



Sensory loss, social participation, and cognitive decline in the aging Canadian society

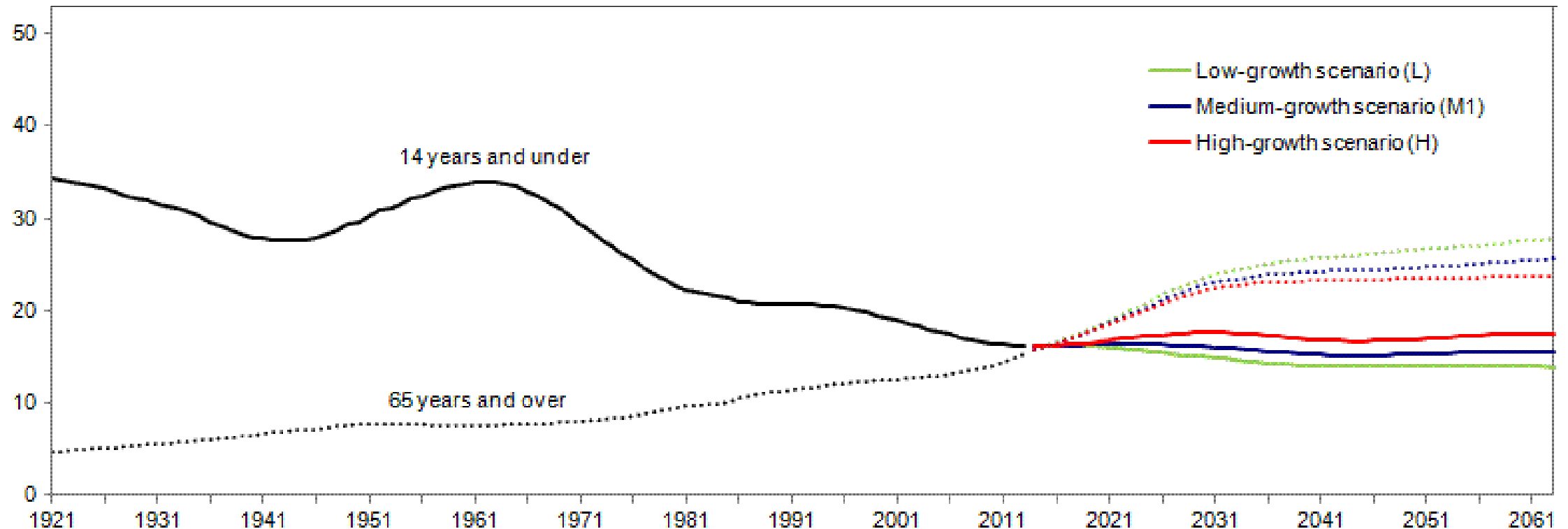
A snapshot from the Canadian Longitudinal Study of Aging

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Aging (Canadian) population

- In 2015 in Canada, proportion of seniors exceeded proportion of children
- Health span < lifespan; chronic conditions and multimorbidity increase with age



