



Changing emotions to promote healthy aging

Olga Klimecki, PhD



HORIZON 2020

The EU Framework Programme for Research and Innovation

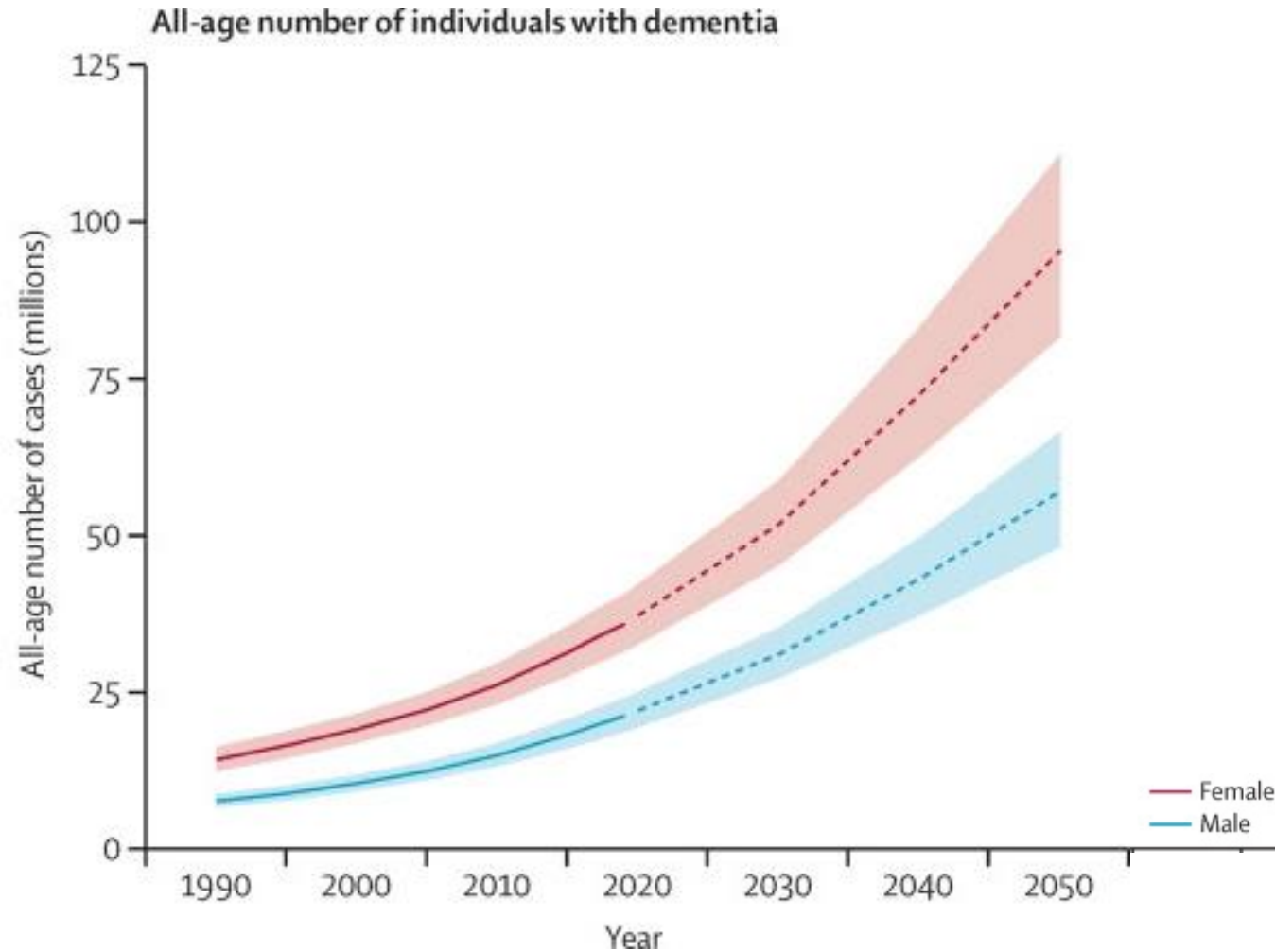
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Poll 1

To promote healthy aging, the following can be done:

- Reducing loneliness
- Improving emotional wellbeing
- Reducing anxiety

Global dementia cases are expected to almost triple from 57 million cases in 2019 to 153 million cases in 2050

