Hearing Loss, Hearing Aid Use, and Risk of Dementia in Older Adults

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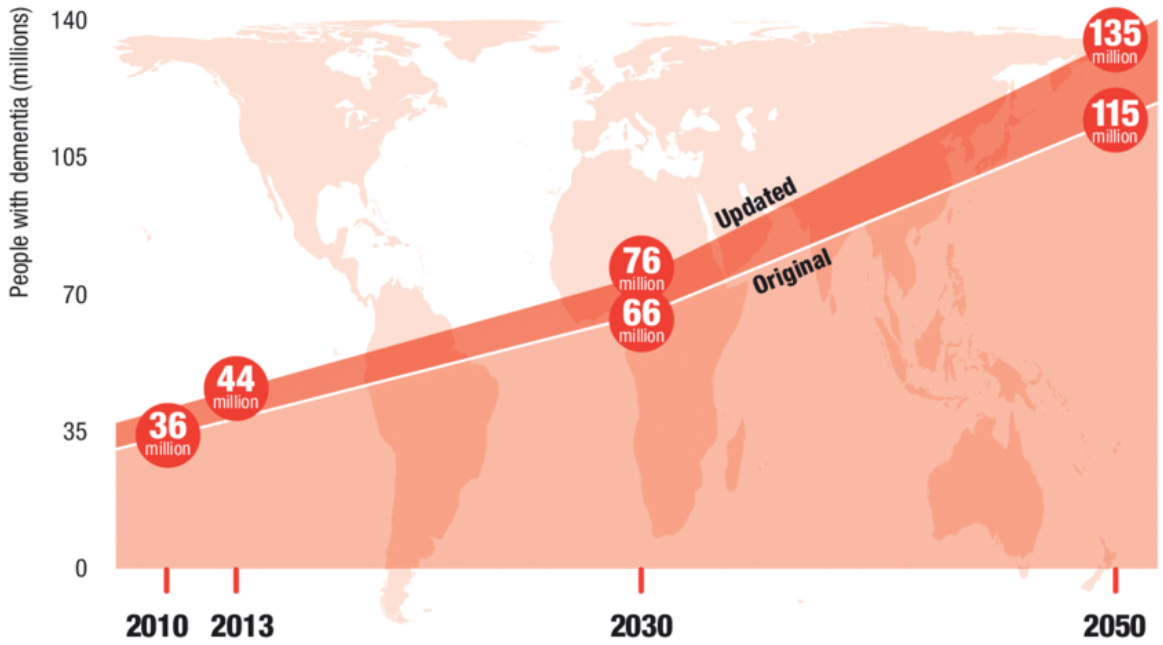
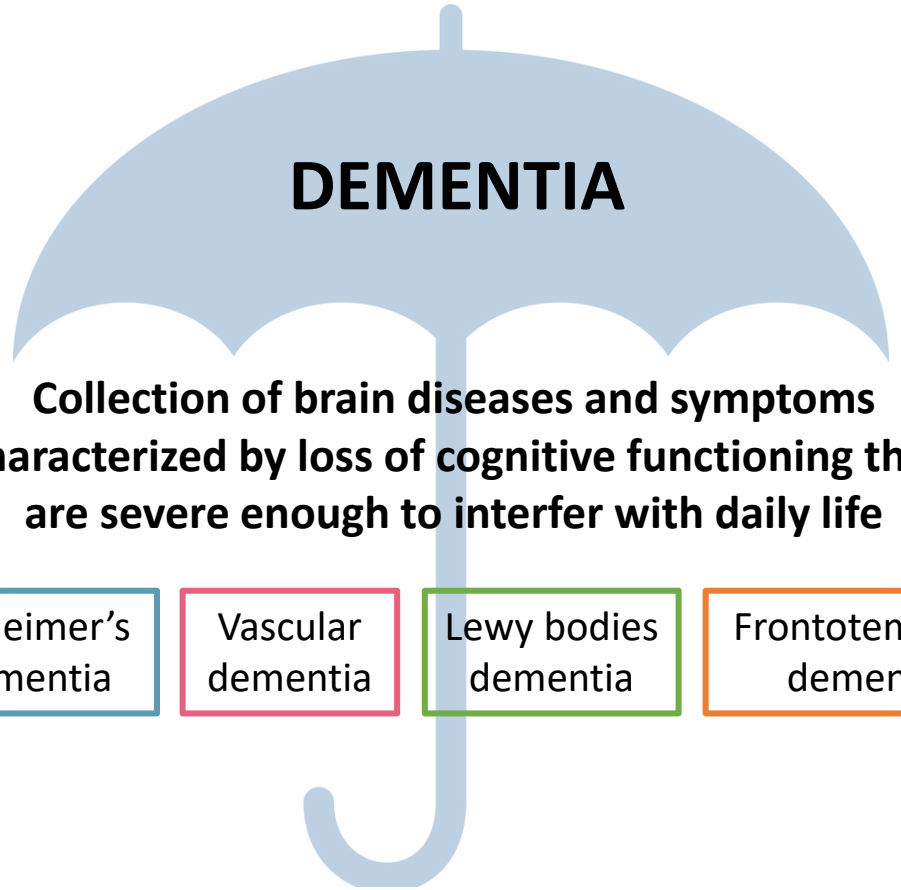
DEMENTIA

