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Characterizing effects of age, sex, and psychosis symptoms on thalamocortical functional connectivity in youth

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The thalamus is composed of multiple nuclei densely connected with the cortex in an organized manner. Thalamocortical dysconnectivity is present in multiple neurodevelopmental disorders including schizophrenia and autism. To understand how these networks are abnormal in neurodevelopmental disorders, it is important to understand typical development. The present study characterized age effects, sex effects and effects of clinical symptomatology in anatomically constrained thalamocortical networks in a large community sample of youth from the Philadelphia Neurodevelopmental Cohort (PNC). In 1100 youth aged 8-21, we characterized age and sex effects in six thalamocortical networks using complementary region-of-interest (ROI) and voxel-wise analyses. To characterize effects of clinical symptomatology, we separated youth into three groups based on their clinical symptoms (typically developing youth, n = 298; psychosis spectrum youth, n = 320; youth with other psychopathologies, n = 482). Sensory/motor thalamocortical networks showed a negative effect of age. Unexpectedly, frontal thalamocortical networks showed no effect of age. Females had greater connectivity with the visual cortex, while males showed greater connectivity with the orbitofrontal cortex. Typically developing youth showing subtle signs of greater connectivity compared to psychosis spectrum youth. Characterizing typical development of thalamocortical networks provides an anchor for conceptualizing these networks in neurodevelopmental disorders.

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