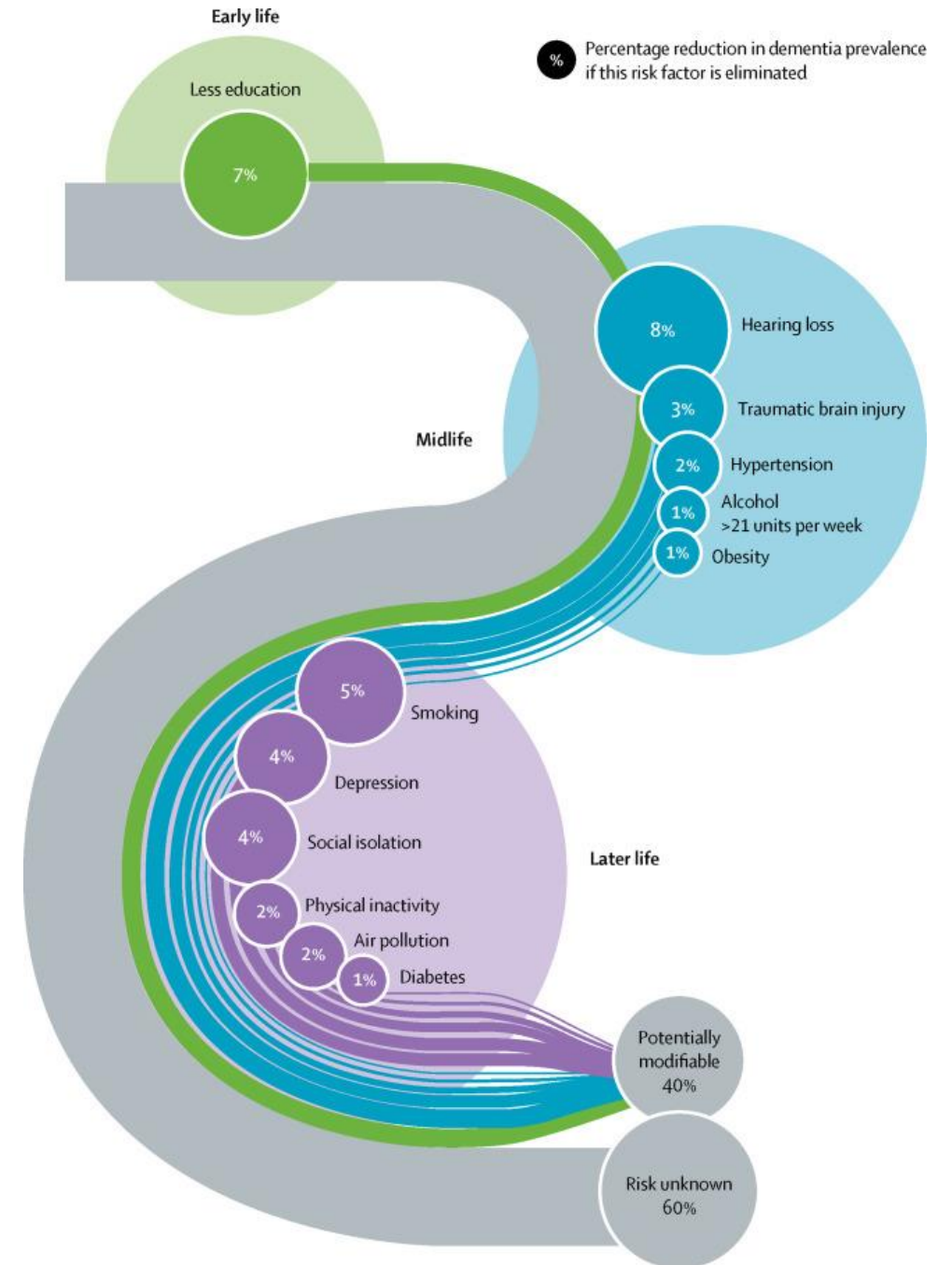


Reducing dementia risk

simultaneously addressing modifiable risk factors such as

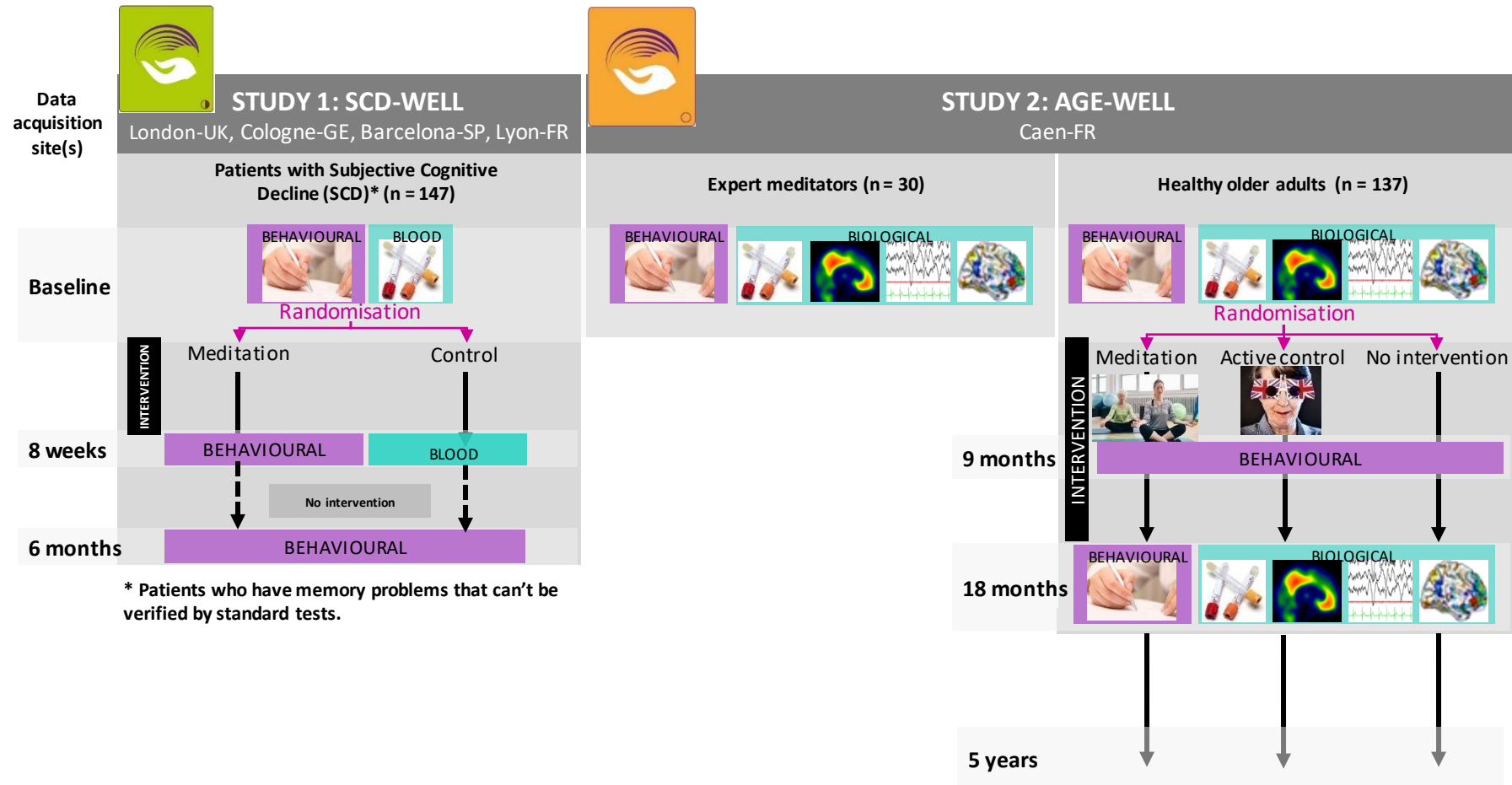
- lifestyle
- **emotional well-being** and
- **social isolation**

in early interventions can reduce the risk of dementia up to 40%





The Medit-Ageing/ Silver Santé Study



Protocol papers:
 Primary outcome papers:

Marchant et al., (2018)

Marchant et al., (2021) *Psychoterapy and Psychosomatics*.