- Dementia is one of the greatest health challenges in the 21st century.
- Rapid progress and huge consequences





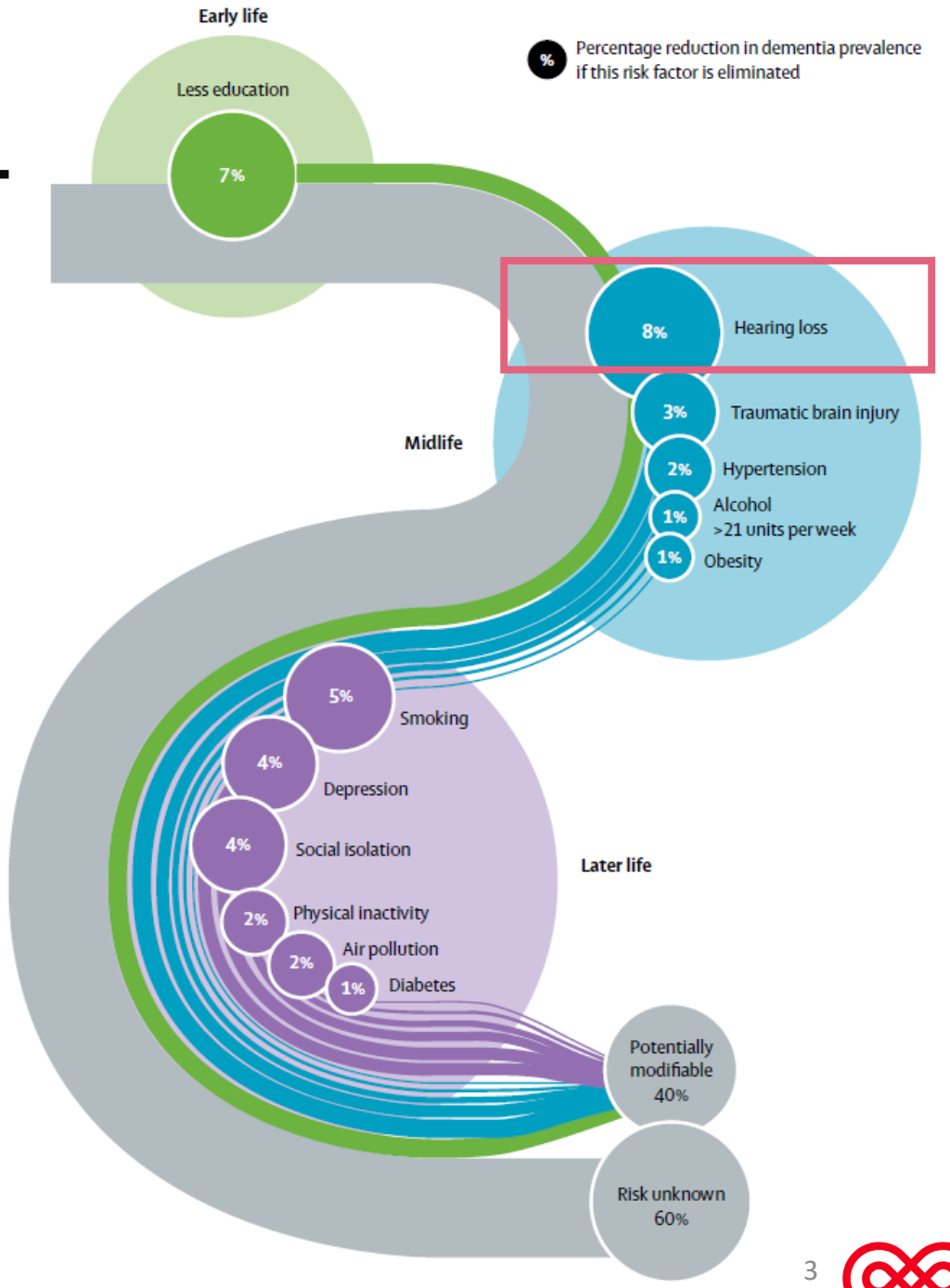
Collection of brain diseases and symptoms characterized by loss of cognitive functioning that are severe enough to interfer with daily life

