Socioeconomic Resources are Associated with Distributed Alterations of the Brain's Intrinsic Functional Architecture in Youth

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Little is known about how exposure to limited socioeconomic resources (SER) in childhood gets "under the skin" to shape brain development, especially using rigorous whole-brain multivariate methods in large, adequately powered samples. The present study examines resting state functional connectivity patterns from 5,821 youth in the Adolescent Brain Cognitive Development (ABCD) study, employing multivariate methods across three levels: whole-brain, network-wise, and connection-wise. Results support three key findings: First, across all three levels, SER was robustly associated with connectivity, with individual differences in functional connectivity accounting for 9.0% of the variance in SER scores—a sizable effect for the social sciences. Second, parental education was the primary driver of neural associations with SER. Moreover, these associations were partially accounted for by contextual factors including home enrichment activities, child's cognitive abilities, and child's grades, indicating interwoven links between parental education, child stimulation, and child cognitive performance. Third, neural associations with SER were massively distributed across the brain with modestly elevated concentration in certain broad systems, but no evidence for selective localization within discrete regions. We propose that the effects of socioeconomic exposures on the developing connectome should be reconceptualized away from a localized "discrete circuit" model in favor of a distributed "omni-connectic" model, analogous to omnigenic models that are increasingly favored in genetics.

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