Age-related sensory and cognitive impairments

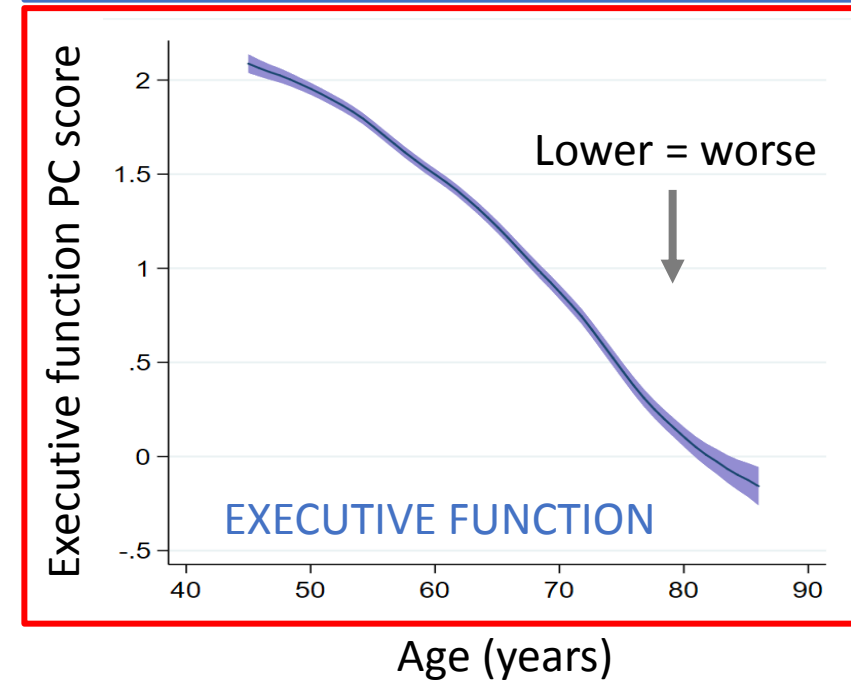
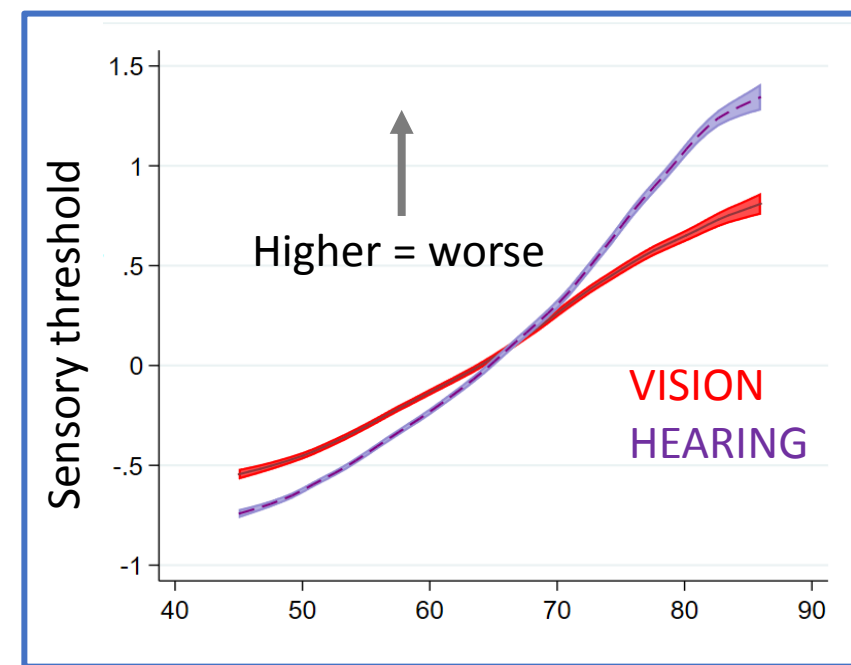
- Ability to perceive, process and respond to incoming information
→ Required to interact with the world
- Impairments limit independence and increase risk of social isolation ¹
- Social isolation:
 - Affects up to 40% of older adults and is linked to adverse health effects ^{2,3,4}
 - Risk factor for dementia ⁵



1. Crews & Campbell 2011 (AJPH) 2. Nicholson 2012 (J Primary Prevent); 3. Coyle & Dugan 2012 (J Aging Health);
4. Wister & Menec 2018 (CLSA report); 5. Livingston 2017 (Lancet)