Lutz et al. (2018)

Poisnel et al., (2018) *Alzheimers & Dementia*.
 Chételat et al., (2022) *JAMA Neurology*.

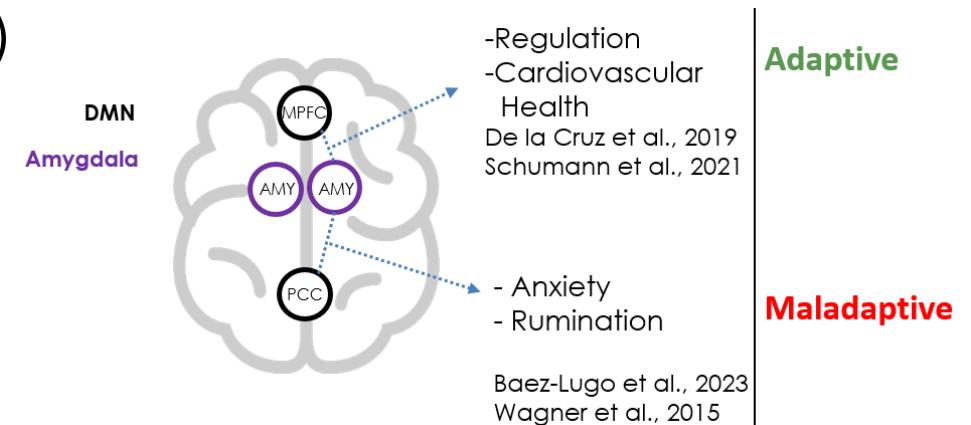
Background

- Impaired emotion regulation is related to anxiety, depression, worry, and rumination throughout the lifespan and in aging (Aldao et al., 2010, *Clin. Psychol. Rev.*; Kraaij et al., 2002, *Aging Ment. Health*)
- Negative emotions, like anxiety and rumination, are an important (and modifiable) risk factor for dementia (Marchant et al., 2020, *Alzheimers Dement*; Marchant et al., 2021 *Psychotherapy & Psychosomatics*)

Emotional inertia

= the extent to which emotions pass from one moment to the next (Kuppens et al., 2010, *Psych Science*).

- can be measured as brain activity after emotional films using task-rest paradigms (Eryilmaz et al. 2011, *Neuroimage*)
- anxiety is related to "emotional inertia" measured as sustained brain activity in amygdala (Pichon et al., 2015, *SCAN*)
- increased connectivity between posterior part of Default Mode Network and amygdala is associated with bipolar depression (Rey et al., 2020, *Eur. Psychiatry*)





How is emotional inertia represented in brain functions in older age?



Experiment 1:

- 29 young adults (18-35)
- 27 older adults (> 64 years)
- 50:50 Men/Women



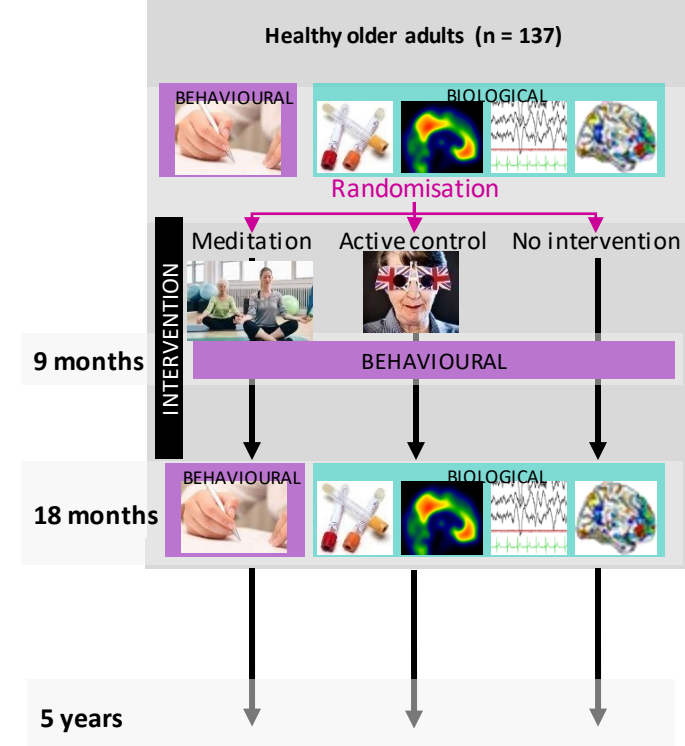
Experiment 2:

- 127 (79 women) older participants
- Age M = 69 years; age range: 64-83 years



STUDY 2: AGE-WELL

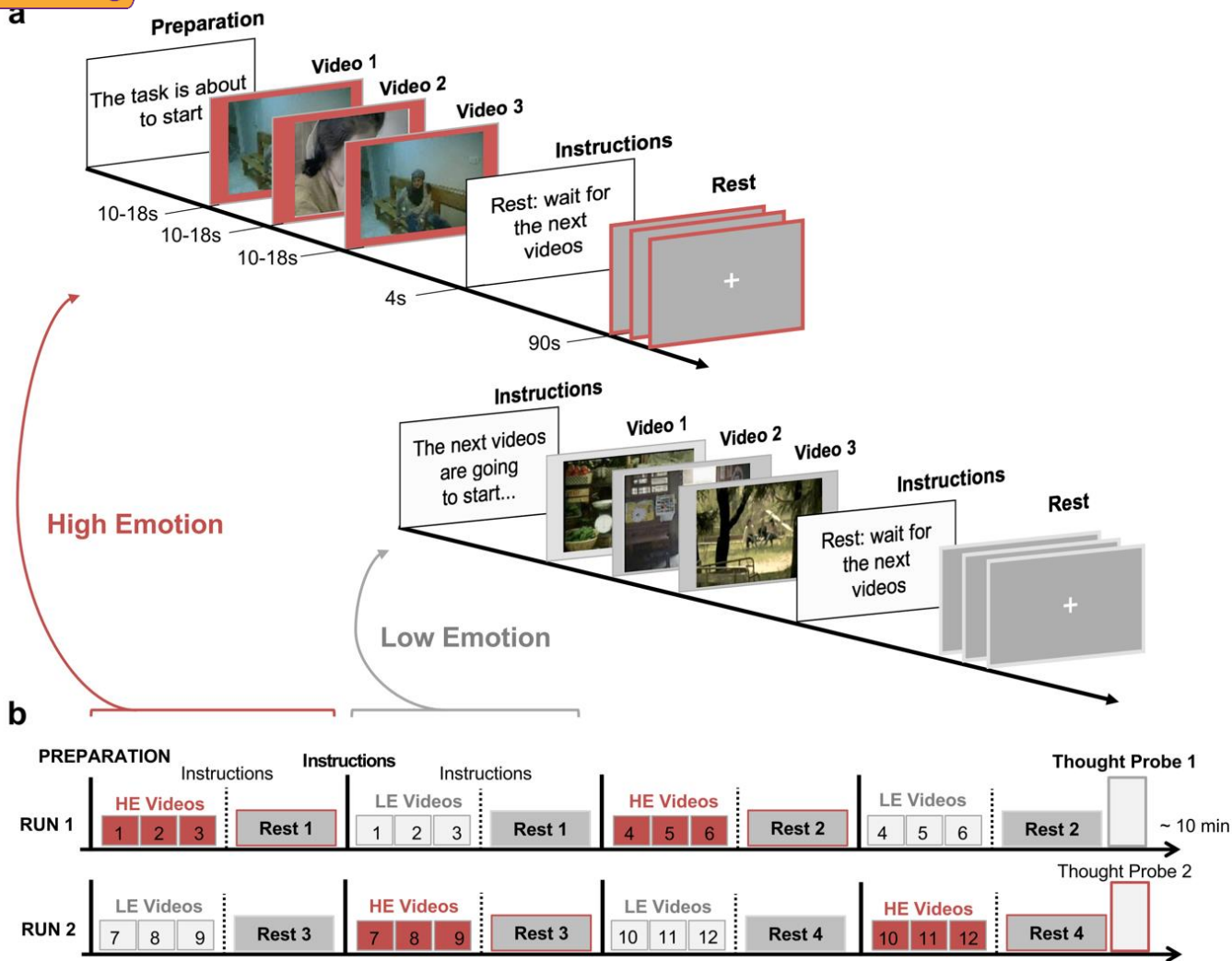
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Poisnel et al., (2018) *Alzheimers & Dementia*.
Chételat et al., (2022) *JAMA Neurology*.



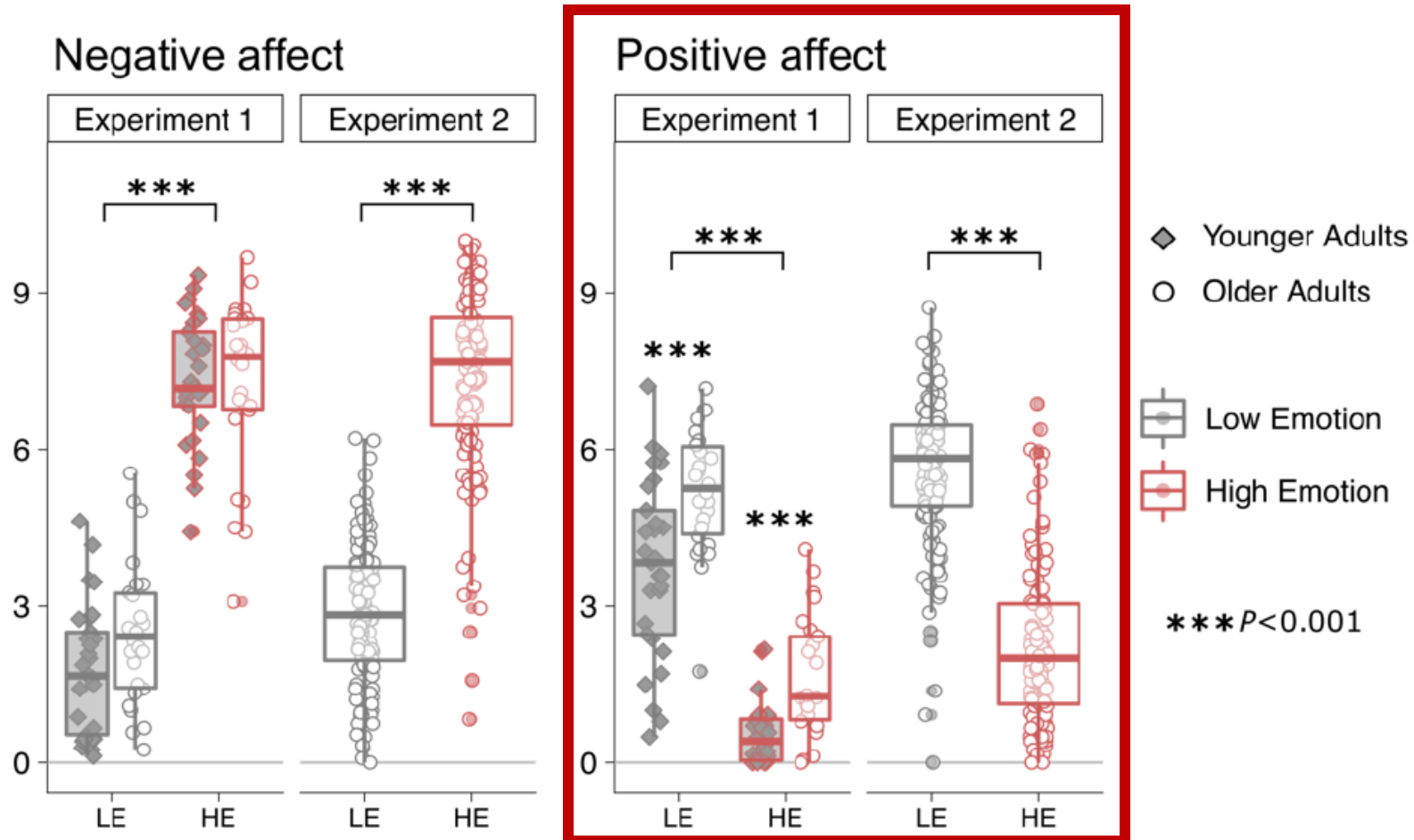
Socio-affective Video Task Rest - SoVT Rest



