How are sleep and the brain related?

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The role of sleep for brain health in the modern society

Fig. 1. Sleep duration recommendations across the life span.
Self-reported sleep and brain health

- Prevalent age-related brain disorders are associated with changes in sleep patterns

- Causality is uncertain, may go both ways

- Changes in sleep are also normal in aging in general
Low sleep quality

Feeling tired

Age (years)
How is your sleep habits related to changes in the brain?

Are sleep and brain health related in normal adults at all?
Worse sleep is related to more brain volume loss over time also in normal research participants

BUT: *The relationship is not strong, and was only seen for adults above 60 years*

*Sexton et al. 2014, Neurology*
Hippocampus structure and sleep

3000 participants from Lifebrain followed over time with repeated brain scans (MRI)

Hippocampus across life

*Fjell et al. 2020, Sleep*
UK Biobank - 21,000 participants

Fjell et al. 2020, Sleep
UK Biobank - 21,000 participants

Daytime dozing

Getting up in morning

Nap during day

Sleep duration

Sleeplessness

Fjell et al. 2020, Sleep
Sleep and Alzheimer’s Disease
Sleep and Alzheimer’s Disease

- Alzheimer’s dementia is associated with changes in sleep
- We do not know what causes what – probably causality goes both ways
Sleep and Alzheimer’s Disease

- Self reported sleep problems are related to more amyloid in the brain – the main biomarker for Alzheimer’s Disease – but the relationship is not strong

Fjell et al. Cerebral Cortex, 2020
Sleep seems to have a robust, short-term effect on memory.
Conclusions

- Worse sleep is moderately related to more brain volume loss

- For the cerebral cortex, this is the case only in older adults (> 60 years)

- Sleep duration – the number of hours spent sleeping each night – is very weakly related to brain volume
Conclusions

- Sleep *may* play a role in brain health

- Short sleep duration – within reasonable limits - does not seem to have a large negative impact on the brain in the long run

- We need a better understand of the relationship between sleep and brain health across the lifespan