Age-Related Differences in the Contributions of Emotional Arousal and Positive Valence to Memory Encoding

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Abstract

Older adults tend to remember more positive information than young adults, consistent with "the positivity effect", and neuroimaging has revealed age-related differences in the encoding of emotional valence. However, it remains unclear whether there are age-related differences in the contribution of arousal to memory encoding. In the current study we investigated emotional memory encoding in a group of 23 young and 23 older healthy women who underwent fMRI as they viewed images which were positive or neutral in valence, and which varied in arousal. Using a parametric modulation approach, we examined how the BOLD signal varied with increasing subjective levels of valence and arousal for images which were remembered versus forgotten several days later. Although both groups showed a behavioural enhancement of memory by arousal, only the young group showed an increase in the arousal-dependent BOLD signal during successful memory encoding, in the right superior frontal gyrus and the left cerebellum. We found no evidence of a positivity bias in the older group, who did not remember more positive images; however the young group did recall more positive images correctly. Compared to the older group, the young group showed greater enhancement of the memory-related BOLD signal in the left amygdala and the left cerebellum, consistent with the positivity bias in their behavioural performance. These results suggest that in our paradigm, both emotional arousal and positive valence more strongly enhanced the memory-related BOLD signal in the young adults. They suggest that ageing is not always associated with a positivity bias in memory.

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