After the scanning participants provided ratings for each video on

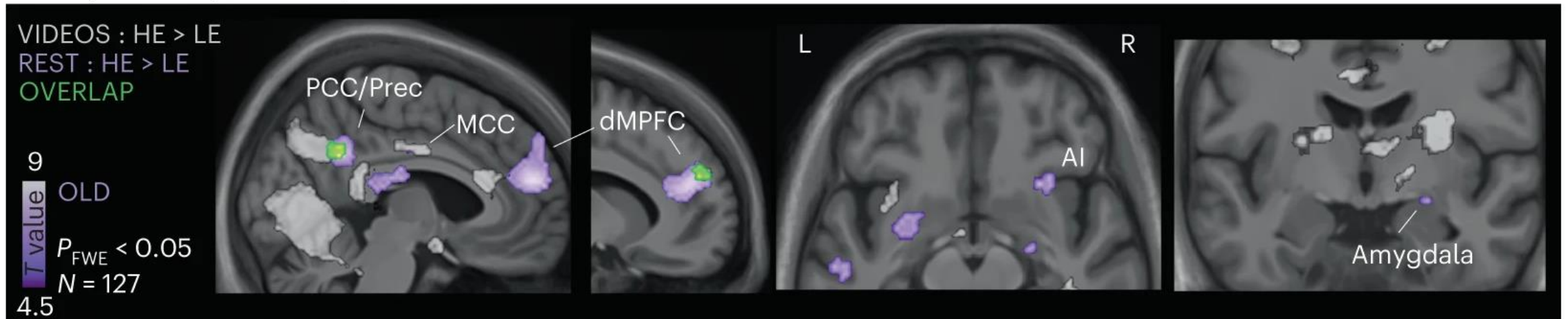
- empathy,
- negative affect,
- and positive affect.

Older adults report more positive emotions than young adults



Carry-over brain activations (emotional inertia) in older adults in Posterior Cingulate Cortex (PCC)

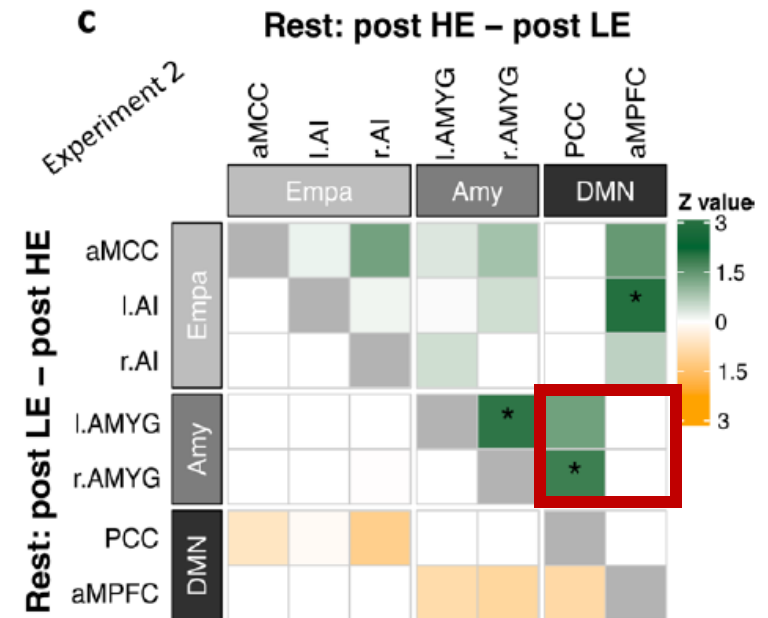
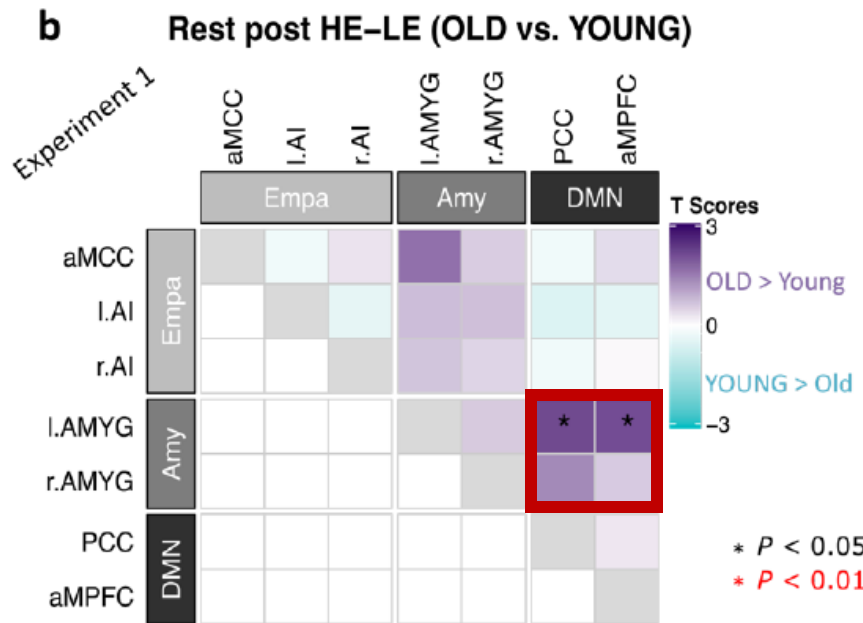
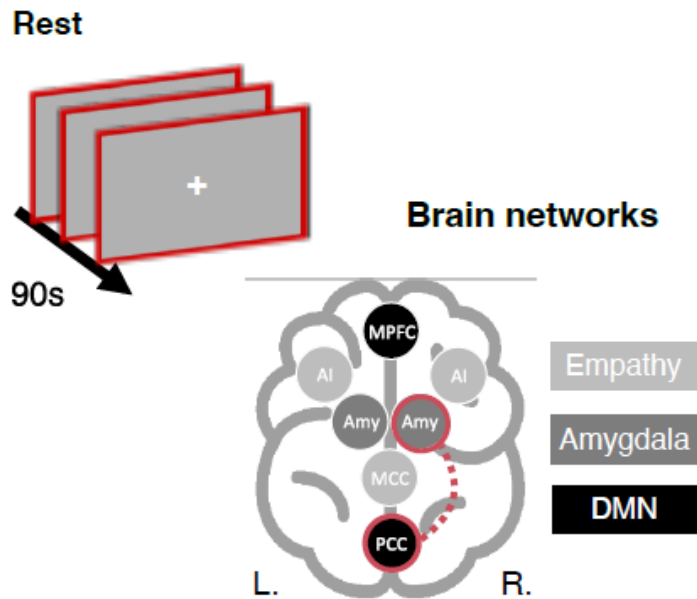
REST: post HE > post LE (experiment 2)