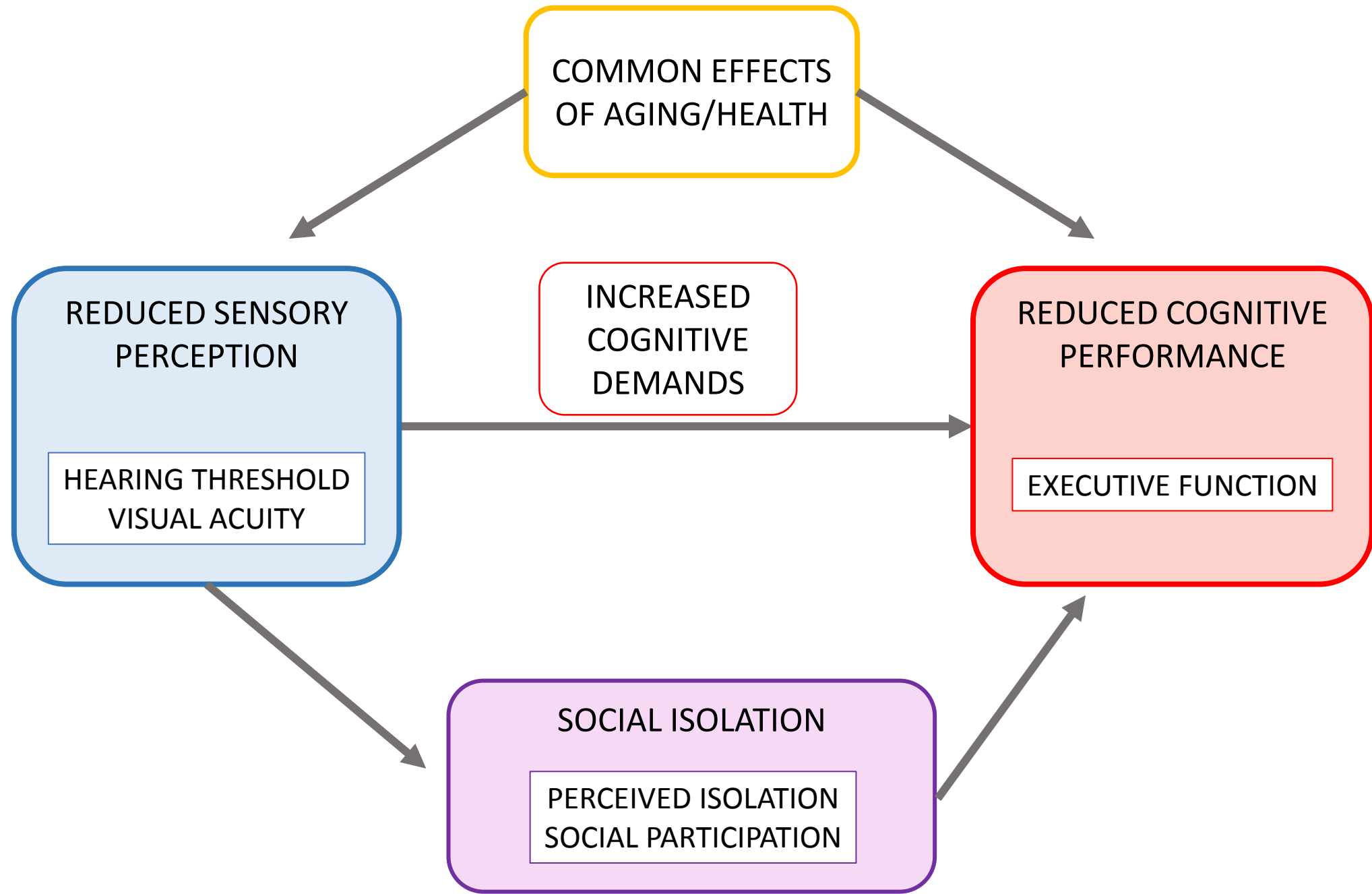
Sensory & cognitive aging

- Sensory and cognitive function decline with normal aging, BUT
- Significant vision/hearing loss and dementia are not parts of normal aging
- Comorbidity can be debilitating
 - Possible to compensate for **one** sensory impairment;
 - Sensory decline is a **risk factor** for dementia ¹



1) Livingston et al. 2017 (Lancet)

(Hämäläinen et al., unpublished)



