Resting-state fMRI Study of Pediatric Post-Traumatic Stress Disorder: Preprocessing Optimization and Clinical Observations

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Resting-state functional magnetic resonance imaging (rs-fMRI) is a reliable technique to map the functional organization of the brain particularly useful for a clinical setting as it does not rely on task performance, contrary to task fMRI. Rs-fMRI can shed light on the underlying neuronal differences between pPTSD patients and healthy controls. This modality, however, suffers from many artifacts arising from in-scanner motion and the patient's physiology (breathing and heart rate changes). Another drawback is a lack of standardization in the pre-processing and the processing of the data. Finding the optimum pre-processing pipeline is key to obtaining the best and the most consistent results that will lead to a better understanding of the brain.

One interesting patient population to study is pediatric post-traumatic stress disorder (pPTSD), which is a mental illness that currently has relatively few treatment options. Behavioral therapy shows modest effect sizes, while no medication has been proven to treat PTSD in youth. Developing new therapies requires a better understanding of the underlying neural substrates of pediatric PTSD. Using rs-fMRI to study pPTSD is both novel and challenging. It is novel because, to date, there have been no reports of rs-fMRI in pPTSD, and it is challenging because pediatric populations are more difficult to study due to a higher amount of motion.

The *goals* of this study are:

1/ Assessing the test-retest reliability of rs-fMRI

2/ Creating motion correction methods and the best possible pipeline to obtain the best connectivity estimates

3/ Estimating functional connectivity differences between pPTSD patients and healthy controls

4/ Studying the influence of different behavioral measures on pPTSD connectivity patterns