AI, anterior insula
Amy/ AMYG, amygdala
dmPFC, dorsomedial prefrontal cortex
MCC, mid cingulate cortex
PCC, posterior cingulate cortex
Prec, Precuneus

Testing functional brain connectivity related to emotional inertia

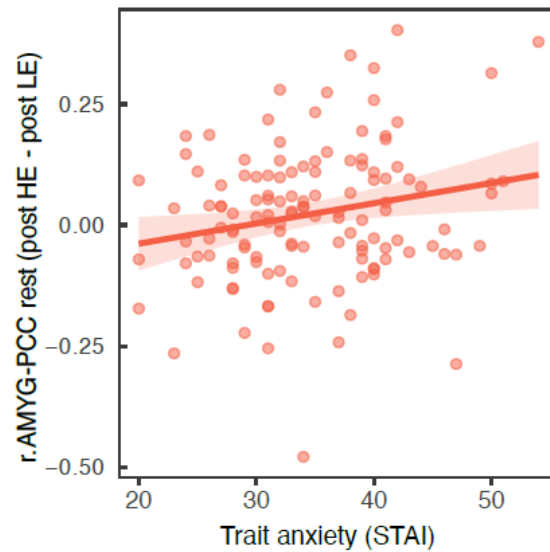
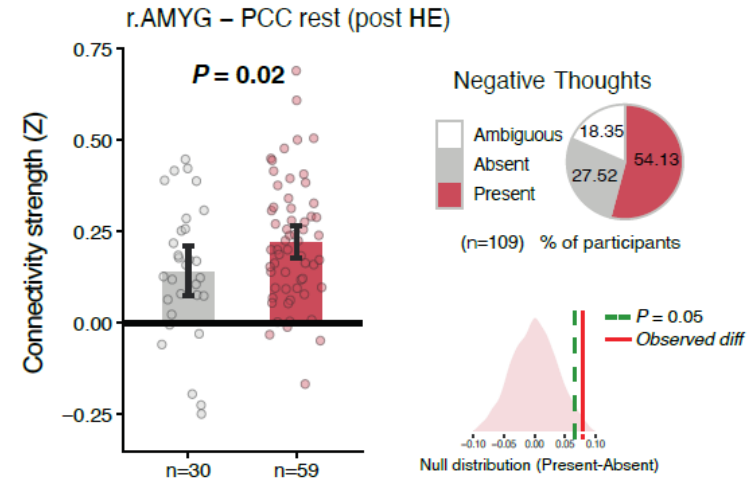
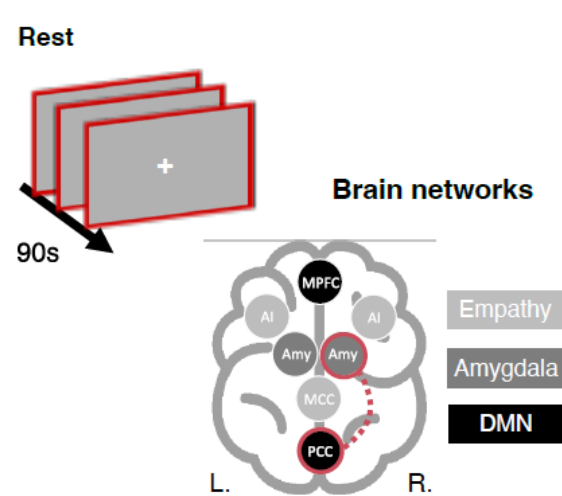
Older adults have more connectivity between amygdala (relevance detection) and posterior cingulate cortex (PCC) after emotional events than younger adults



AI, anterior insula
Amy/ AMYG, amygdala
aMCC, anterior mid cingulate cortex

aMPFC, anteriormedial prefrontal cortex
MCC, mid cingulate cortex
PCC, posterior cingulate cortex

In older adults, connectivity between amygdala and PCC is associated with more negative thoughts, anxiety, and rumination



Amyg, amygdala
PCC, posterior cingulate cortex
STAI, State Trait Anxiety Inventory
RRS, Rumination Response Scale
R, right

Poll 2

Compared to younger adults, older adults have more

- positive emotions
- brain connectivity between amygdala and DMN
- brain connectivity related to negative emotions



Age-Well primary outcome - effect of 18 months meditation training on regional brain volume and perfusion in older adults

POPULATION

54 Men, 83 Women



Community-dwelling cognitively unimpaired older adults

Mean age, 69.4 y

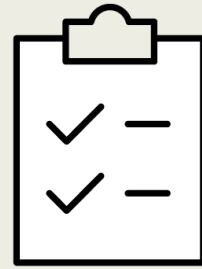
SETTINGS / LOCATIONS



Monocentric study in France

INTERVENTION

137 Participants



45 Meditation training

"Silver Santé Study Meditation Programme" with mindfulness and loving kindness and compassion meditations

46 Non-native language training

Non-native language (English) exercises to reinforce each participant's abilities in comprehension, writing, and speaking

46 No intervention

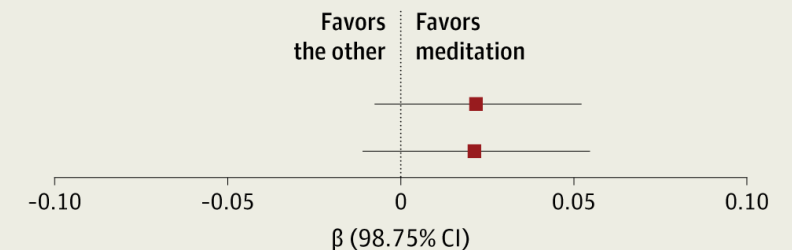
Passive control group: continue living as they did before entering the study

