BORDEAUX POPULATION HEALTH Research Center - U1219

Psycho-epidemiology
of aging and chronic diseases

Hearing loss, hearing aids use and trajectories of aging: Epidemiological results

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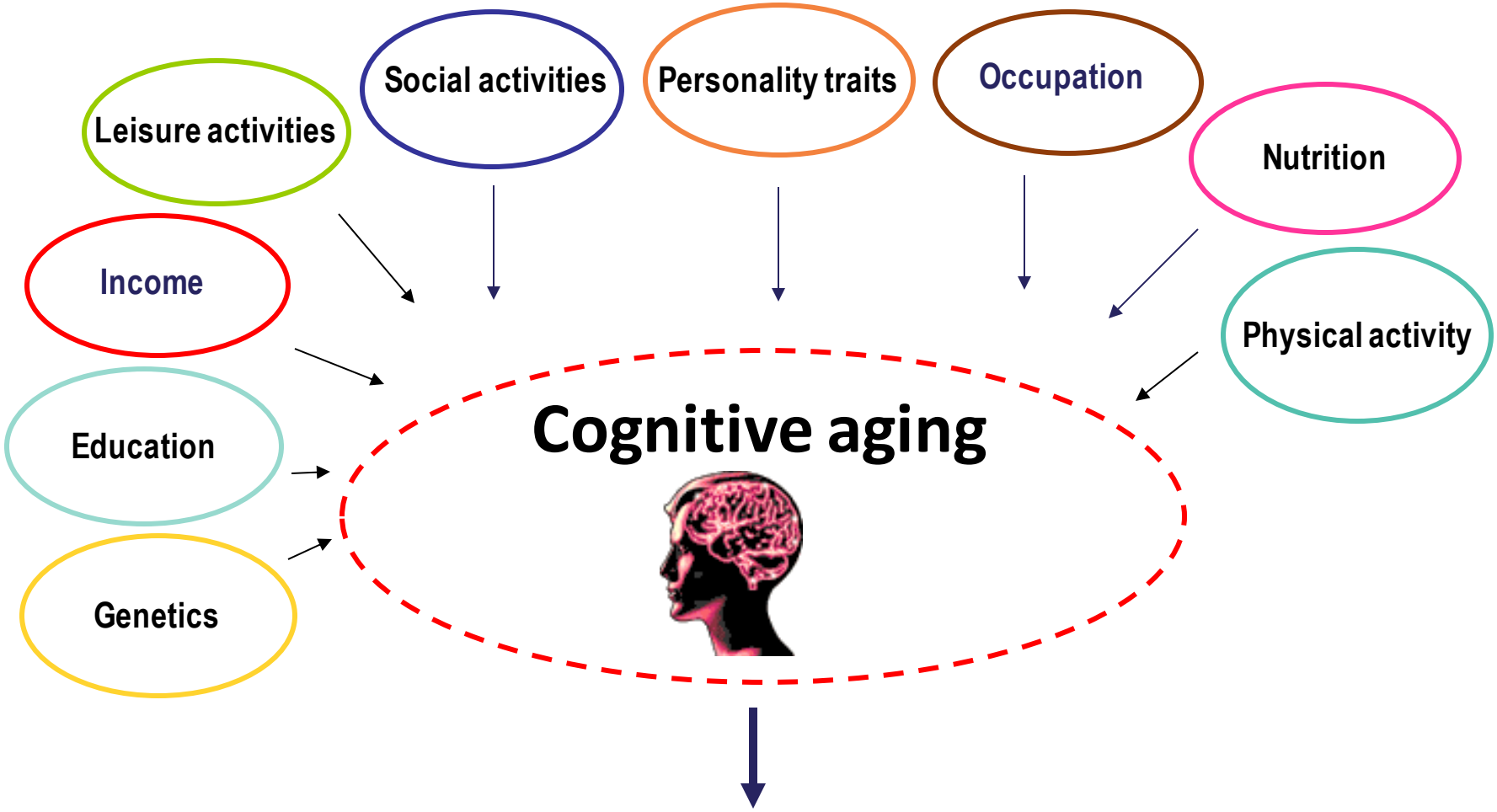
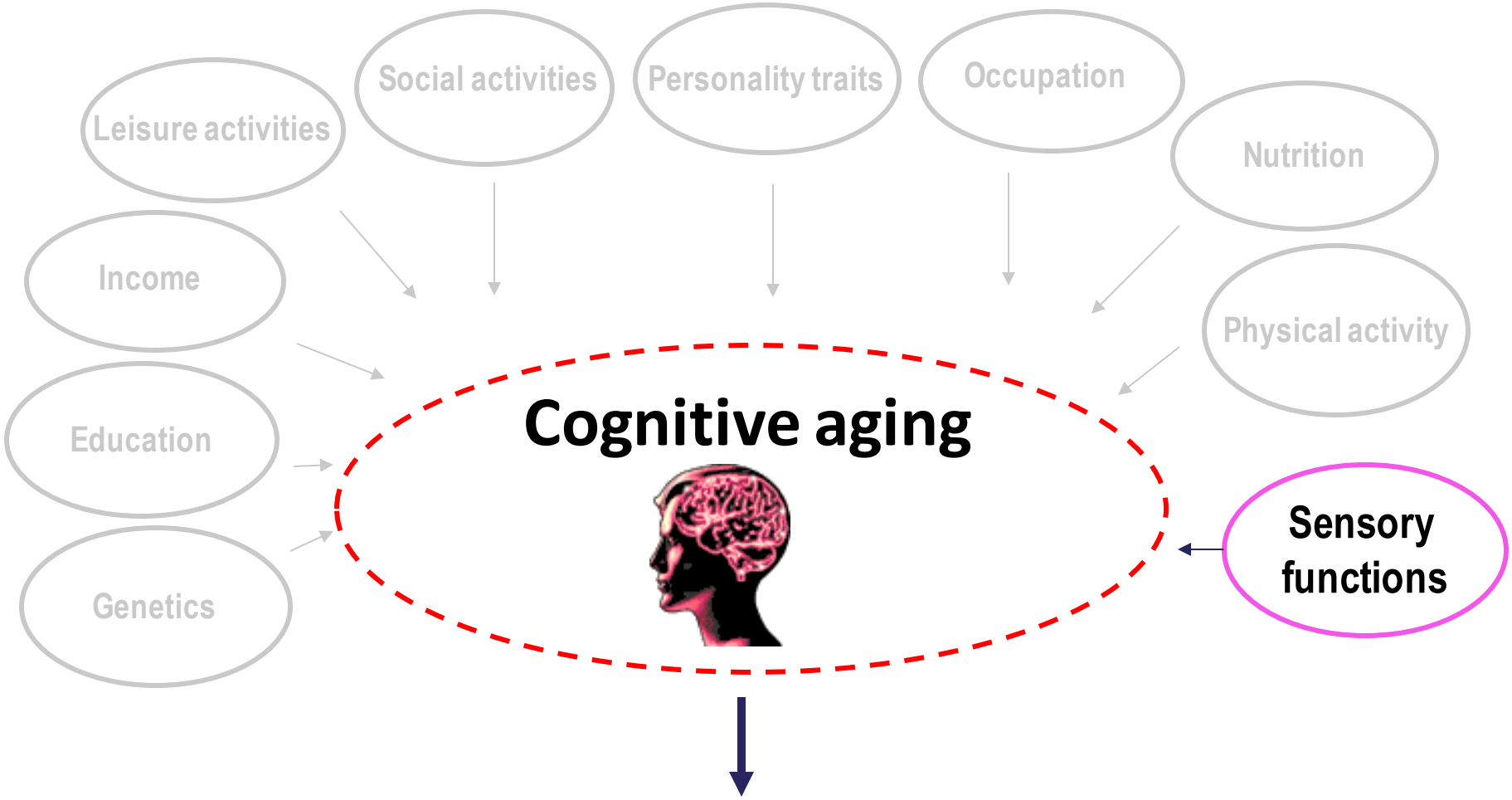