Alzheimer's dementia	Vascular dementia	Lewy bodies dementia	Frontotemporal dementia

Alzheimer's Disease International, 2013

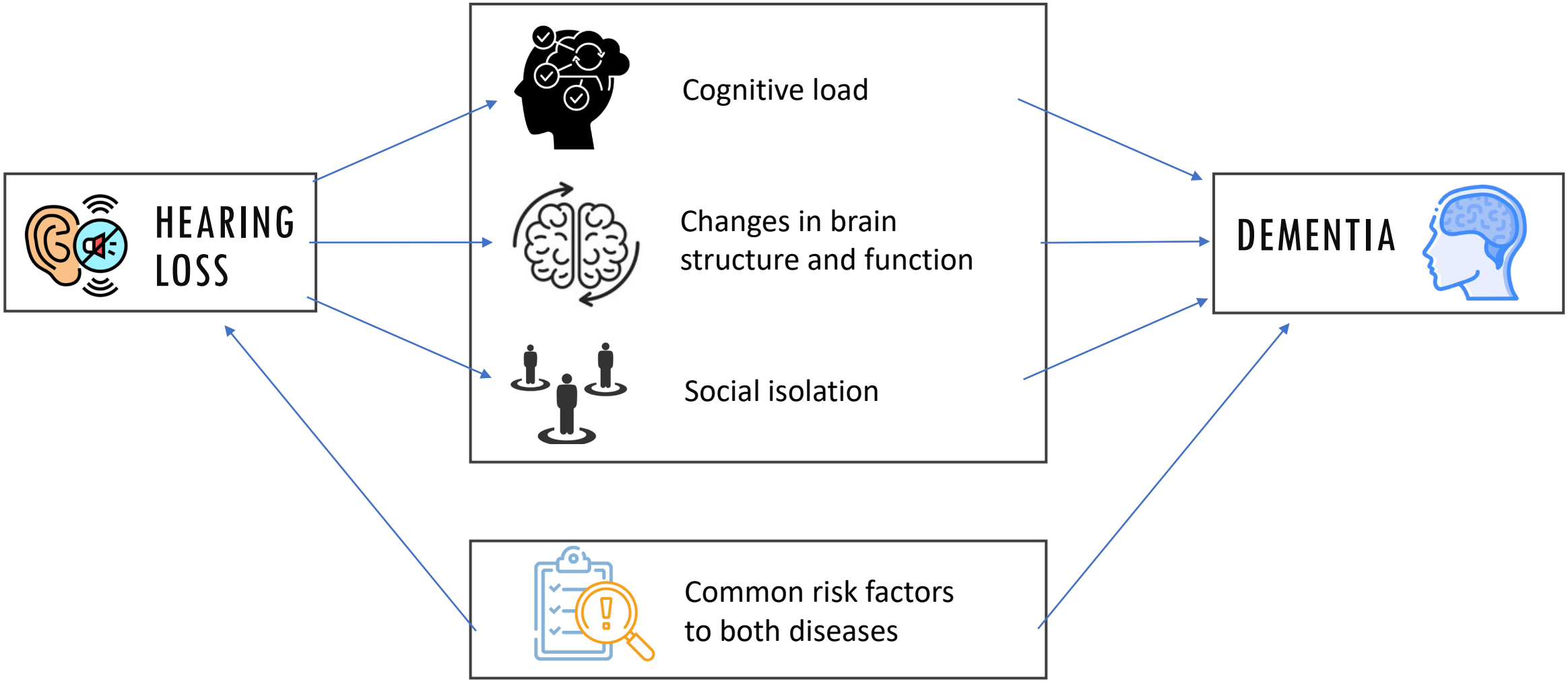
HEARING LOSS AS A POTENTIAL RISK FACTOR FOR DEMENTIA

- The identification of potential modifiable risk factors for dementia have become highly relevant
- Hearing loss was ranked as the most contributable modifiable risk factor for dementia (Lancet Comission reports)
- Meta-analysis, however, was based on three studies (i.e. Lin et al., 2011; Gallacher et al., 2012; Deal et al., 2017), with considerably small sample sizes.