COMMON EFFECTS
OF AGING/HEALTH

REDUCED SENSORY
PERCEPTION

HEARING THRESHOLD
VISUAL ACUITY

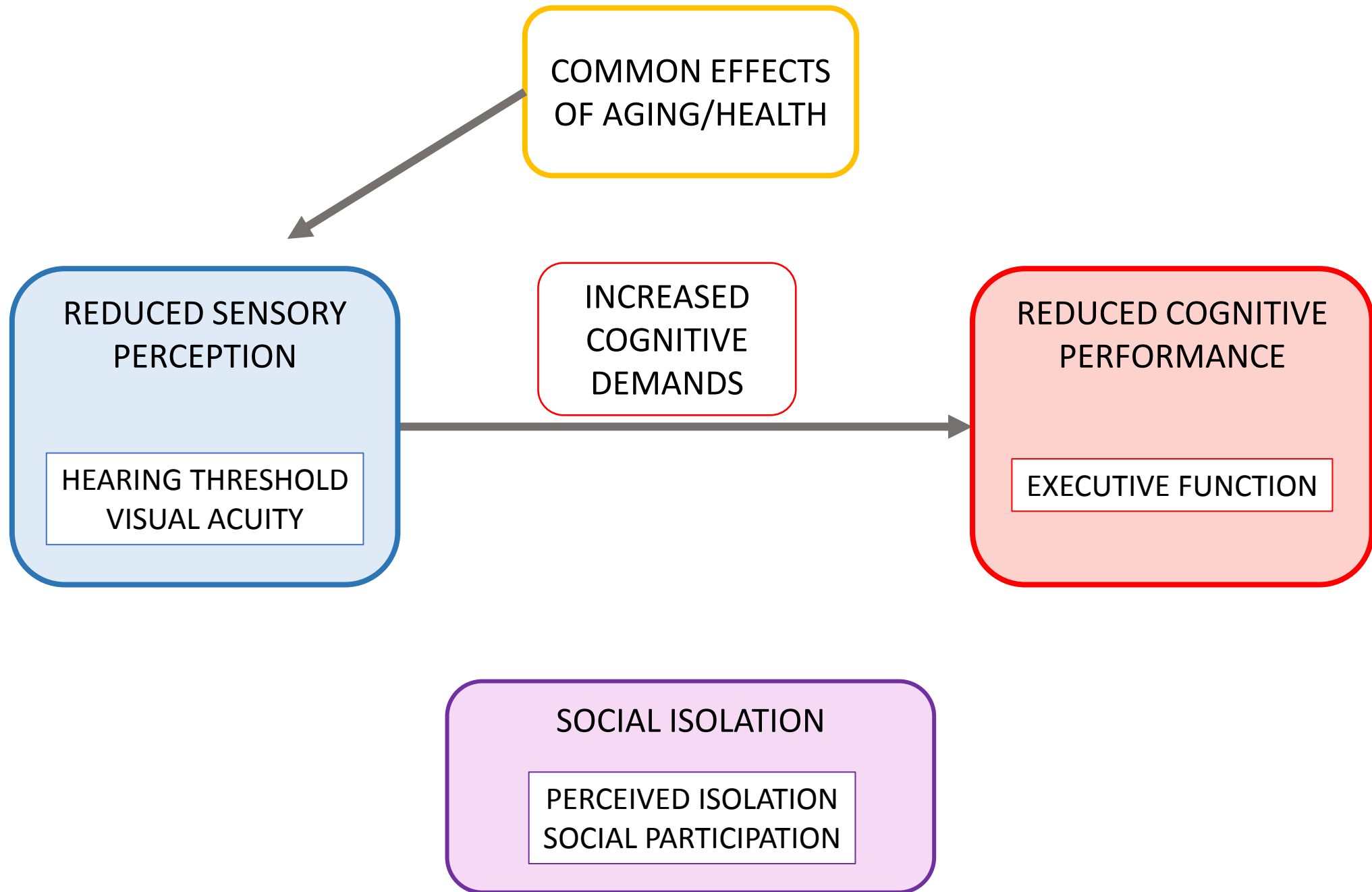
INCREASED
COGNITIVE
DEMANDS

REDUCED COGNITIVE
PERFORMANCE

EXECUTIVE FUNCTION

SOCIAL ISOLATION