Epidemiology of cognitive aging identifies the factors influencing the way our brain ages, in order to explain the variability of cerebral and cognitive aging according to individuals



To what extent does hearing function contribute to the variability of cerebral and cognitive aging ?

Hearing loss in older adults

- Hearing loss is one of the most frequent chronic health condition affecting older adults:
  - ≈ 30% of elders aged 65 and over have some degree of hearing loss;
  - ≈ 70% to 90% for those over age 85 (Chien & Lin, 2012; Weinstein, 2000).

- 2 thirds of older adults exhibiting hearing impairment do not use hearing aids (Fisher et al., 2011).

Hearing loss in older adults

- Assumed to play an important role in:
  - Restriction in activities of daily living and leisure activities (Crews et al., 2004);
  - Social isolation and depression (Kiely et al., 2013).

Hearing loss and cognition in older adults

- Huge evidence now
- Numerous cross-sectional studies: Poorer cognitive performances (Lin et al., 2011; Uhlmann et al., 1989; Gussekloo et al., 2005; Ohta et al., 1981; Lindenberger et al., 1994)
- Fewer longitudinal studies:
  - Lin & Yaffe, 2013 : in a sample of 1984 community-dwelling older adults aged 70 to 79 showed that hearing loss measured with audiometric testing was associated with accelerated cognitive decline and incident cognitive impairment during a 6-year follow-up period.
  - Lin et al., 2011: increased incidence of dementia.

What about the impact of hearing aids use in elderly people ?

