more complex and chronic.***

ICOPE

3 ICOPE addresses priority conditions associated with declines in capacities:

MOBILITY LIMITATIONS

MALNUTRITION

VISION LOSS

HEARING LOSS

DEPRESSIVE SYMPTOMS

COGNITIVE DECLINE

Intervening at an early stage of declining capacity is essential because the process of becoming care dependent can be prevented or delayed.

2

4

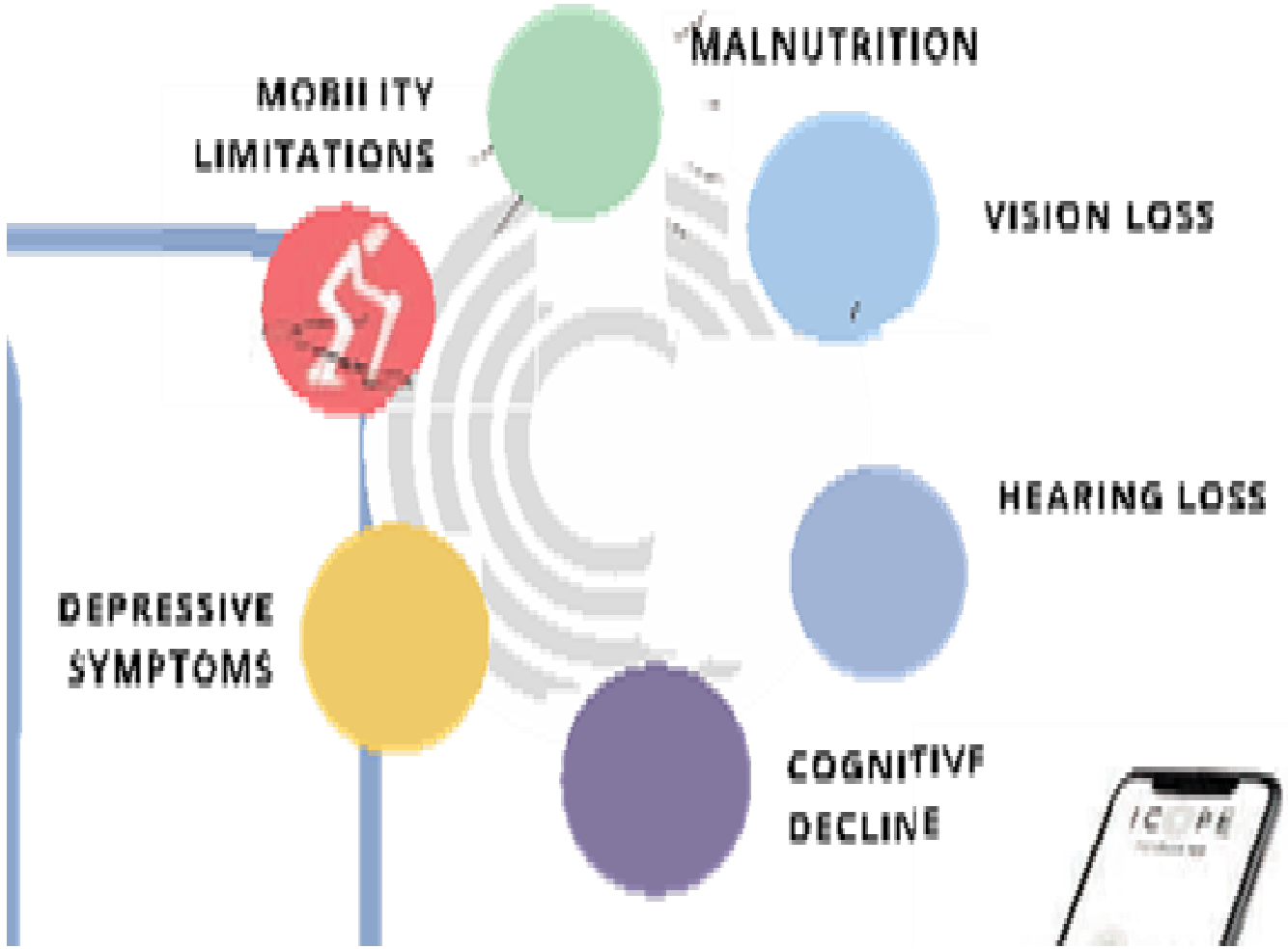
The ICOPE App and handbook assist health and social care workers to:

- Screen older people at risk of care dependency in the community
- Undertake a person-centred assessment of older people's health and social care needs in primary care
- Design a personalized care plan

5 ICOPE is a ***community-based approach*** towards person-centred health and social care to ***optimize the functional ability of older people***

For more information:
https://www.who.int/ageing/health-systems/icope/en/

World Health Organization



PLOS | MEDICINE

POLICY FORUM

Redesigning care for older people to preserve physical and mental capacity: WHO guidelines on community-level interventions in integrated care