PERCEIVED ISOLATION
SOCIAL PARTICIPATION



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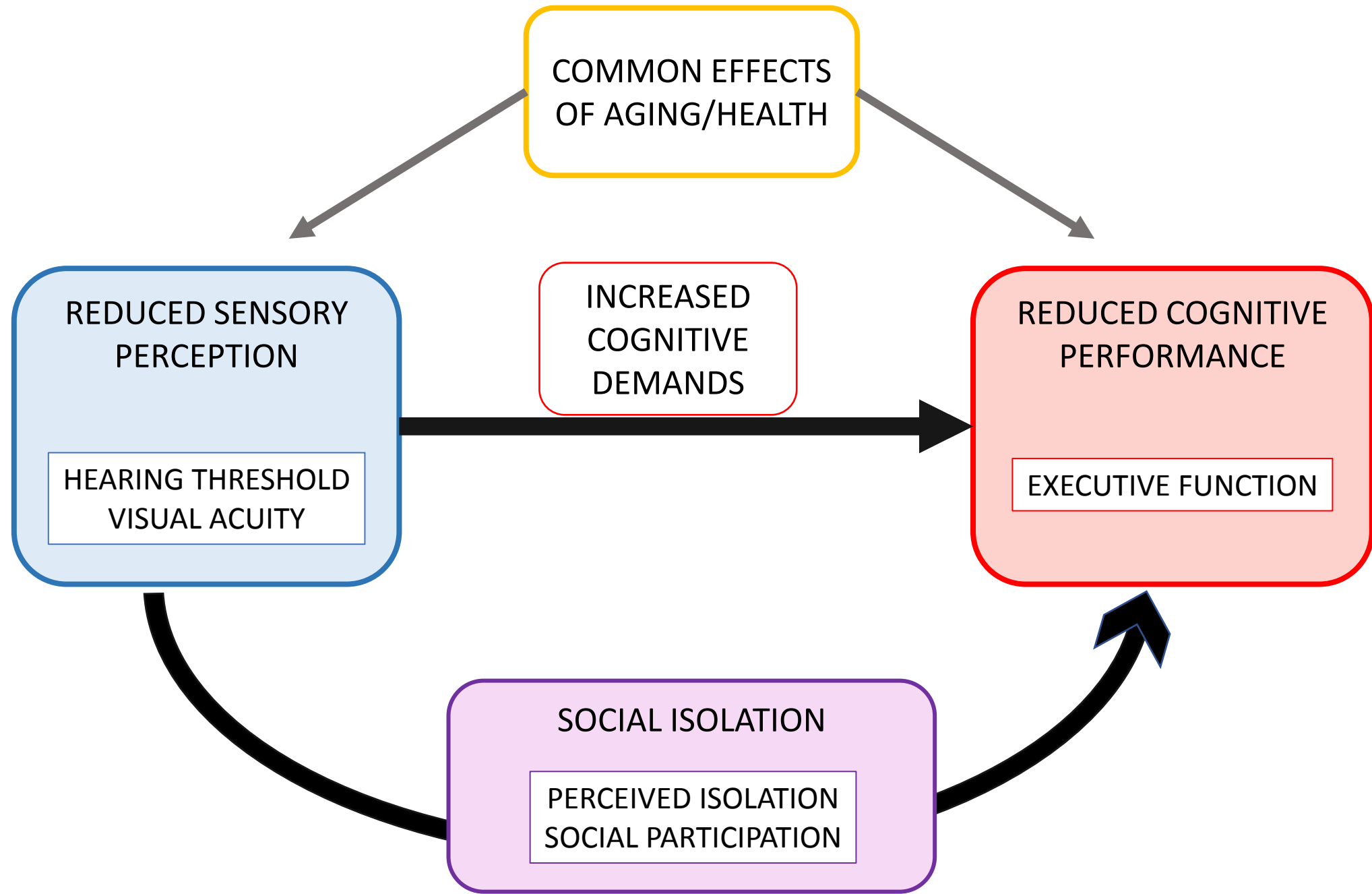
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Canadian Longitudinal Study of Aging (CLSA)

