The socially anxious brain: EEG functional connectivity and network topology

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**Background**: Social anxiety disorder is one of the most common and disabling anxiety disorders, characterized by a persistent fear and avoidance of social and performance situations. To gain insight into the etiology of social anxiety, it is important to know how the socially anxious brain functions during rest as well as how it processes socially threatening information.

**Methods**: In the current investigation we employed graph theoretical measures to characterize EEG alpha band neural network topology in high socially anxious (HSA) females (n=21) and age-matched low socially anxious (LSA) female controls (n=32). Neural networks were examined during a resting-state (using phase lag index), as well as when participants were anticipating performing in a socially threatening task. In addition, we investigated the change in network topology over time by examining the start and end of both resting-state and anticipation measurements (using minimum spanning tree).

**Results**: Results indicated that HSA females exhibited decreased long-range functional connectivity at the end of the resting-state but not during threat anticipation, as compared to LSA females. Moreover, HSA females showed decreased importance of the posterior hub during the resting-state, as indicated by lower degree distribution (number of paths connected to the node).

**Conclusions**: The decreased long-range functional connectivity during resting-state might reflect decreased integration of information in HSA females as compared to LSA females. The decreased importance of the posterior hub in HSA females is interpreted to suggest an information overload of the posterior hub, causing a decrease in global processing efficiency in posterior neural networks in social anxiety. Together, this investigation suggests abnormalities in alpha-band specific neural network organization in social anxiety and may set the stage for future studies that could relate these abnormalities to biased cognitions in social anxiety disorder.