Intrinsic Functional Connectivity of the Striatum in Developing Adolescents

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Presentation Abstract Summary The striatum is a system of nuclei within the basal ganglia hypothesized to integrate input from sensorimotor, limbic and executive cortical networks for context-sensitive action selection via recurrent striatal-thalamic-cortical projections. Classical anatomical studies have suggested a topographic organization of function in the striatum. However, the depth of detail of striatal functional topography and how it changes postpubertal development remains poorly understood. In this paper, we implement masked Independent Component Analysis (mICA) on resting state functional Magnetic Resonance Imaging (fMRI) collected from 135 youths (ages 11-14) that had completed survey assessments of pubertal stage and predisposition for future risky behaviors. Split-half sampling revealed the fidelity of intrinsic striatal networks shared across youths plummets beyond estimates of 8 ICs. Striatal-cortical connectivity increased in a posterior-to-anterior gradient as a function of age and pubertal onset. Higher connectivity between the medial caudate and medial prefrontal cortex was present in more mature children and inversely correlated with risk for future adverse outcomes. Our results suggest delayed onset of refinement in connectivity between reinforcement learning brain areas predicts a proneness towards later risky behavior in adolescents. Overall, these methods demonstrate the utility of mICA and split-half sampling for reproducible functional parcellations of brain structures.

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