- “Comprehensive cohort”
 - Age at baseline **45-85** years
 - **30 000** community-dwelling participants
 - **No cognitive impairment** at baseline
 - Functional testing, interviews
 - >4000 variables recorded
 - Baseline data collection finished in 2015
 - Follow-ups every ~3 years for 20 years.



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

→ Sensory-social-cognitive associations in a “normally aging” older population

HEARING

- Digital audiometry of **hearing thresholds**
- Pure-tone average

VISION

- Higher screening with ETDRS chart
- Pinhole-corrected visual acuity
- Higher logMAR = worse vision

COGNITION

- PCA of 4 tests of executive function
- **Executive Function score (PC1)**

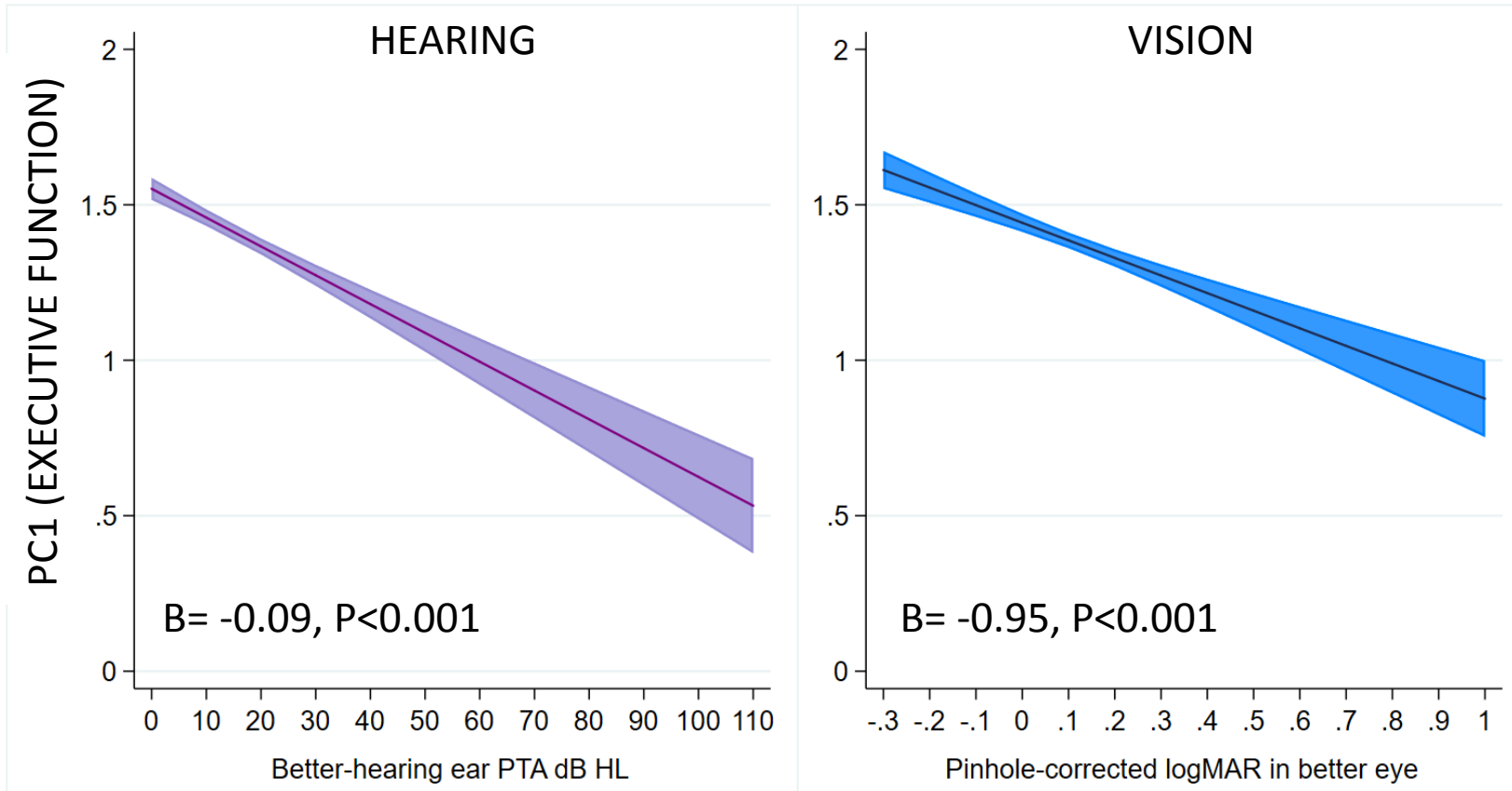
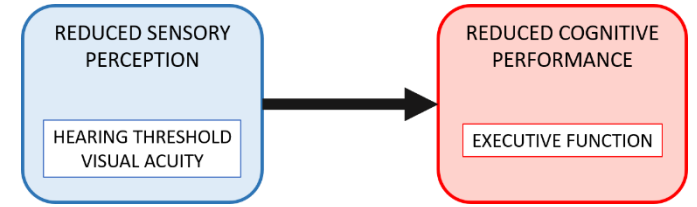
SOCIAL

Self-reported information on

- Perceived availability of **social support, loneliness**
- **Social network size, participation in social activities** (# types and frequency), **living arrangement** (alone or with others)

