

The relationship between negative life events and cortical structural connectivity in adolescents

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Adolescence is a crucial period for physical and psychological development. The impact of negative life events represents a risk factor for the onset of neuropsychiatric disorders. This study aims to investigate the relationship between negative life events and structural brain connectivity, considering both graph theory and connectivity strength. A group ($n = 487$) of adolescents from the IMAGEN Consortium was divided into Low and High Stress groups. Brain networks were extracted at an individual level, based on morphological similarity between grey matter regions with regions defined using an atlas-based region of interest (ROI) approach. Between-group comparisons were performed with global and local graph theory measures in a range of sparsity levels. The analysis was also performed in a larger sample of adolescents ($n = 976$) to examine linear correlations between stress level and network measures. Connectivity strength differences were investigated with network-based statistics. Negative life events were not found to be a factor influencing global network measures at any sparsity level. At local network level, between-group differences were found in centrality measures of the left somato-motor network (a decrease of betweenness centrality was seen at sparsity 5%), of the bilateral central visual and the left dorsal attention network (increase of degree at sparsity 10% at sparsity 30% respectively). Network-based statistics analysis showed an increase in connectivity strength in the High stress group in edges connecting the dorsal attention, limbic and salience networks. This study suggests negative life events alone do not alter structural connectivity globally, but they are associated to connectivity properties in areas involved in emotion and attention.