

Children Growing Up in Socioeconomically Disadvantaged Families and from Marginalized Racial/Ethnic Groups Tend to Have Epigenetic Profiles Associated with a Faster Pace of Biological Aging

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INTRODUCTION

The cognitive processes children use to learn, pay attention, remember, and make decisions can be harmed if their environment is stressful or lacks learning opportunities. Children endure stressful environments when they experience such things as limited access to high-quality childcare, educational resources, health care, and nutrition. They also experience stressful environments if they are exposed to family stress, toxic chemicals, and neighborhood threats. Children with social advantages in the United States, particularly those with White identity, or White privilege, are less likely to experience stressful environments because they have benefited from generations of social and legal advantages resulting from classism and racism. Children who identify as Black and of Latin American origin (or Latinx), on the other hand, are more likely to experience stressful environments and more limited learning opportunities.

Scientists can measure environmental effects, including stress, by looking at a child's *epigenetic profile*—a score based on markers on the DNA that turn genes “on” or “off.” Epigenetic profiles change as children develop, and can be negatively affected by stressful environments. Previous research with adults has shown that certain epigenetic profiles are associated with negative health outcomes such as increased inflammation (an indicator of stress) and a faster pace of biological aging. Adults who have epigenetic markers of a faster pace of biological aging are more likely to develop health issues such as heart disease, cognitive impairments, as well as earlier death, compared to adults with a slower pace of biological aging.

By analyzing epigenetic profiles in children, scientists can investigate whether associations between epigenetics and negative health outcomes found for adults may begin in childhood. If the associations

KEY FINDINGS

- ▶ **Epigenetic profiles of children from disadvantaged backgrounds looked worse than those of other children.** That is, children growing up in more socioeconomically disadvantaged families and neighborhoods and children from marginalized racial/ethnic groups exhibited epigenetic profiles that, in previous studies of adults, were associated with:
 - ▶ a faster pace of biological aging (*see figure*),
 - ▶ higher chronic inflammation, and
 - ▶ lower cognitive functioning.
- ▶ **Children's epigenetic profiles were associated with their performance on tests of cognitive and academic skills**, including processing speed, general executive function, perceptual reasoning, verbal comprehension, reading, and math. Children with epigenetic profiles associated with chronic inflammation had worse outcomes.
- ▶ These findings from epigenetic profiles support the notion that **cognitive function, illness, and death in adulthood are partially driven by molecular processes that begin in childhood.**

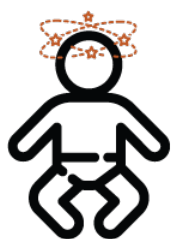
INTRODUCTION, CONT.

exist, it is evidence that social inequalities experienced in childhood are carried forward into adulthood in the form of worse health outcomes.

This brief reports on a recent study [1] in which the authors took epigenetic samples from the saliva of young people participating in the Texas Twin Project, a study following twins over time. In the current study, 1,183 participated; they ranged in age from 8 to 19 years, and had an average age of 14. The authors created epigenetic profiles and compared them to profiles that were originally developed for adults to predict the pace of biological aging, chronic inflammation, and cognitive function.

Children from disadvantaged backgrounds tended to have epigenetic profiles associated with a faster pace of biological aging, which in turn can lead to worse health and earlier death

Stressful childhood conditions



Faster pace of biological aging



Worse health and earlier death



POLICY IMPLICATIONS

Epigenetic profiles are a promising tool and can help us link adult aging to early child experiences to better understand how social inequalities become embedded in the body and impact the mind across the lifespan. To decrease disparities in the cognitive and physical health of adults, interventions need to start in childhood. These interventions would seek to improve children's educational opportunities and nutrition, while also seeking to reduce their family stress and exposure to air pollution and other environmental toxicants.

REFERENCE

[1] Raffington, L., Tanksley, P.T., Sabhlok, A., Vinnik, L., Mallard, T., King, L.S., Goosby, B., Harden, K.P., & Tucker-Drob, E.M. (2023). Socially stratified epigenetic profiles are associated with cognitive functioning in children and adolescents. *Psychological Science*, 34(2):170-185. <https://doi.org/10.1177/09567976221122760>

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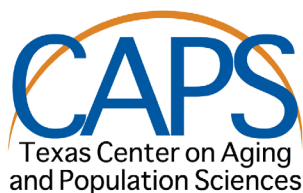
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