- A lot of intuitions but very little data.
- Lin et al., 2013:
  - Hearing aids use was associated with slightly attenuated rates of cognitive decline among individuals with hearing loss, but **results were not statistically significant**;
  - Short follow-up (6 years).
- Amieva, Ouvrard, Giulioli, Meillon, Rullier, Dartigues, 2015:

Self-Reported Hearing Loss, Hearing Aids, and Cognitive Decline in Elderly Adults: A 25-Year Study

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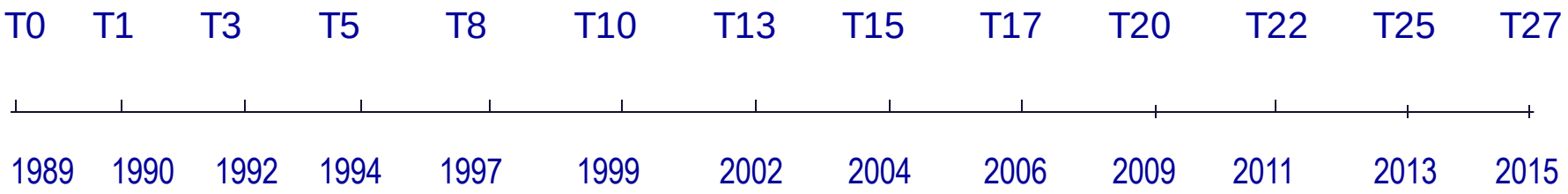
The PAQUID study

Long follow-up

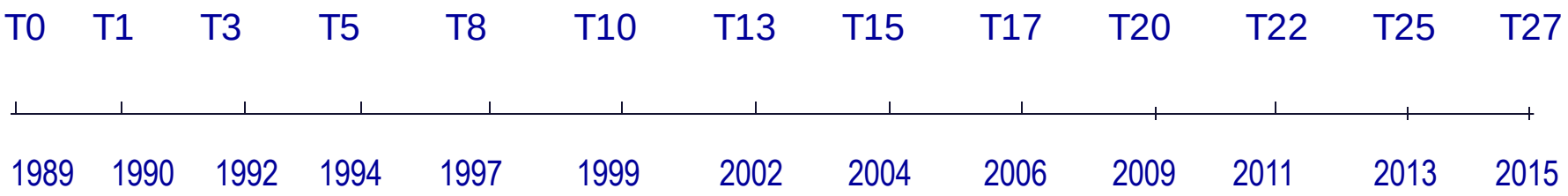


N = 3777 participants aged 65 and over at baseline

Assessment visits performed at home by trained psychologists

The PAQUID study

Outcomes and measures repeatedly assessed



Sociodemographics

Lifestyle

Comorbidity

Drugs

Cognition

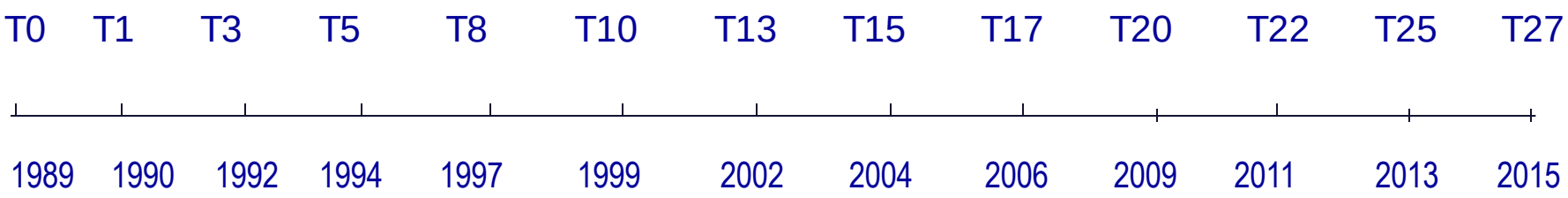
Mental Health

Center for Epidemiologic Studies Depression scale CES-D scale

1) I was bothered by things that usually don't bother me.*
2) I did not feel like eating; my appetite was poor.
3) I felt I could not shake off the blues even with the help from my family and friends.
4) I felt that I was as good as other people.
5) I had trouble keeping my mind on what I was doing.*
6) I felt depressed.*
7) I felt that everything I did was an effort.*
8) I felt hopeful about the future.*
9) I thought my life had been a failure.
10) I felt fearful.*
11) My sleep was restless.*
12) I was happy.*
13) I talked less than usual.
14) I felt lonely.*
15) People were unfriendly.
16) I enjoyed life.
17) I had crying spells
18) I felt sad.
19) I felt that people dislike me.
20) I could not get "going".*

The PAQUID study

Outcomes and measures repeatedly assessed



Sociodemographics

Lifestyle

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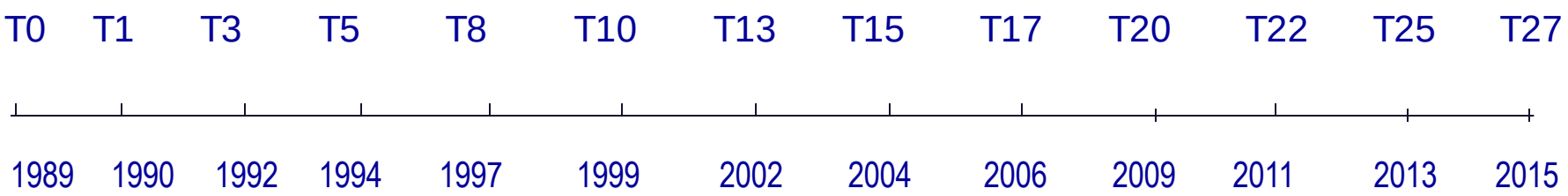
Disability

Instrumental activities of daily living (Lawton scale)	Activities of daily living (Katz scale)
Using telephone Shopping Preparing food Housekeeping Doing laundry Using transportation Handling medication Handling finances	Feeding Continence Transferring Toiletting Dressing Bathing

