Racial bias and discrimination among women of color can impact their baby's biological clock

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Two people of the same age can look and act very differently in terms of how old they seem. The secret lies in their "biological age," a measure of cell and tissue health.

In a recent study, CU Boulder and Anschutz Medical Campus researchers revealed that children born to women who had experienced higher levels of racial discrimination and bias throughout their lives have a younger biological age than their calendar age. While additional research is required to understand the long-term implications of slower biological aging, these findings could indicate delayed or disrupted development.

The study appears in *Annals of Epidemiology*.

"It's troubling that negative social experiences can get under the skin," said the paper's first author, Zachery Laubach, a postdoctoral fellow in the Department of Ecology and Evolutionary Biology at CU Boulder. "These children don't have control over what their mothers may have experienced, but they can still be affected. During early development, there are lots of biological systems that are undergoing rapid changes. Any deviation in the process may put development out of sync and cause long-term problems."

Biological clock

Scientists measure a person's biological age, also referred to as epigenetic age acceleration in this study, by looking at changes in the body's DNA patterns. These changes occur naturally with age, but they can also result from stress and unhealthy behaviors like smoking. Previous research has shown that accelerated epigenetic aging—when a person's biological age is older than their chronological age—is linked to higher mortality risk and a variety of health problems, such as cognitive impairment and cardiovascular disease.

But these studies have mostly focused on teenagers and adults. The CU team was curious about what biological aging looks like in young children. Specifically, they wanted to investigate if negative maternal experiences could have lasting impacts on the next generation. Only a few studies have explored this question to date, and the results have been inconclusive.

The team collected data from 205 mothers in the U.S. who self-identified as racial or ethnic minorities. They collected data on the mothers' experiences of racial bias or discrimination throughout their lives. By analyzing the children's blood samples, the team found that children born to women who experienced high levels of racial bias or discrimination had slower epigenetic acceleration, meaning their biological age was younger than their chronological age. This association was particularly prominent during early to mid-childhood between ages 3 to 7.

Out of sync

The result surprised the paper's corresponding author, Wei Perng, associate professor of epidemiology at the CU Anschutz Medical Campus. Negative social experiences tend to be associated with faster epigenetic acceleration and poorer health outcomes based on previous research in adults.

However, among young children, it is unclear what health impacts a slower epigenetic acceleration might have later in life. Laubach suggested that the difference in aging rates could indicate disruptions in early development.

"We show that epigenetic aging isn't just about what happens to you or what you do; it's also about what happened to your mom and maybe your grandma," said Perng. "There is an intergenerational cycle that can

promote health or lead to greater chronic disease risk."

The team hopes to continue tracking the health status of these children, who are now in their 20s, throughout their lives.

"This work highlights that it's important for us to be cognizant of the effects of structural and social factors on maternal and child health. We hope this research will spark future studies linking epigenetic aging to a clinically relevant outcome for children," Perng said.

More information: Zachary M. Laubach et al, Maternal prenatal social experiences and offspring epigenetic age acceleration from birth to mid-childhood, *Annals of Epidemiology* (2023). DOI: 10.1016/j.annepidem.2023.10.003

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