- Lack of evidence on whether hearing aid treatment may prevent and/or delay the onset of dementia



2020 report of the Lancet Commission

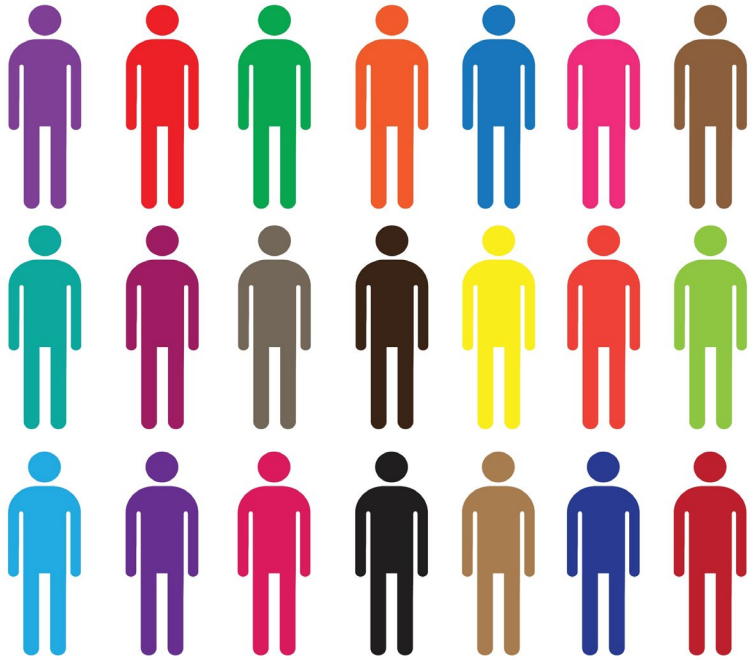
POTENTIAL MECHANISMS



Adapted from Lin and Albert, 2014

OBJECTIVE

There is still much to be explored in relation to the **nature of this relationship** and whether hearing loss is a **risk factor** for dementia and whether effective **treatment** for hearing loss could reduce the incidence of dementia.



