Emotion Regulation and Cognitive Function

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Regulation of negative emotions

- **Emotion Regulation** – Process by which we influence which emotions we have, and when and how we experience them (Gross, 1998).
Regulation of negative emotions

• **Reappraisal**— Reinterpret the meaning of a negative stimulus to change emotional response (Gross, 1998).

*Meta-analysis of cognitive reappraisal*

Buhle*, Silvers*, et al., (2014)

Ochsner & Gross, 2005
Regulation of negative emotions

- **Reappraisal**— Reinterpret the meaning of a negative stimulus to change emotional response (Gross, 1998).

  e.g., Vrticka et al., 2013
  e.g., Holland & Kensinger, 2013
  e.g., Delgado et al., 2008
Regulation of negative emotions

• Emotion regulation strategies such as reappraisal:
  – Not effective for everyone or in all contexts (Troy et al., 2013).
  – Recruits more effortful cognitive control processes (Strauss et al., 2016).
  – *Difficult due to age-related declines in cognitive control* (Liang et al., 2017; Shiota & Levenson, 2010)
  – Not as effective under stress (Raio et al., 2013).
  – Can lead to increases in peak cortisol reactivity in response to social or physical stressors (Denson et al., 2014).

• Broaden and build theory of positive emotion (Catalino & Fredrickson, 2011)
  – Broadens one’s cognitive perspective
  – Helps build psychological resources for coping
Remember the good times…

- The retrieval of autobiographical memories can bring back emotions tied to the original experience (Westerman et al., 1996; Rubin, 2007).

- Adaptive role of autobiographical memories
  - Bolster a sense of self-identity (Bluck et al., 2005)
  - Shape future/prospective planning (Schacter & Addis, 2007)
  - Influence an individual’s well-being (Young et al., 2013).

- Can the recall of positive memories recruit neural circuits involved in reward and increase subjective well-being?
Positive memory recall paradigm

First session – Autobiographical Memory Questionnaire (AMQ)
Provide brief description of memory you were personally involved in (cued recall).

Playing in the snow

Grocery shopping

Speer, Bhanji & Delgado (2014) - Neuron
Remembering our positive past recruits reward-related regions as a function of positive feeling

Speer, Bhanji & Delgado (2014) - Neuron
Remembering our positive past correlates with individual differences in resiliency

Can positive memory recall serve as an emotion regulation strategy?

Speer, Bhanji & Delgado (2014) - Neuron
Reminiscing about the past while under stress

Elaborations:

- Acute Stressor
  - 2 min
  - 24 memories
    - 12 min
  - or
  - Non-stressful Control Task

Elapsed Time (minutes):

- Baseline: 0
- Peak: 20
- Recovery: 50

Socially evaluated cold-pressor test (Schwabe et al., 2008)
Cortisol Change by Condition and Memory Valence

Cortisol Change by Condition and Memory Valence

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Reminiscing about positive memories recruits regions associated with emotion regulation and reward-processing.
Parametric regression of feeling ratings during memory recall

- Emotion regulation (e.g., Ochsner et al., 2004, Lieberman et al., 2007)
- Reappraisal success (Wager et al., 2008)
- Response selection and inhibitory function (e.g., Robbins, 2007)

Psychophysiological Interaction (PPI) Analysis:
Psychological context: Feeling ratings during Memory Recall Stress-Positive Group
Stronger vlPFC-dlPFC connectivity (emotion regulation circuitry) as a function of increased positive feelings

**Psychophysiological Interaction (PPI) Analysis:**
Psychological context: Feeling ratings during Memory Recall
Stress-Positive Group
Emotion regulation via positive emotions

• Recalling positive experiences from the past:
  – Increases positive emotions & influences mood.
  – Engages reward-related neural circuitry.

• Positive memories may serve as an alternative form of emotion regulation.
  – Dampens the physiological response to acute stress.
  – Engages neural circuitry potentially involved in emotion regulatory processes.

• Future direction: Finding positive meaning in the negative past changes how we feel and updates memories.
  – Positive meaning finding leads to increases in positive emotion at future retrieval, which tracks greater changes in positive memory content.
Implications for Aging

• Viability of alternative forms of emotion regulation
  – Age-related declines in cognitive function may make typical regulation strategies more effortful.
  – Similarities in reward-related circuitry (e.g., Samanez-Larkin et al., 2007)

• Positivity effect: Age related changes in motivation
  – Meta-analysis supports a positivity effect increase with age (Reed et al., 2014; Carstensen and DeLiema, 2018)
  – Associated with improved health (Kalokerinos et al. 2014) and effective in terms of future interventions (e.g., positive, rather than negative messages; Notthoff & Carstensen, 2014)

• Neural circuitry of positive emotion regulation in aging?
  – Recent work suggests shift from more lateral to medial regions in aging during emotion regulation (Van Reekum et al, 2018).
# Acknowledgements

## Laboratory

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<tr>
<th>Current</th>
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<th>Collaborators</th>
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[Image of logos: NIMH, NIDA, McKnight Foundation, The Delgado Lab]