Rehabilitation to bring the red line up to the blue line

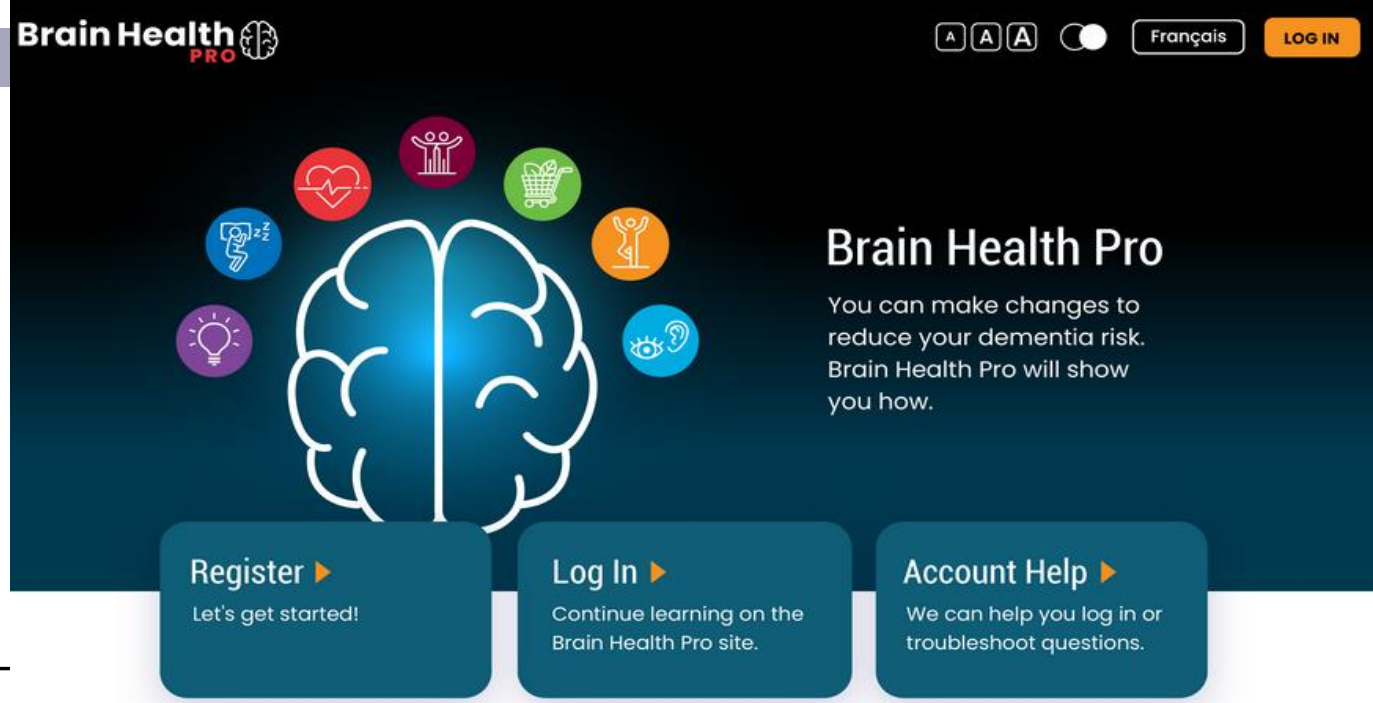
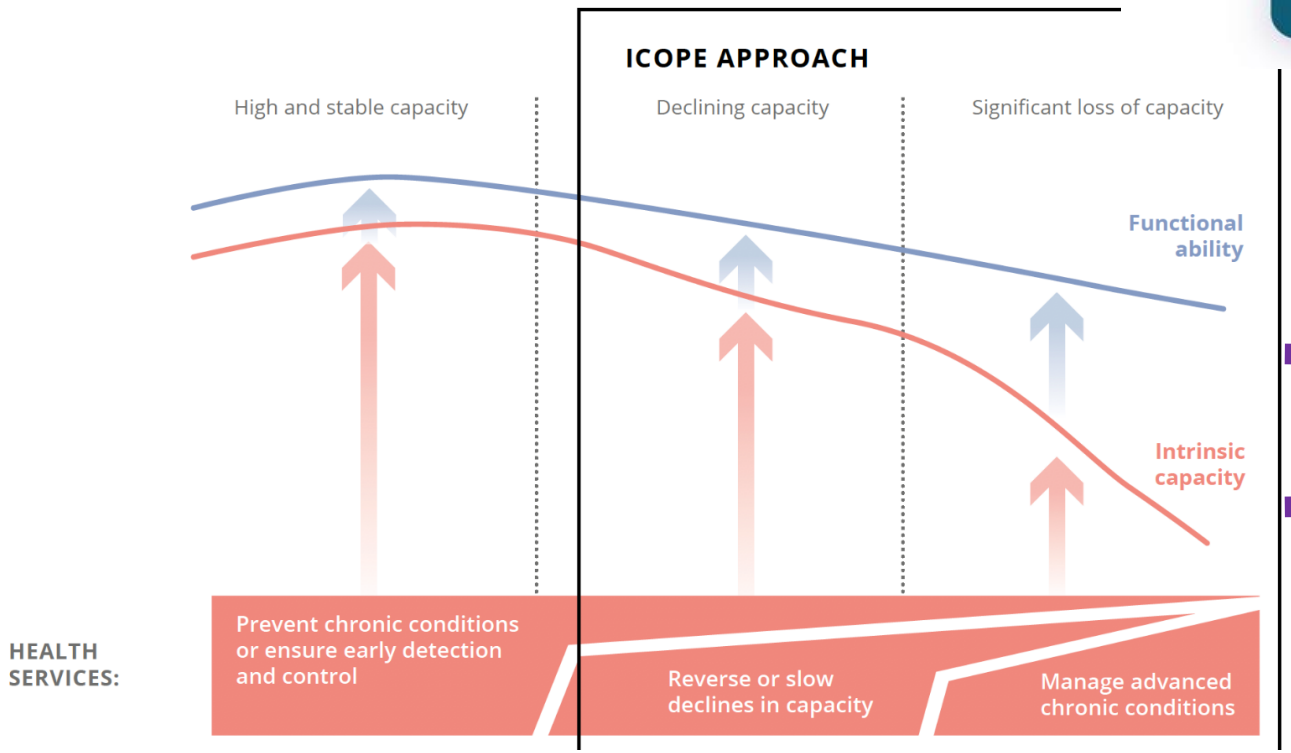
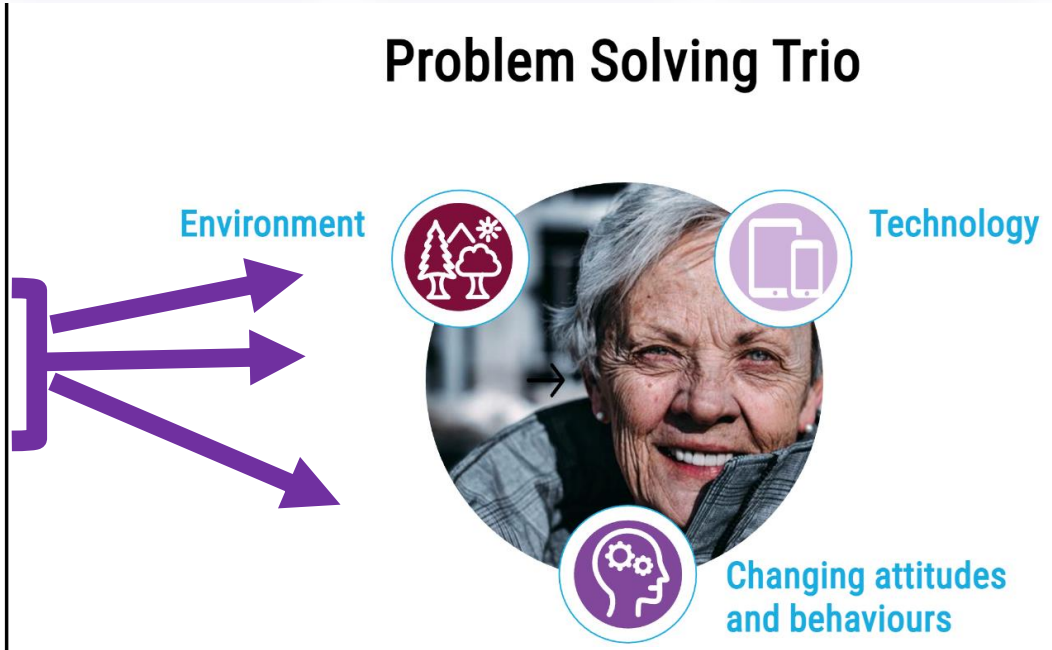


FIGURE 2. A PUBLIC-HEALTH FRAMEWORK FOR HEALTHY AGEING: OPPORTUNITIES FOR PUBLIC HEALTH ACTION ACROSS THE LIFE COURSE





Niagara, November 9th 2021

https://www.ifa2021.ngo/hearing-in-later-life-convention/
https://www.ifa-abstracts.com/why-and-how-to-screen-hearing-in-primary-and-geriatric-care/

Hearing in Later Life: A Multi-stakeholder Convention in Anticipation of the Lancet Commission Report on Reducing the Global Burden of Hearing Loss

World Health Organization

WORLD REPORT ON HEARING

World Health Organization

Health Topics | Countries | Newsroom | Emergencies | Data | About WHO

Home / Initiatives / Ageing / UN Decade of Healthy Ageing