PRIMARY OUTCOME

Changes in anterior cingulate cortex (ACC) volume and perfusion between the meditation and no intervention groups and changes in insula volume and perfusion between the meditation and non-native language groups at 18 mo

FINDINGS

There were no significant between-group differences in perfusion changes to the ACC (top value) or insula (bottom value)



Mean difference of meditation vs no intervention groups

ACC volume: **0.01; 98.75% CI, -0.02 to 0.04; P = .36**

ACC perfusion: **0.02; 98.75% CI, -0.01 to 0.05; P = .06**

Mean difference of meditation vs English exercise groups

Insula volume: **0.01; 98.75% CI, -0.02 to 0.03; P = .58**

Insula perfusion: **0.02; 98.75% CI, -0.01 to 0.05; P = .09**



Age-Well primary outcome

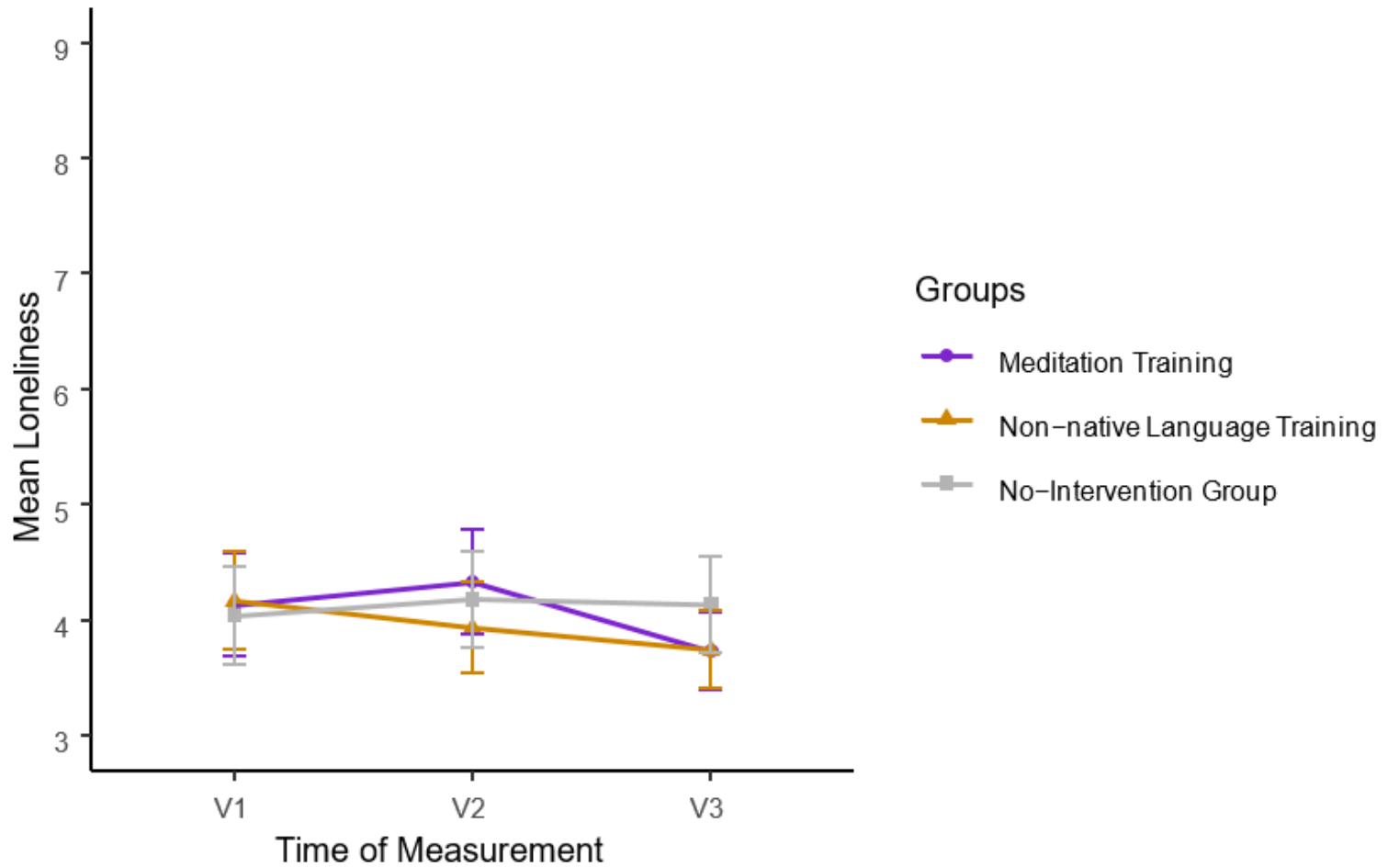
- 18 months of meditation training compared with English training improves the attention composite score
- Meditation compared to English training favours the maintenance of compassion, empathy and prosociality





