The Mellow Years?: Neural Basis for Improving Emotional Stability Over Age

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So let’s face reality:

So there’s good news and there’s bad news:

BAD NEWS:
Reduced memory and executive planning with age

GOOD NEWS:
Behavioral studies have shown an increase in emotional stability with increasing age

GAME PLAN:
- Outline Competing Theories
- Experiment
- Results
- Discuss the Results
- Questions?

Increase in emotional stability as we get older…
- reported less negativity, an easing of emotional intensity, and a reduction in trait neuroticism
- a shift in the ratio of positive-to-negative emotion
Theories of why emotional stability increases with age:
- Retirement=reducing daily stress and negative emotions
- Age related atrophy for brain regions which process positive versus negative emotion
- Change in attitude towards life→ adopt a "life is short!" attitude

Lack of research into the neurological mechanisms!

Point of this research?
To examine the neurological mechanisms of this increase in emotional stability over age
- Examine medial prefrontal cortex (MPFC) implicated in the governance of emotional functions
- Examine the subcortical circuits associated with emotion processing
Use: fMRI and ERP (event related potentials)

THE EXPERIMENT
Participants comprised 242 healthy individuals
122 males, 120 females
Participants were divided into 4 groups:
  Teens
  Young
  Middle
  Old

Participants were assessed on emotional stability using a self-report index of neuroticism from the NEO-Five Factor Inventory
Participants were asked to attend to faces displaying:
  - fear, happiness, or neutral
They rated the perceived intensity of each expression on a scale of 1 (extremely mild) to 5 (extremely intense)
  - ERP and fMRI were recorded

RESULTS
- Neuroticism decreases with age
- MPFC activation decreases with age for response to happiness stimuli
- MPFC activation increases with age for response to fearful stimuli
- There were a total of 4 blocks each for happiness, fear, and neutral
- Each stimuli had 8 pictures
DISCUSSION

As you grow older:
- Response to Fear stimuli increased MPFC activation during the later phase of processing (180-450 ms).
- Response to Happy stimuli activated MPFC was in the automatic earlier phase of processing (150 ms).

DISCUSSION

Going back to the shift in positive-negative emotion ratio
- The MPFC allows positive responses to proceed without much restraint
- The resources for processing emotion in the MPFC are allocated towards processing fear
- Results in more evaluation and control of negative emotion

To summarize and conclude:
- This paper evaluated emotional stability over age based on MPFC activation during fear or happiness stimuli
- Compared activation using ERP and fMRI
- Overall, looked at the plasticity of the brain in regulating negative emotion as we age

Future Research:
- Look into mechanisms of dopamine’s regulation of emotion in the MPFC
- Because of plasticity of our brains as we age, dopamine receptor concentrations change our brains compensate for this change through various changes such as increased cell size

My Opinion:
- GOOD IDEA!
- Can use PET to track dopamine for a more detailed mechanism as to the regulation of emotion as we age

QUESTIONS??