The PAQUID study

Outcomes and measures repeatedly assessed



Sociodemographics

Lifestyle

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Dementia

The PAQUID study

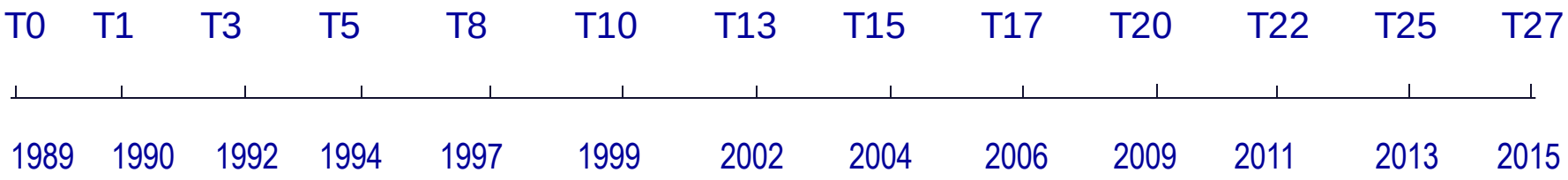
Screening of dementia

T0	T1	T3	T5	T8	T10	T13	T15	T17	T20	T22	T25	T27
1989	1990	1992	1994	1997	1999	2002	2004	2006	2009	2011	2013	2015

Psychologist → **Neurologist / Geriatrician** → **Panel of experts**

The PAQUID study

Outcomes and measures repeatedly assessed



Sociodemographics

Lifestyle

Comorbidity

Drugs

Cognition

Mental Health

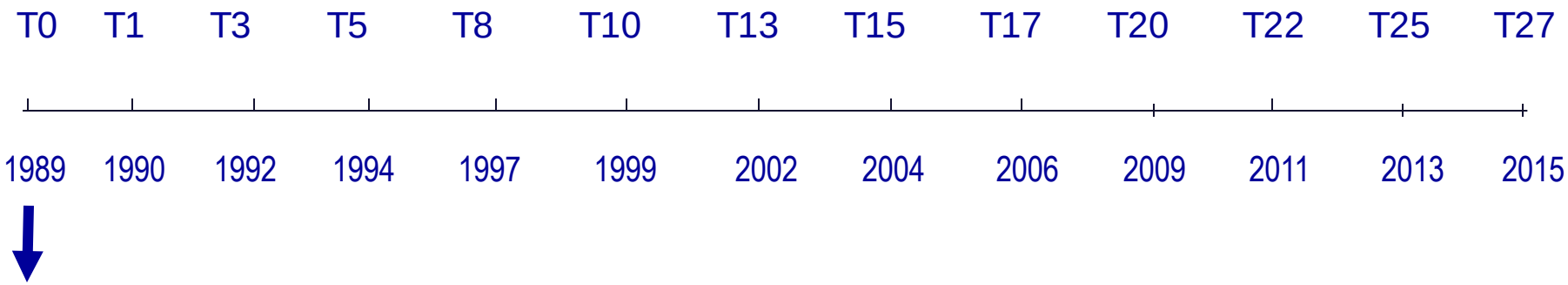
Disability

Dementia

Death

The PAQUID study

Hearing loss



"Do you have hearing trouble?"
(1) I do not have hearing trouble;
(2) I have trouble following the conversation with two or more people talking at the same time or in a noisy background;
(3) I have major hearing loss.

"Do you use a hearing aid ?" YES / NO

Self-Reported Hearing Loss, Hearing Aids, and Cognitive Decline in Elderly Adults: A 25-Year Study

Hélène Amieva, PhD, Camille Ouvrard, MSc, Caroline Giulioli, MSc, Céline Meillon, MSc, Laetitia Rullier, PhD, and Jean-François Dartigues, MD, PhD

JAGS 63:2099–2104, 2015

	Groups	β[a]	SE	P > |t|
MMSE score	No hearing loss	Reference group		
	Hearing loss	-0.04	0.02	0.01

Accelerated cognitive decline in those with hearing loss compared to controls

Linear Mixed effects model adjusted on age, gender and education

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	Groups	β[a]	SE	P > |t|
MMSE score	No hearing loss	Reference group		
	Hearing loss / no hearing aids	-0.06	0.02	<.001
	Hearing loss / hearing aids	0.07	0.04	NS

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Accelerated cognitive decline in those with hearing loss not using hearing aids compared to controls