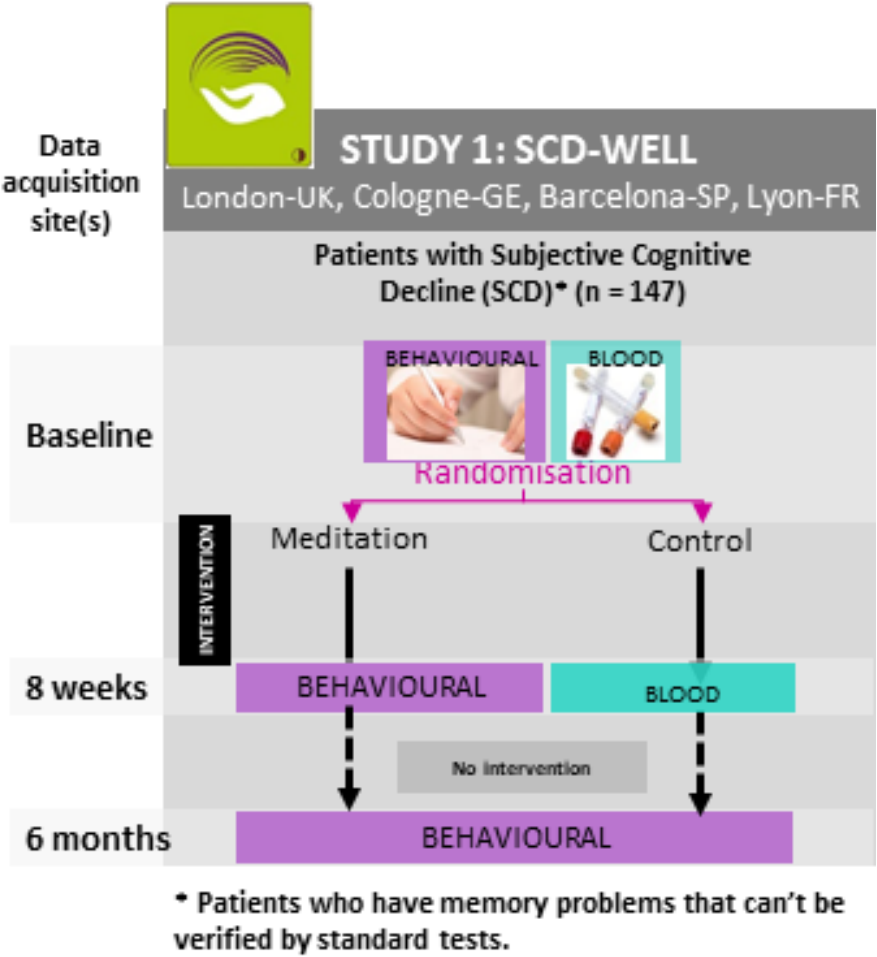
Meditation training and learning a non-native language reduce loneliness in the Age-Well study

Longitudinal Trajectories of Loneliness by Study Group



Flora Hähnel

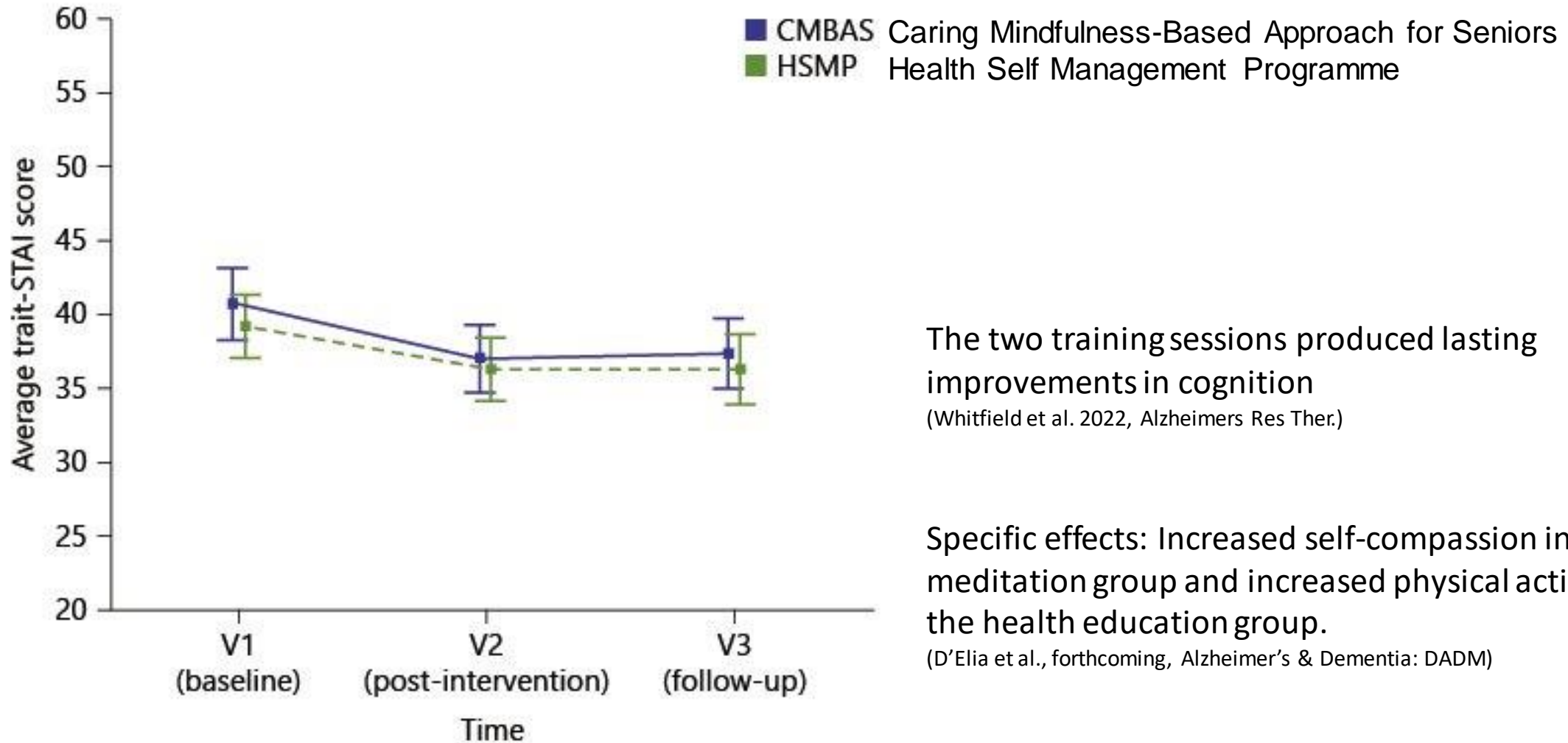
Can meditation training reduce anxiety (risk factor for dementia)?



- 147 participants from memory clinics (mean age: 72) with subjective cognitive decline
- 8 weeks of mindfulness and compassion training (adapted from Zellner Keller et al. Mindfulness 2014)
- or 8 weeks of health education (adapted from Lorig et al 2012 Living a Healthy Live with Chronic Conditions)



Lasting reduction in anxiety (risk factor for dementia) after both interventions



The two training sessions produced lasting improvements in cognition
(Whitfield et al. 2022, *Alzheimers Res Ther.*)

Specific effects: Increased self-compassion in the meditation group and increased physical activity in the health education group.
(D’Elia et al., forthcoming, *Alzheimer’s & Dementia: DADM*)

Poll 3

Meditation training in older participants can

- Reduce anxiety
- Reduce loneliness
- Improve cognition
- Help to maintain empathy

THANK YOU

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