

Article: 0077

Topic: S27 - Symposium 29: Childhood trauma in severe mental disorders: clinical expression and mechanisms

The Effects of Childhood Trauma On Limbic Structure and Connectivity: a Multimodal MRI Study in Healthy Subjects

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Background: Childhood trauma (CT) is known to impact brain structure and function and is a major risk factor for most of the psychiatric conditions. However, there are few multimodal studies allowing an integrated perspective. Our goal was thus to study the effects of CT on the limbic network using multimodal MRI.

Methods: We obtained multimodal MRI (T1, diffusion weighted, and resting state fMRI) data from 55 healthy subjects. We performed correlational analyses between Childhood Trauma Questionnaire (CTQ) subscores and anatomo-functional measurements of the limbic network (hippocampal and amygdala volumes, functional connectivity between hippocampus or amygdala with ventromedial prefrontal cortex and fractional anisotropy (FA) in the Uncinate Fasciculus (UF).

Results: Significant associations of CTQ subscores were found with changes in limbic anatomy, functional and structural connectivity. We observed a positive correlation between CTQ subscores and left amygdala volumes, negative correlations with right amygdala and hippocampus (bilateral) volumes as well negative correlations with left prefrontal-amygdala functional connectivity and with FA in right UF fibers.

Conclusions: The present study provides new evidences that childhood adversity may be associated with structure and connectivity of the limbic system. Future longitudinal studies may be valuable to further understand the timing effects of CT on the limbic structures and also to obtain a more precise insight about the relation among CT, limbic alterations and the etiology of psychiatric disorders.