Emrah Düzel, MD

DZNE

Emrah Düzel
DZNE, Magdeburg

Deutsches Zentrum für Neurodegenerative Erkrankungen
in der Helmholtz-Gemeinschaft

OTTO VON GUERICKE
UNIVERSITÄT
MAGDEBURG

MED   FACULTY OF
MEDICINE

UCL

Institute of Cognitive
Neuroscience

Areas of Investigation with Respect to Reserve and Resilience

- Population Studied: Healthy older adults, Subjective Cognitive Decline, Mild Cognitive Impairment, Alzheimer's dementia, cross sectional and longitudinal

- Methods: task fMRI, CSF, Amyloid/Tau-PET

- I investigate the neural mechanisms of memory and how they are affected by disease pathology along the Alzheimer's disease continuum.

- Specifically, I use task fMRI to assess how disease pathology affects the maintenance of task networks in preclinical and prodromal Alzheimer's disease

Concepts Used In Research

- **Reserve:** Availability of alternative neural resources that can compensate for a focal decline of neural resources

- **Maintenance:** The preservation of neural resources over the adult lifespan

- **Resilience:** Preventing a decline of neural resources (for instance loss of local brain volume) in the face of manifest pathology

- **Resistance:** Preventing the emergence of pathology (i.e. tau or amyloid accumulation)

Example Data: maintenance of a novelty encoding network

- Concept: Maintenance
- Measure: fMRI activity during encoding of novel photographs

- Operational definition: Maintenance in old age is defined as similarity of the activation pattern to that of young adults (aged 20-30 years)

- FADE score: "functional activity deviance in encoding" (a single score quantifying the network difference of a person to that of young adults)

Cross-sectional data from the DZNE DELCODE study N=316 (healthy controls, subjective complainers, mild cognitive impairment, ages 55-80) with fMRI; of these N=140 with CSF data
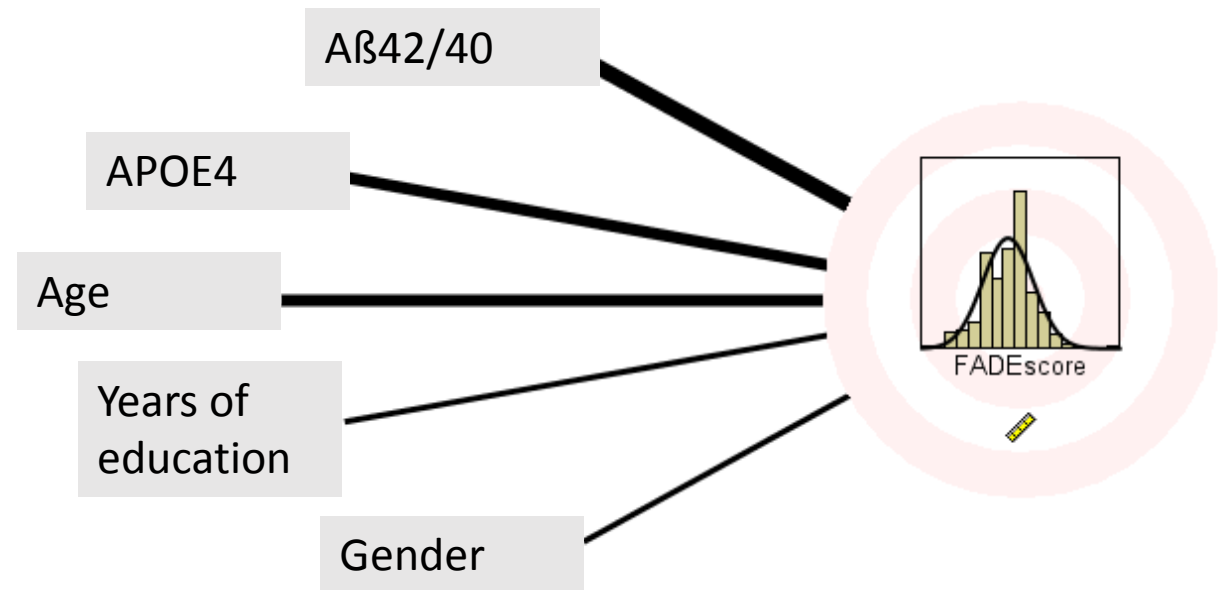
Linear regression shows that the Aß42/40 ratio, APOE status and age have the strongest influence on whether an older adult activates the same encoding network as a young person. Years of education has a marginally significant effect. Tau pathology has no effect.