Objective: To investigate associations between **hearing loss** and incident **dementia** as well as the contribution of **hearing aids** to these associations.

DATA

HESD Database (Cantuaria et al., 2021)

Detailed audiometric hearing information from public hearing rehabilitation clinics

AuditBase 5

Default Navigation and Pane setup for a Role – for System Administrators

Health Registers (LPR + DNPR)

Incident dementia cases based on inpatient or outpatient hospital contact or prescription for anti-dementia drug

CPR number

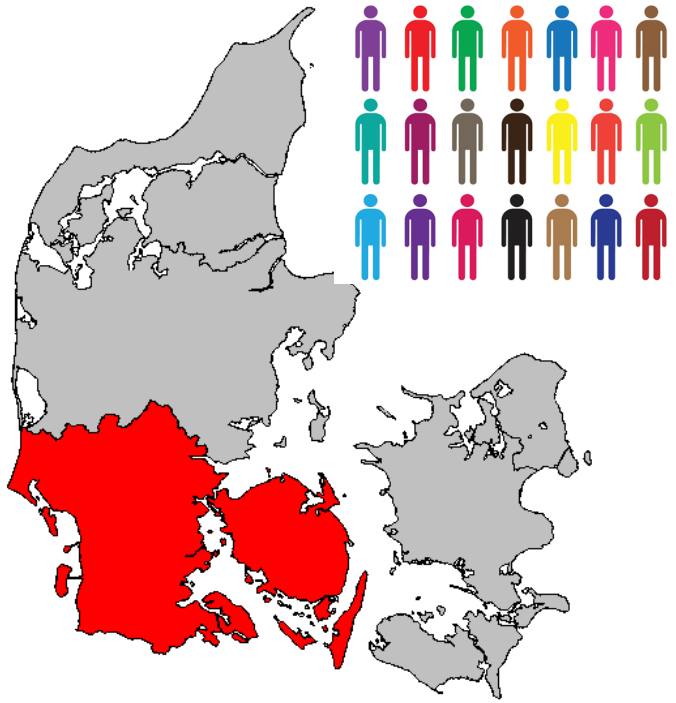
Individual and area-level SES (e.g education, cohabiting status, income, occupation) and information on cardiometabolic comorbidities

Statistics Denmark

Information on all persons who have requested a subsidy for hearing aids (from 2007) or subsidized hearing aid batteries (from 2013)

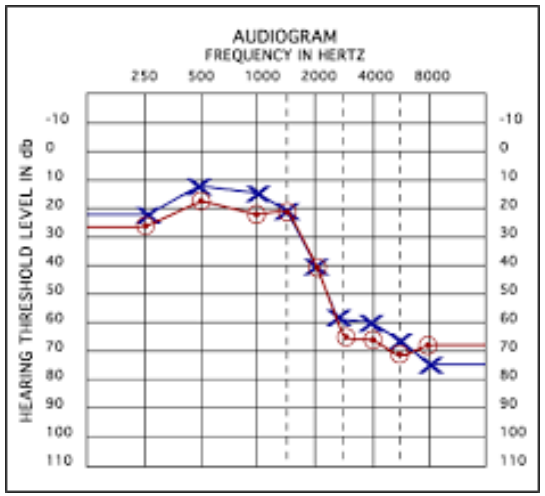
RHA and Batteri database

Establishment of a **large cohort** including **all older adults (≥ 50 years old)** living in the Region of Southern Denmark



SDU

COHORT STUDY



Hearing loss (HL)

Pure-tone-average (better and worse ear)
Frequencies: 0.5, 1, 2, and 4 kHz

Hearing loss yes/no

Hearing loss severity

Mild (26-40 dB HL)
Moderate (41-60 dB HL)
Severe (≥ 60 dB HL)

Followed over time

Dementia?