→ Multiple imputation to account for missing data → multiple regression models

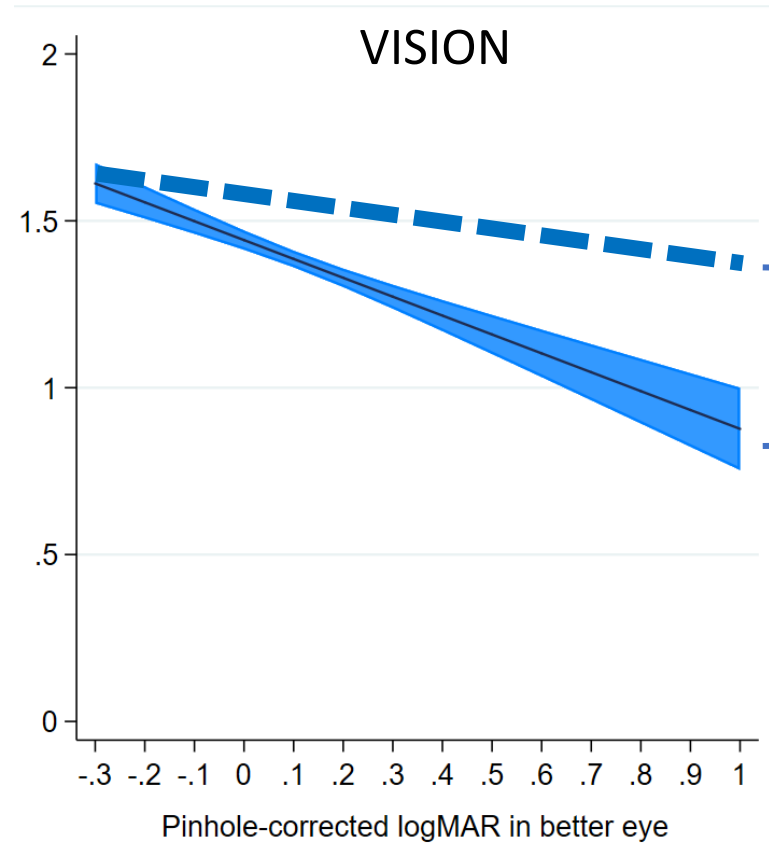
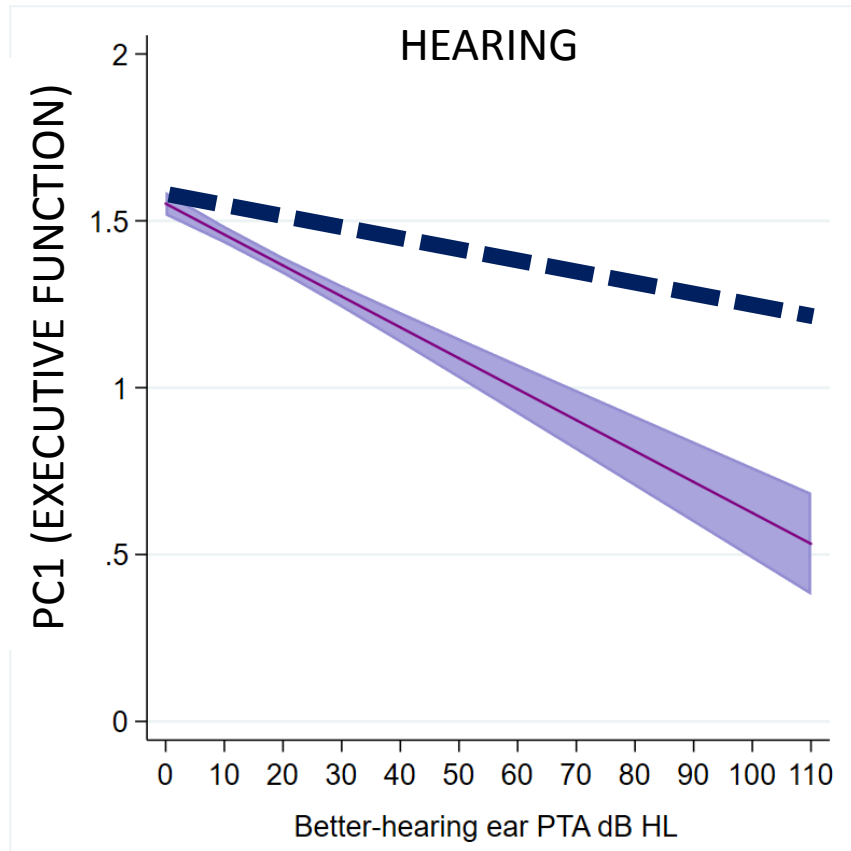
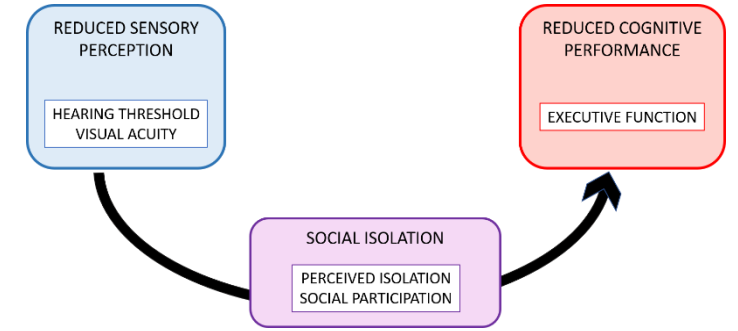
Is sensory decline directly associated with cognitive decline?



YES. Those with worse hearing and vision also have lower cognitive scores.

Predicted relationships from **Model 1** adjusting for vision and hearing thresholds, age, sex, cultural background, education, income, number of comorbidities, test language, bilingual status

Is the sensory-cognitive association mediated by social participation?

