

Racial disparities in childhood adversity linked to brain structural differences in US children

February 1 2023



Credit: Pixabay/CC0 Public Domain

Black children in the United States are more likely to experience childhood adversity than white children, and these disparities are

reflected in differential changes to regions of the brain linked to psychiatric disease like post-traumatic stress disorder (PTSD), according to new research led by McLean Hospital, a member of Mass General Brigham.

The findings, published February 1 in the *American Journal of Psychiatry*, suggest that adversity may act as a toxic stressor to regions of the brain related to threat processing and that this exposure is disproportionately seen in Black children. The authors added that their study provides additional evidence contradicting the pseudoscientific falsehood that there are inherent race-related differences found in the brain and instead emphasizes the role of adversity brought on by structural racism.

For the study, led by Nathaniel Harnett, Ph.D., director of the Neurobiology of Affective Traumatic Experiences Laboratory at McLean Hospital, researchers analyzed surveys and MRI brain scans of more than 7,300 white children and nearly 1,800 Black children in the U.S. who were 9 and 10 years old. They found Black children displayed small neurobiological differences reflected as lower gray matter volumes in the amygdala, hippocampus and prefrontal cortex than white children. Their analysis also revealed that experiencing adversity was the significant differentiating factor, with [household income](#) the most common predictor of brain volume differences.

"Our research provides substantial evidence of the effects structural racism can have on a child's developing brain, and these small differences may be meaningful for their [mental health](#) and well-being through adulthood," said Dr. Harnett, who is also an assistant professor in psychiatry at Harvard Medical School.

"The dataset in our study included children younger than 10 years old—children who have no choice in where they are born, who their

parents are and how much adversity they are exposed to. These findings offer another chilling reminder of the public health impact of structural racism, and how crucial it is to address these disparities in a meaningful way."

Mining data for social determinants of adversity and impact on brain

In the US, there are stark racial disparities in the distribution of economic resources, exposure to stress, and psychiatric disorder prevalence. To date, limited research has investigated how racial inequities in the social determinants of health may lead to changes in the brain for different groups.

This led Dr. Harnett and colleagues at McLean's Neurobiology of Fear Laboratory to leverage strong datasets to look for potential race-related differences in the neurobiology of psychiatric disorders and how racial structural inequities may explain these differences.

The researchers reviewed data from the 2019 Adolescent Brain and Cognitive Development (ABCD) Study, a large-scale MRI research effort that included nearly 12,000 U.S. children between the ages of 9 and 10 from 21 sites across the country. Study participants' parents filled out surveys assessing parent and child race and ethnicity; parental education, employment and [family income](#); and other variables. Children also completed assessments that captured emotional and physical conflicts within their household. Also included were measures of neighborhood disadvantage using the Area Deprivation Index, which utilizes 17 socioeconomic indicators from the U.S. Census, including poverty and housing, that characterize a given neighborhood.

The analysis found that [white children](#)'s parents were three times more

likely to be currently employed than Black children's parents. White children's parents also attained a higher level of education and had greater family income than Black children's parents. Specifically, about 75 percent of white parents had a college degree, compared with nearly 41 percent of Black parents, and about 88 percent of white parents made \$35,000 a year or more, compared with about 47 percent of Black parents. White children also experienced less family conflict, less material hardship, less neighborhood disadvantage and fewer traumatic events compared with Black children.

When assessing corresponding MRI data, experiencing childhood adversity was associated with lower gray matter volumes in the amygdala, hippocampus and prefrontal cortex—effects more likely to be seen in Black children. The amygdala plays an important role in the learning of a fear response, the hippocampus in memory formation, and the [prefrontal cortex](#) is what regulates the emotional and threat response to fear.

The researchers observed neurobiological effects tied to most adversity indicators with income being the most frequent predictor, affecting gray matter volume in eight of 14 regions of the brain studied. Trauma history and family conflict were not related to gray matter volume in any of the models; however, the researchers note that doesn't necessarily reflect that there is no neurobiological impact from those adversities.

"The overall differences in the brain were small and partially accounted for by the differences seen in socioeconomic status, which is important," said Dr. Harnett. "We were not looking at completely different species of people—the disparities in lived adversity is what drove these differences."

Additional analysis factoring in previous studies on PTSD and regions of the brain found Black children had significantly greater PTSD symptom

severity, and symptom severity was further predicted by adversity.

Future study of neurobiological impact of structural racism

Future research from this team will build upon these findings and expand their data collection beyond the ages included in this study in an effort to track the neurobiological impact racial disparities in adversity have throughout a lifetime. The researchers also hope to determine whether exposure to adversity may accelerate or decelerate aging in the brain, and whether additional measures of adversity not included in this study may impact these regions of the [brain](#) or others involved in psychiatric disorders.

"These findings may just be the tip of the iceberg," said Dr. Harnett.

More information: Racial Disparities in Adversity During Childhood and the False Appearance of Race-Related Differences in Brain Structure, *American Journal of Psychiatry* (2023). [DOI: 10.1176/appi.ajp.21090961](#)

Provided by McLean Hospital

Citation: Racial disparities in childhood adversity linked to brain structural differences in US children (2023, February 1) retrieved 26 April 2024 from <https://medicalxpress.com/news/2023-01-racial-disparities-childhood-adversity-linked.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--