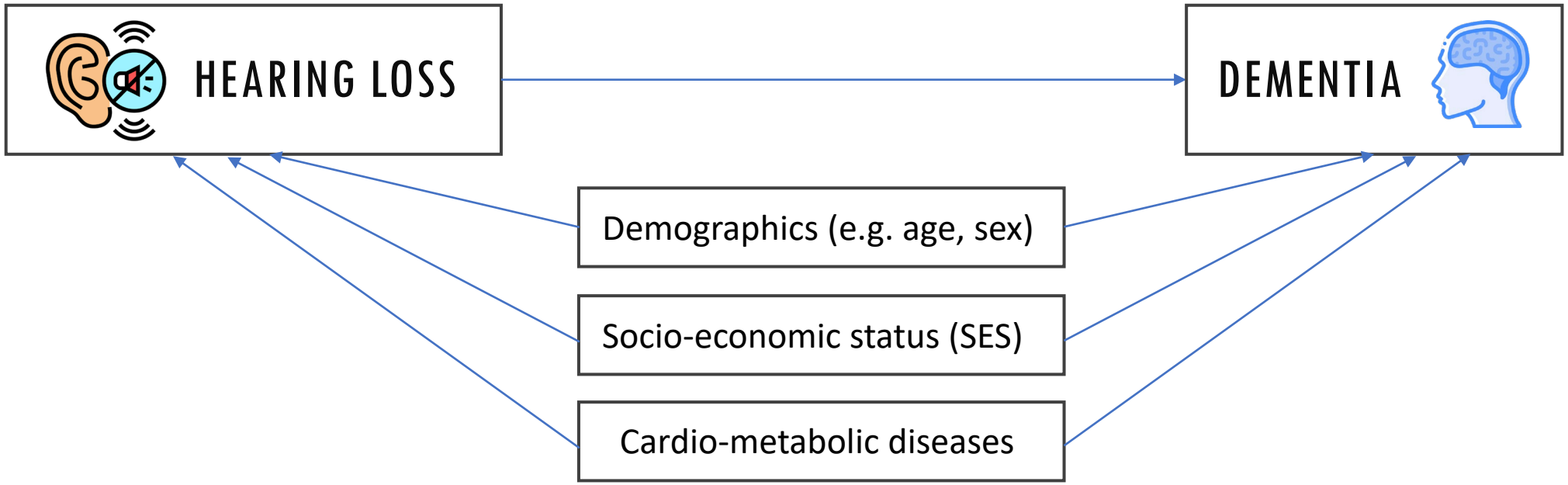
2003 or 2008 (or turning 50 years)

Time

Until 2017 or lost to follow-up

METHODS

- Cox proportional hazards model (age as underlying time-scale)