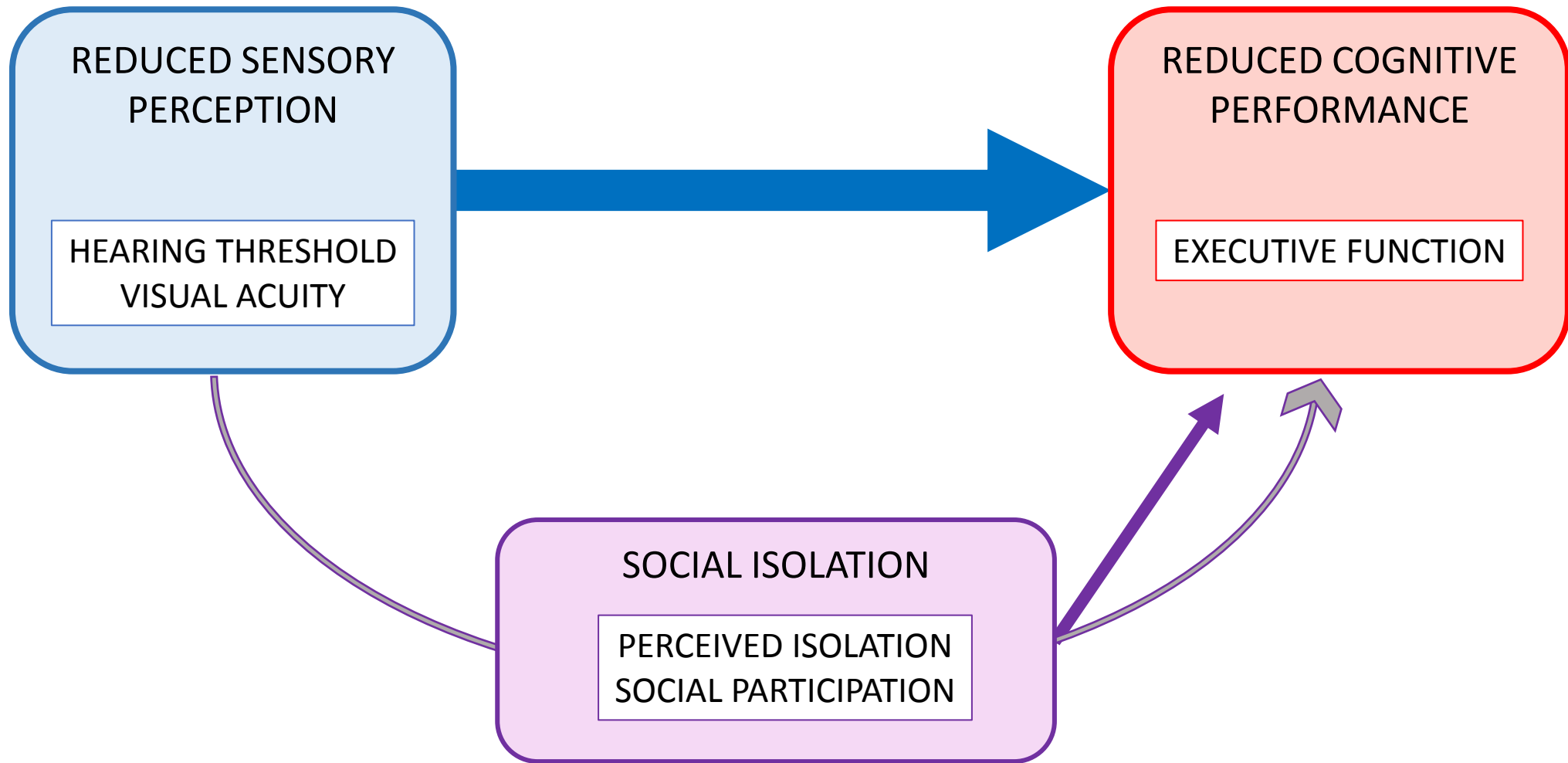


+ social variables
Mediation effect
Direct effect

Social mediation of sensory-cognitive decline?

Executive function	Main effects, Model 1		Main effects + social mediators, Model 2		Difference	
	Coef.	P	Coef.	P	Δ Coef.	
Hearing threshold	-0.088	0.011	-0.084	0.013	-0.004	-5%
Visual acuity	-0.947	<0.001	-0.929	<0.001	-0.018	-2%
Perceived availability of social support			0.002	0.022		
Perceived loneliness			-0.090	0.006		
Social network index			-0.009	0.069		
Social participation types			0.032	<0.001		
Social participation at least weekly			0.069	0.021		
Lives alone			0.120	0.006		

Both models adjusted for age, sex, cultural background, education, income, number of comorbidities, test language, bilingual status



Outcomes and implications

1) **Sensory function and social isolation have direct associations with cognitive function** in older adults, even in the absence of serious cognitive impairments



Risk of cognitive decline could be reduced through sensory interventions (e.g. hearing aid use) and by reducing social isolation

2) **Sensory-cognitive association at most weakly mediated by social isolation** in the generally healthy CLSA sample
→ future follow-ups needed to quantify effect on development of dementia



Targeted social participation interventions could slow down cognitive aging in those with independence-limiting sensory impairments



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Walter Wittich



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Participants, researchers and data collectors



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