DEPRESSION IS ASSOCIATED WITH WEAK RIGHT AMYGDALA MODULATION DURING EMOTIONAL REAPPRAISAL

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Introduction

Excessive sadness is a key symptom of Major Depressive Disorder (MDD), and training individuals to cognitively regulate negative emotions is at the core of cognitive behavioral therapy1. Surprisingly, recent work demonstrates that depressed individuals are less reactive to sad stimuli than healthy controls2. This finding suggests that MDD is characterized by emotional inflexibility. The amygdala is consistently implicated in emotional processing and is sensitive to top-down modulation via emotion regulation strategies in healthy controls3. Accordingly, the primary goal of this project is to test the hypothesis that the amygdala is insensitive to emotion regulation strategies in unmedicated, depressed adults. To achieve this goal, we are conducting a functional magnetic resonance imaging (fMRI) experiment that requires participants to control their reactions to emotional stimuli. This project is to test the hypothesis that the amygdala is insensitive to emotion regulation strategies in healthy controls.

Participants and Clinical Measures

• 13 depressed participants who met DSM-IV criteria for MDD (6 m, 7 f; mean ± SD age: 33.5 ± 11.9 yrs; education: 15.4 ± 2.0 yrs)
• 24 community controls (12 m, 12 f; mean ± SD age: 34.4 ± 14.9 yrs; education: 15.9 ± 1.5 yrs)
• After the MRI session, participants completed the Beck Depression Inventory (BDI), the Mood and Anxiety Symptoms Questionnaire (MASQ), the Ruminative Responses Scale (RRS), and the Emotion Regulation Questionnaire (ERQ). Relative to controls, the MDD group reported significantly higher scores on the BDI (26.5 ± 11.9 vs. 1.5 ± 2.0 yrs), all MASQ scales, and the RRS-Disinhibition and RRS-Distraction scales (p < .02). No significant differences emerged on the RRS-Reflection scale, the ERQ, or the Vividness of Visual Imagery Questionnaire, which was included to assess possible group differences in the ability to use imagery as a reappraisal technique.

Reappraisal and Memory Tasks

REAPPRaisal TASK

LOOK

REAL

Valence Rating

Valence Rating

PHOTO

Valence Rating

Confidence Rating

MEMORY TASK

GROUP TASK

CONFIDENCE

REAL vs. PHOTO

MDD GROUP

CONTROL GROUP

Group difference in negative trials only compare left (1st) bar, p < .05

Weak Right Amygdala Modulation in MDD

Negative/real - Negative/photo Contrast

CONTROL GROUP, p < .05

MDD GROUP, p < .05

No Effect of MDD on Valence Ratings or Memory

Summary & Conclusion

• MDD was associated with weak right amygdala modulation by reappraisal on trials featuring negative pictures, and this deficit increased with increasing depression severity
• Across groups, reappraisal recruited brain regions that support mental imagery (parietal cortex), self-referential processing (medial PFC), and arousal modulation (rostral ACC)
• Emotion and reappraisal modulated valence ratings, and emotion modulated memory, but neither valence ratings nor memory was influenced by depression
• MDD appears to be associated with loss of top-down control of the amygdala in the face of emotional provocation, and this may be susceptible to therapeutic intervention

Acknowledgements and References


References

Watson et al. (1995) J Abnorm Psychol 104: 3-14