RESULTS

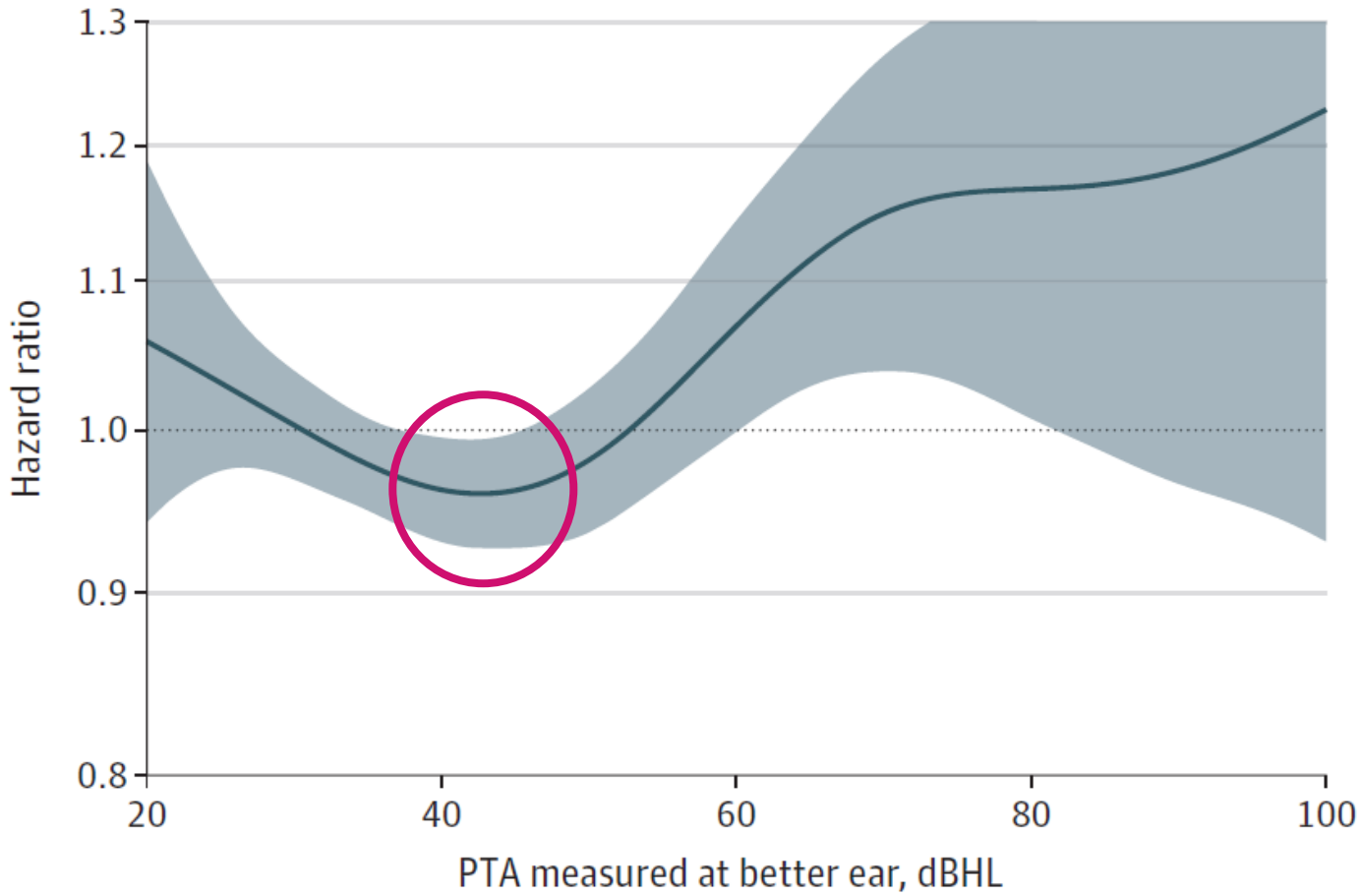
- Positive associations between HL (yes/no) and risk for dementia
- Stronger associations with severe hearing loss
- Higher associations when HL was measured at the better ear
- We did not find such strong associations as shown in e.g the studies cited by the Lancet report

Hearing loss	N cases	HR (95% CI)
HL (yes/no)		
No	12,822	1 (reference)
Yes	5,895	1.07 (1.04 to 1.11)
Suspected HL	4,306	1.03 (0.99 to 1.07)
HL severity (better ear)		
No HL	13,289	1 (reference)
Mild (26-40 dBHL)	1,998	1.05 (1.00 to 1.10)
Moderate (41-60 dBHL)	2,297	1.01 (0.97 to 1.06)
Severe (>60 dBHL)	452	1.20 (1.09 to 1.32)
Suspected HL[g]	4,987	1.04 (1.00 to 1.07)
HL severity (worse ear)		
No HL	12,922	1 (reference)
Mild (26-40 dBHL)	1,195	1.07 (1.00 to 1.13)
Moderate (41-60 dBHL)	2,708	1.02 (0.97 to 1.06)
Severe (>60 dBHL)	1,211	1.13 (1.06 to 1.20)
Suspected HL[g]	4,987	1.04 (1.01 to 1.08)

