

Anti-poverty programs may help reduce disparities in brain development and mental health symptoms in children

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States that provide stronger social safety nets have lower socioeconomic disparities in the brain development and mental health of children 9 to

11 years old, according to research supported by the National Institute on Drug Abuse (NIDA) at the National Institutes of Health. The disparity in brain structure between children from high- versus low-income households was more than a third lower in states with greater cash assistance than in those offering less, and the disparity in mental health symptoms was reduced by nearly a half.

The study, published in *Nature Communications*, highlights the impact that socioeconomic inequities can have on a child's [brain](#) development, but demonstrates that this gap can be mitigated through state anti-poverty programs, such as Earned Income Tax Credit, Temporary Assistance for Needy Families, and Medicaid.

The findings reflect data from the large, multisite Adolescent Brain Cognitive Development Study (ABCD Study), led by NIDA. Researchers from Harvard University in Cambridge, Mass., and Washington University, St. Louis, analyzed ABCD Study data from more than 10,000 youth across 17 [states](#) that differ in their cost of living and anti-poverty policies.

Emerging evidence has shown that children from families with lower income relative to children from families with higher income exhibit smaller hippocampal volume. The hippocampus plays a critical role in memory and emotional learning.

"Multiple studies have found associations between the brain changes shown in this research and meaningful impacts such as low test scores, lack of school readiness, and [risk factors](#) for [mood disorders](#)," said NIDA Director Nora Volkow, M.D. "Investigating the policy factors that are associated with [brain development](#) and [mental health](#) is an important part of better understanding health inequities that impact people throughout their lives, starting in critical periods of development."

Replicating findings from smaller studies, the research team first validated that lower family income is associated with smaller hippocampal volume and more symptoms of mental health conditions like anxiety, depression, aggression, impulsivity, and inattention among the 9- to 11-year-old participants. They expected these disparities among families with a high versus low income to be exacerbated in more expensive states, where the high cost of living places additional strain on [low-income households](#).

As hypothesized, differences in hippocampal volume between children from high- and low-income families were greater in states with a higher cost of living. However, the availability and benefit value of monetary assistance programs in higher cost-of-living states reduced this disparity by 34%, and similarly, in states with Medicaid expansion, the disparity was reduced by 43%. Overall, more expensive cost-of-living states with anti-poverty programs in more expensive states had narrower gaps in income-associated differences in brain structure. Similar levels were observed in states with the lowest cost of living.

Additionally, the income-associated disparity in some mental health symptoms like anxiety and depression was 48% lower in expensive states with larger cash benefits than in states with lower cash benefits. These patterns remained significant when controlling for numerous state-level social, economic, and political characteristics, including population density, education equity, incarceration rates, and gender equity.

"The association between [brain structure](#) and a low-resource environment is not an inevitability," said study author David Weissman, Ph.D., a postdoctoral fellow in the Stress and Development Lab at Harvard University. "Children's brains are undergoing substantial development and have enhanced plasticity or capacity for further change based on their environment. These data suggest that policies and programs that work to reduce social and health inequities can directly

reach children in disadvantaged environments and help support their mental health."

More information: DG Weissman, et al, State-level macro-economic factors moderate the association of low income with brain structure and mental health in U.S. children, *Nature Communications* (2023). [DOI: 10.1038/s41467-023-37778-1](https://doi.org/10.1038/s41467-023-37778-1), www.nature.com/articles/s41467-023-37778-1

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