Successful psychotherapy of depression in adolescents normalizes fronto-limbic resting-state connectivity

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Background: Current resting state imaging findings support suggestions that the neural signature of depression should be conceptualized as a network disorder rather than a dysfunction of specific brain regions. However, little is known about how changes in network connectivities are modulated by therapy, particularly not in adolescents. In this study, we compared neural connectivity of adolescent patients with depression (PAT) and matched healthy controls (HC) and analysed pre-to-post changes of PAT after participation in a brief cognitive behavioural group psychotherapy (CBT).

Methods: 38 adolescents (PAT: n=19; HC: n=19) between 13 to 18 years of age underwent an eyes-closed resting-state scan. PAT were scanned before (pre) and after (post) five sessions of CBT. Whole-brain resting-state functional connectivity was analysed for seeds in the right amygdala and the right subgenual anterior cingulate cortex (sgACC) and compared between groups. Symptom severity was assessed using the Beck Depression Inventory Revision.

Results: Psychological assessments demonstrated significant pre-to-post symptom reduction after CBT. In PAT pre-CBT as compared to post-CBT and also to HC, amygdala and sgACC connectivity was stronger with regions of the default mode network. Conversely, higher connectivity between amygdala, sgACC and regions of the task-positive- and salience network was observed in HC and also in PAT post-CBT as compared to PAT pre-CBT. Changes in connectivity of amygdala and sgACC with the dorsolateral prefrontal cortex correlated with pre-to-post symptom improvement and pre-treatment connectivity between these regions predicted treatment response in depressed adolescents.

Conclusions: Successful group psychotherapy of depression in adolescents led to an alignment of previously altered resting state network activation to healthy controls.