Changing emotions to promote healthy aging

Olga Klimecki, PhD
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

Nichols et al., *The Lancet*, 2022
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%

Livingston et al. (2020) Lancet.
The Medit-Ageing/ Silver Santé Study

**STUDY 1: SCD-WELL**
London-UK, Cologne-GE, Barcelona-SP, Lyon-FR

<table>
<thead>
<tr>
<th>Data acquisition site(s)</th>
<th>Patients with Subjective Cognitive Decline (SCD)* (n = 147)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Mediation, Control, Randomisation</td>
</tr>
<tr>
<td>8 weeks</td>
<td>Behavioural, Blood</td>
</tr>
<tr>
<td>6 months</td>
<td>No intervention</td>
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</tbody>
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* Patients who have memory problems that can't be verified by standard tests.

**STUDY 2: AGE-WELL**
Caen-FR

<table>
<thead>
<tr>
<th>Expert meditators (n = 30)</th>
<th>Healthy older adults (n = 137)</th>
</tr>
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Randomisation

Meditation, Active control, No intervention

**BEHAVIOURAL**

Data acquisition site(s)

- 9 months
- 18 months
- 5 years

Protocol papers:
- Marchant et al., (2018)
- Lutz et al. (2018)

Primary outcome papers:
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)

- Regulation - Cardiovascular Health
  De la Cruz et al., 2019
  Schumann et al., 2021

- Anxiety - Ruminiation
  Baez-Lugo et al., 2023
  Wagner et al., 2015
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
Caen-FR

Healthy older adults (n = 137)

Randomisation

Meditation
Active control
No intervention

9 months

BEHAVIOURAL

18 months

BEHAVIOURAL

5 years

BIOLOGICAL

Data acquisition site(s)

Chételat et al., (2022) JAMA Neurology.
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)

VIDEOS: HE > LE
REST: HE > LE
OVERLAP

PCC/Prec
MCC
dMPFC

L
R

Amygdala

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.
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

**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

**Settings/locations**
- Monocentric study in France

**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*

- **Groups**
  - Meditation Training
  - Non-native Language Training
  - No-Intervention Group

Hähnel et al., (submitted).
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

https://silversantestudy.eu