Linear Mixed effects model adjusted on age, gender and education

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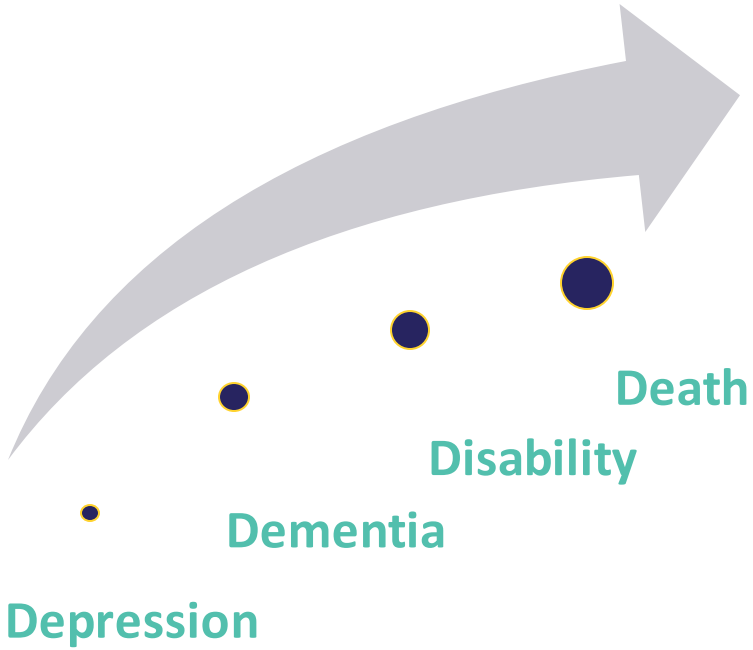
	Hearing loss / hearing aids	0.07	0.04	NS

Accelerated cognitive decline in those with hearing loss not using hearing aids compared to controls

NO accelerated cognitive decline in those with hearing loss + hearing aids

Linear Mixed effects model adjusted on age, gender and education

The 4 « Ds » of aging



- Starting by letter D…
- High prevalence rates
- Main factors of quality of life breakdown
- Heavy « Burden » for families who become « caregivers »
- High medical and social costs for the society

New objective

- To extend the study of the impact of hearing aid use to 4 major negative outcomes of aging: *the four Ds*
  - Death
  - Depression (CESD scale)
  - Dementia
  - Disability
    - IADL (Lawton scale) : phone, shopping, domestic finances, transports, medication
    - ADL (Katz scale) : bathing, toileting, dressing, feeding, transferring
- Over a 25-year period

Sample of participants

	All (n=3588)	No hearing loss (n=2299)	Hearing loss with no hearing aids (n=1113)	Hearing loss with hearing aids (n=176)	P-value
Characteristics					
Age (years), mean (SD)	75.3 (6.8)	74.0 (6.2)	77.2 (7.2)	79.0 (7.6)	<.0001
Woman, No. (%)	2075 (57.8)	1443 (62.8)	553 (49.7)	79 (44.9)	<.0001
Education, No. (%)					
school certificate or higher	2344 (65.3)	1556 (67.7)	659 (59.2)	129 (73.3)	<.0001
MMSE score, mean (SD)	25.8 (3.4)	26.2 (3.2)	25.2 (3.7)	26.0 (2.8)	<.0001

Risk of death

		Model 1			Model 2		
	Events No. (%)	HR	95% CI	P Value	HR	95% CI	P Value
Death (n=3588)				<.0001			0.7275
No hearing loss	2025 (88.1)						
Hearing loss with no hearing aids	1038 (93.3)	1.39	1.29 - 1.50	<.0001	1.03	0.95 - 1.11	0.4749
Hearing loss with hearing aids	164 (93.2)	1.59	1.35 - 1.86	<.0001	1.04	0.88 - 1.22	0.6232

Cox proportional hazards model
Model 1 : univariate
Model 2 : adjusted for age, gender, educational level and co-morbidities

Risk of dementia

		Model 1			Model 2		
Dementia (n=3588)	Events No. (%)	HR	95% CI	P Value	HR	95% CI	P Value
No hearing loss	556 (24.2)						
Hearing loss with no hearing aids	291 (26.2)	1.43	1.24 - 1.65	<.0001	1.22	1.05 - 1.41	0.0077
Hearing loss with hearing aids	29 (16.5)	0.96	0.66 - 1.39	0.8204	0.87	0.60 - 1.26	0.4572

Cox proportional hazards model
Model 1 : univariate
Model 2 : adjusted for age, gender, educational level, and co-morbidities

Incident disability (IADL scale : *phone, shopping, housekeeping, meals, laundry, domestic finances, transports, medication*)

		Model 1			Model 2		
	Events No. (%)	HR	95% CI	P Value	HR	95% CI	P Value
Disability in IADL (n=2561)				0.0001			0.0404
No hearing loss	979 (64.6)						
Hearing loss with no hearing aids	395 (69.4)	1.24	1.10 - 1.39	0.0003	1.17	1.03 - 1.31	0.0114
Hearing loss with hearing aids	64 (64.0)	1.42	1.10 - 1.82	0.0072	1.07	0.83 - 1.39	0.5944

Cox proportional hazards model
Model 1 : univariate
Model 2 : adjusted for age, gender, educational level and co-morbidities

Incident disability (ADL scale : *bathing, toiletting, dressing, feeding, transferring*)

		Model 1			Model 2		
	Events No. (%)	HR	95% CI	P Value	HR	95% CI	P Value
Disability in ADL (n=3452)				<.0001			0.0002
No hearing loss	547 (29.4)						
Hearing loss with no hearing aids	301 (34.8)	1.57	1.36 - 1.81	<.0001	1.33	1.15 - 1.53	0.0001
Hearing loss with hearing aids	27 (20.3)	0.96	0.65 - 1.41	0.8198	0.84	0.57 - 1.24	0.3697