Results are given in hazard ratio (95% confidence interval)

RESULTS

EXPOSURE-RESPONSE ASSOCIATION BETWEEN DEMENTIA RISK AND PTA AT THE BETTER EAR



RESULTS – STRATIFIED ANALYSIS HEARING AID USE

Hearing aid use	N cases	HR (95% CI)
No HL diagnosis	8,147	1 (reference)
Non-treated HL (no hearing aid)	1,296	1.20 (1.13; 1.27)
Treated HL (hearing aid user) *	3,020	1.06 (1,01; 1.10)

* Defined by at least one request for hearing aid subsidy and/or hearing aid batteries.

- Compared with people without HL, people with HL who did not use hearing aids were at a higher risk of dementia than people with HL who used hearing aids
- Hearing aids might prevent or delay the onset and progression of dementia.

CONCLUSIONS

- Hearing loss was found to be associated with an increased risk for dementia. However, this was observed only for higher degrees of hearing loss (i.e. PTA ≥ 45 dBHL).

- The magnitude of these associations was much lower than what has been shown in some other smaller studies, potentially suggesting an overestimation of associations in the current literature.

- Results suggest that the association is stronger for those that do not undergo hearing aid treatment. If confirmed in future studies, this can have an impact on establishing prevention strategies for dementia involving auditory rehabilitation methods.

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IF YOU WANT TO KNOW MORE

Research

JAMA Otolaryngology–Head & Neck Surgery | Original Investigation

Hearing Loss, Hearing Aid Use, and Risk of Dementia in Older Adults

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Multimedia

Supplemental content

IMPORTANCE Hearing loss has been suggested as a risk factor for dementia, but there is still a need for high-quality research to better understand the association between these 2 conditions and the underlying causal mechanisms and treatment benefits using larger cohorts and detailed data.

OBJECTIVE To investigate the association between hearing loss and incident dementia, as well as how hearing aid use contributes to this association.

DESIGN, SETTING, AND PARTICIPANTS This population-based cohort study was conducted in Southern Denmark between January 2003 and December 2017 and included all residents 50 years and older. We excluded all persons with dementia before baseline as well as those who did not live in the region 5 years before baseline, with incomplete address history, or who had missing covariate information.

EXPOSURES Individual hearing status based on the Hearing Examinations in Southern Denmark database, which contains data on all pure-tone audiometry examinations performed at public hearing rehabilitation clinics in Southern Denmark.

MAIN OUTCOMES AND MEASURES Incident cases of dementia and Alzheimer disease as identified from national registries.

RESULTS The study population comprised 573 088 persons (298 006 women [52%]; mean [SD] age, 60.8 [11.3] years) with 23 023 cases of dementia and mean (SD) follow-up of 8.6 (4.3) years. Having a hearing loss was associated with an increased risk of dementia, with an adjusted hazard ratio (HR) of 1.07 (95% CI, 1.04-1.11) compared with having no hearing loss. Severe hearing loss in the better and worse ear was associated with a higher dementia risk, with an HR of 1.20 (95% CI, 1.09-1.32) and 1.13 (95% CI, 1.06-1.20), respectively, compared with having no hearing loss in the corresponding ear. Compared with people without hearing loss, the risk of dementia was higher among people with hearing loss who were not using hearing aids than those who had hearing loss and were using hearing aids, with HRs of 1.20 (95% CI, 1.13-1.27) and 1.06 (95% CI, 1.01-1.10), respectively.

CONCLUSIONS AND RELEVANCE The results of this cohort study suggest that hearing loss was associated with increased dementia risk, especially among people not using hearing aids, suggesting that hearing aids might prevent or delay the onset and progression of dementia. The risk estimates were lower than in previous studies, highlighting the need for more high-quality longitudinal studies.

Thank you!
Questions?

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