Neighborhood conditions associated with children's cognitive function

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A study published today in *JAMA Network Open* shows that children from poorer neighborhoods perform less well on a range of cognitive functions, such as verbal ability, reading skills, memory, and attention, and have smaller brain volumes in key cognitive regions compared to those from wealthier neighborhoods.

While multiple studies have shown that household socioeconomic status affects a child's cognitive development, less is known about the effect of the broader neighborhood context. By revealing a role that the neighborhood environment may play in shaping brain development, research findings can inform interventions aimed at improving outcomes for children from disadvantaged backgrounds. The study is funded by the National Institute on Drug Abuse, and nine other institutes, centers, and offices that are part of the National Institutes of Health.

The researchers analyzed data from the Adolescent Brain Cognitive Development (ABCD) Study, which focuses on how environmental and biological factors influence adolescent development. The team looked at data from brain imaging and neurocognitive testing from 11,875 9- and 10-year-old children (48% female) from 21 sites within the United States, largely reflecting urban and suburban areas.

The researchers found that youth living in high poverty neighborhoods had lower volumes of certain brain regions, partially explaining the possible relationship between high neighborhood poverty and lower scores on cognitive tests. The affected areas of the brain were in the prefrontal cortex and the hippocampus, areas known to be involved in language and memory. The differences in volume were significant even after the researchers adjusted for the effects of household income. For every unit increase in neighborhood poverty, children scored 3.22 points lower on cognitive testing, even when accounting for household income.

While other studies have found poorer school and cognitive performance among children raised in impoverished environments, this study shines a light on the specific importance of the neighborhood context in a child's development, regardless of that child's household income. The study's findings suggest that policies that address uneven distribution of resources among neighborhoods may help lessen imbalances in cognitive performance. Additional research is needed to identify which neighborhood characteristics, such as school funding or environmental pollution, may influence children's brain and cognitive development.

The ABCD Study, the largest of its kind in the United States, is tracking nearly 12,000 youth as they grow into young adults. Investigators regularly measure participants' brain structure and activity using magnetic resonance imaging (MRI) machines, and collect psychological, environmental, and cognitive information, as well as biological samples. The goal of the study is to

define standards for normal brain and cognitive development and to identify factors that can enhance or disrupt a young person's life trajectory.

More information: Rita L. Taylor et al. Assessment of Neighborhood Poverty, Cognitive Function, and Prefrontal and Hippocampal Volumes in Children, *JAMA Network Open* (2020). DOI: 10.1001/jamanetworkopen.2020.23774

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