Cox proportional hazards model
Model 1 : univariate
Model 2 : adjusted for age, gender, educational level and comorbidities

Incident depression *(interaction with gender)*

	Events n (%)	HR	95% CI	P Value
Men (n=1327)				
No hearing trouble	105 (13.3)			
Hearing trouble with no hearing aids	92 (20.2)	1.43	1.07 - 1.90	0.01
Hearing trouble with hearing aids	12 (14.5)	1.21	0.66 - 2.22	0.54

Cox proportional hazards model
Adjusted for age, gender, educational level and co-morbidities

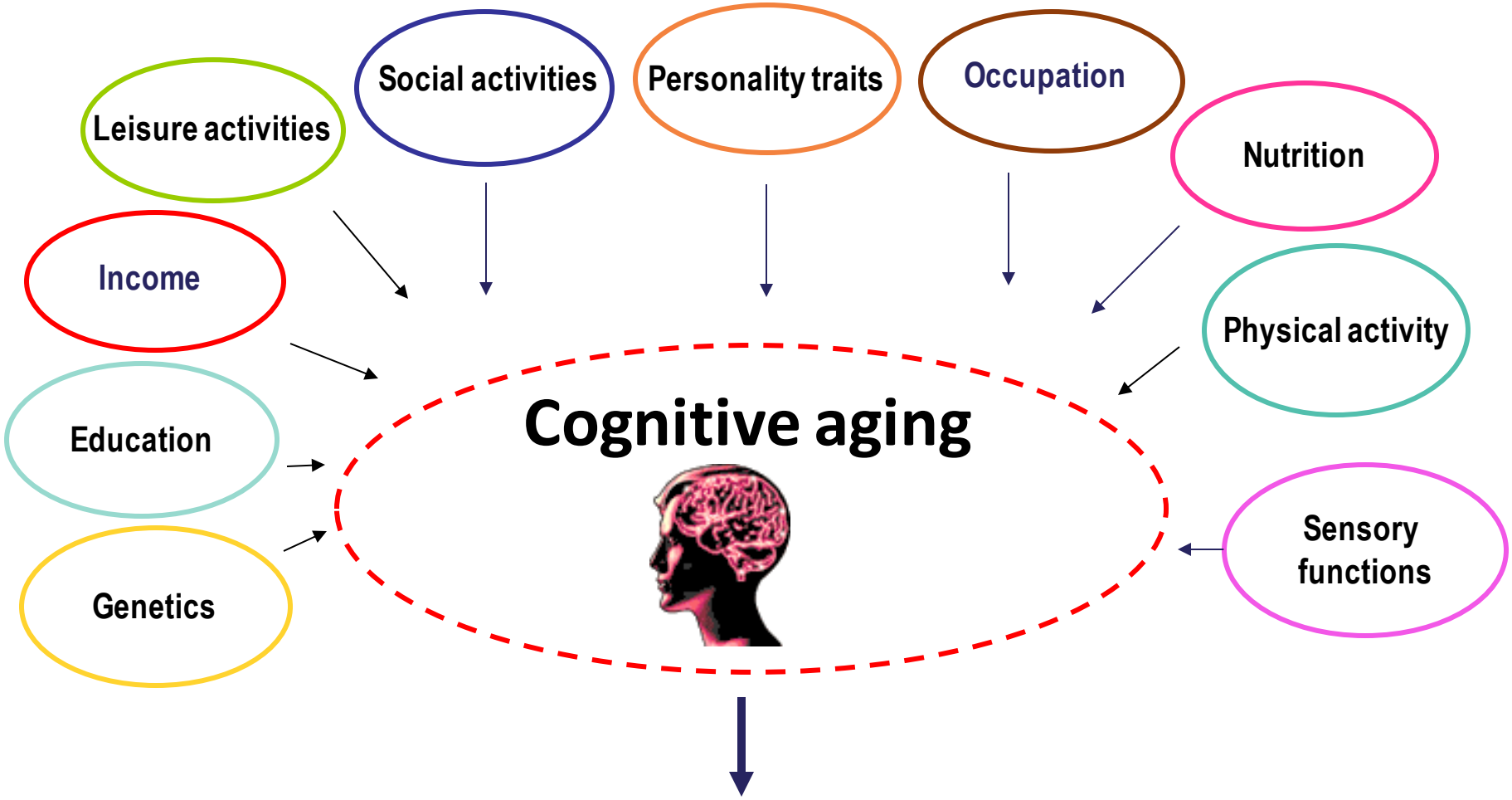
Two important limits

- *Observational* study (not *interventional*)
- No objective measure of hearing loss

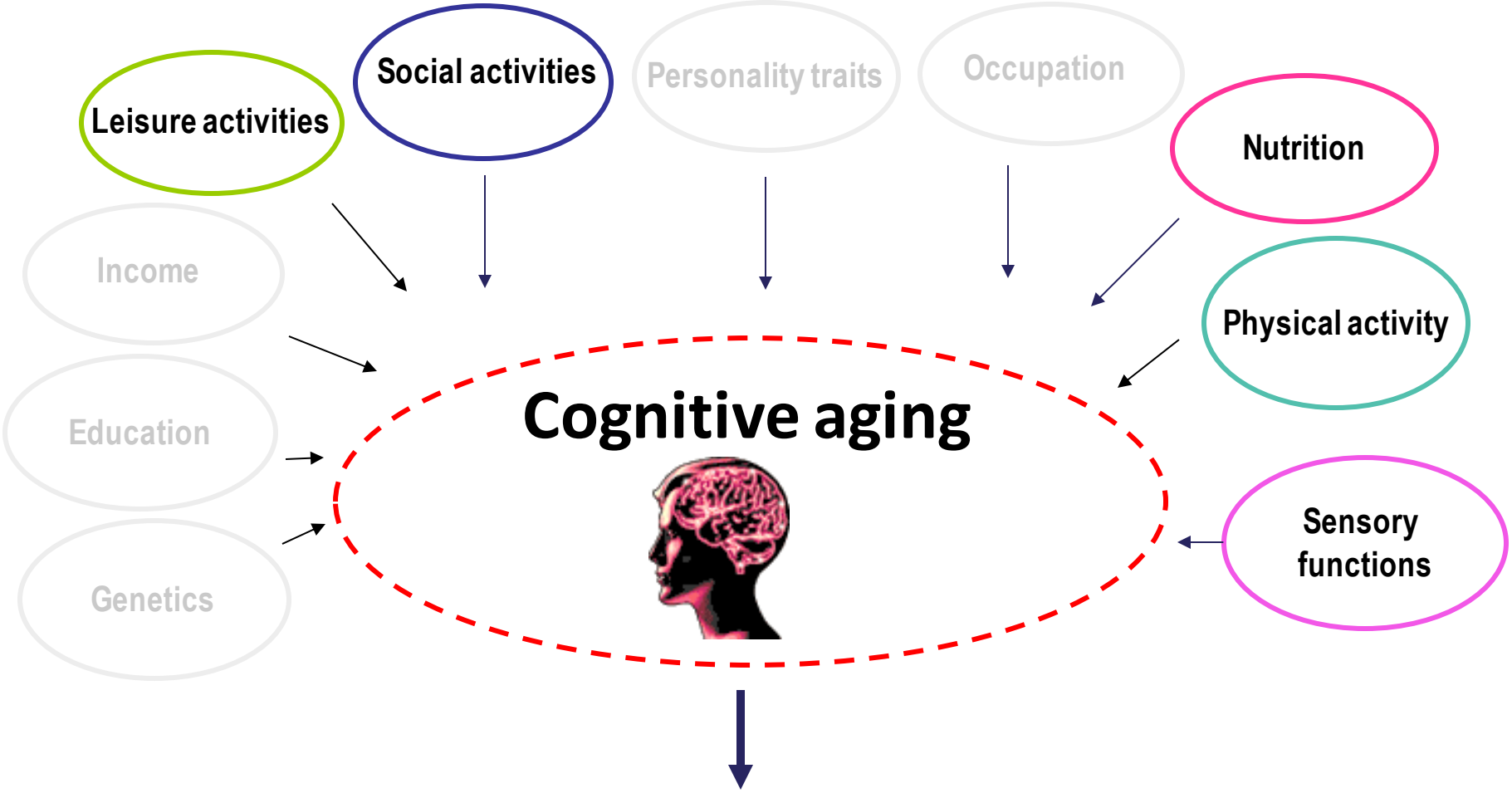
Despite the limits…

- Hearing aids may possibly have benefits on cognitive decline associated with hearing loss in older adults (Amieva et al., 2015).
- These additional analyses confirm the increased risk of depression (men), dementia, disability in older adults with hearing loss:

  → With a larger sample and a longer follow-up period than prior studies, our results strongly reinforce the plausibility of such associations.
- **But no increased risk** for older adults using **hearing aids.**
- **Taken together these results underline the importance of seriously considering hearing loss in elderly population**.



Few <u>modifiable</u> factors associated with pathological aging



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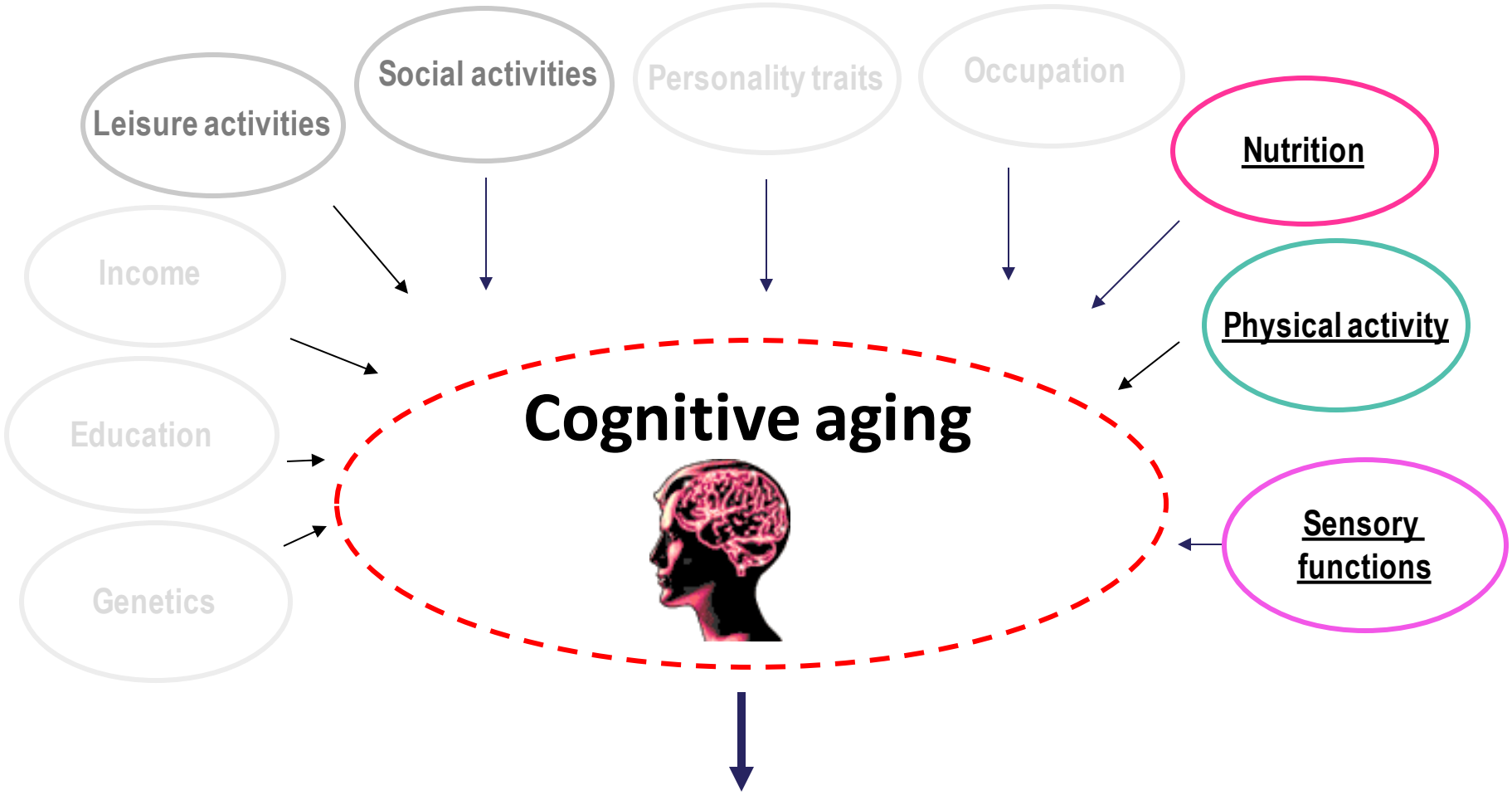

Few <u>modifiable</u> factors associated with pathological aging

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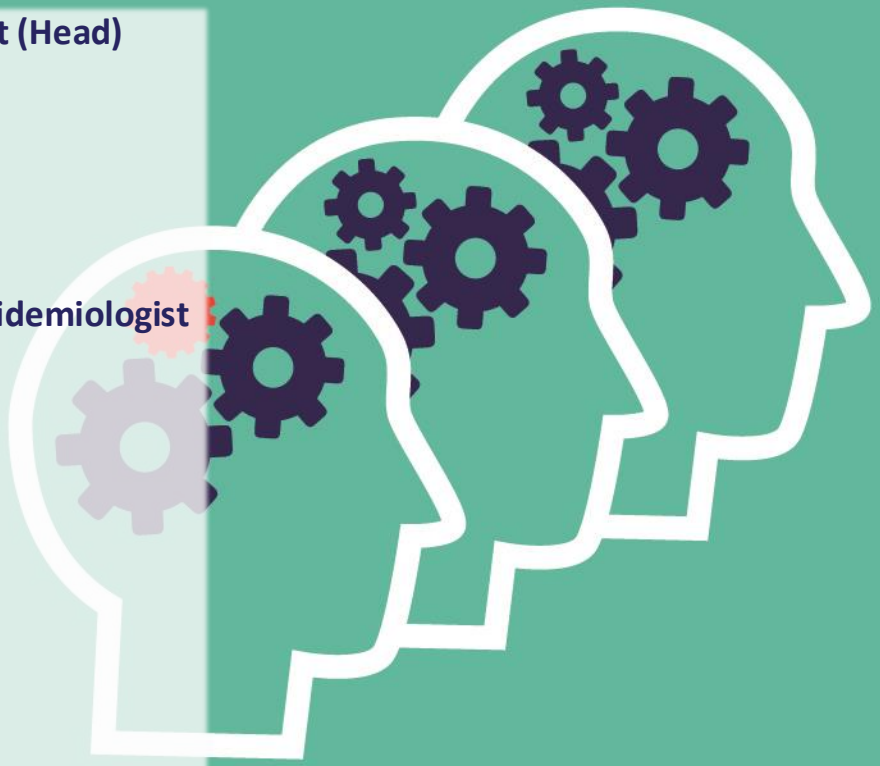

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