

Study links insulin resistance and advanced cell aging with childhood poverty

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Black adolescents who lived in poverty and were less optimistic about the future showed accelerated aging in their immune cells and were more likely to have elevated insulin resistance at ages 25-29, researchers have

found.

Allen W. Barton, a professor of human development and family studies at the University of Illinois Urbana-Champaign is the first author of the study, which tracked the health of 342 African Americans for 20 years, from adolescence to their mid- to late twenties. The researchers' goal was to explore links between the individuals' childhood social environment and [insulin resistance](#), a precursor to diabetes where cells don't respond well to insulin or use blood glucose for energy.

The participants lived in rural Georgia, a region with one of the highest poverty rates and shortest life expectancies in the U.S.

"Once we found some compelling evidence that family poverty during childhood was associated with participants' insulin resistance in their late 20s, we looked at immune cell aging as a possible mediator, something that transmits the effect," Barton said. "And we found support for that. Immune cell aging was a pathway, a mechanism through which poverty was associated with insulin resistance."

Published in the journal *Child Development*, the findings support the hypothesis that chronic diseases such as diabetes and [metabolic syndrome](#) that occur at significantly higher rates among Black adults and low-income populations may partially originate with experiences much earlier in life—even during childhood—and that such disadvantages can influence individuals' cognition and physiology.

"Understanding these [health disparities](#) associated with [race](#) and socioeconomic status really requires a developmental perspective, but prospective research with these populations is sparse," Barton said.

"In addition to focusing on contemporaneous stressors—such as their [socioeconomic status](#) in adulthood, where they currently live and their

access to health care—prospective studies like this that follow participants into adulthood are important to explore developmental pathways originating in childhood to see associations between individuals' early social environment and their subsequent health outcomes as adults," he said.

Recent research cited in the current study also indicates that Type 2 diabetes and other diseases are affecting certain populations—especially Blacks—at much younger ages.

Data used in the new study were drawn from the Strong African American Families Healthy Adult Project, also called SHAPE, that enrolled 667 Black fifth-grade students and their caregivers. SHAPE began collecting data in 2001.

Young adults in the sample provided at least one blood sample at age 20 and again between the ages of 25-29. From these samples, researchers assessed participants' biological age using DNA methylation and compared this age with their chronological age. Participants' blood samples also were used to quantify their levels of insulin resistance at ages 25, 27 and 29.

At six time points, beginning when the children were 11 and continuing through age 18, the caregivers completed questionnaires about their family's need-to-income ratios, which were used to calculate their poverty status and the number of years they lived below the federal poverty level.

Three times from the ages of 16-18, the youths completed the Perceived Life Chances Scale, a 10-item inventory that asked them whether they believed they would go to college or obtain a job that paid well, and how likely that was.

In their initial analyses, the researchers found that living in poverty between ages 11-18 was associated with insulin resistance at ages 25-29. The longer participants lived in poverty during adolescence, the higher their risk of insulin resistance and [diabetes](#) in adulthood, the researchers found. This risk was calculated using a Homeostatic Model of Insulin Resistance, or HOMA, score. Each additional year of poverty was associated with a greater than one-point higher HOMA score.

When the children reached age 19-20, the researchers examined DNA methylation in a subset of participants. DNA methylation is a natural process associated with aging that can affect gene function.

When the researchers also considered whether the teens believed they could reach their goals as adults, they found that more years spent living in [poverty](#) was associated with fewer perceived life chances. The team found associations between youths' perceived life chances and premature immune cell aging at 20 years old, which was then linked to insulin resistance, Barton said.

"We don't know what may have happened to them prior to age 11, so perhaps there were things put in place that we just can't assess yet," Barton said about the study's limitations.

The researchers continue to follow the sample individuals and are exploring the role of resilience in participants' health outcomes as they age, he said.

"It's a tremendous data set and can begin to answer some important public health questions, shed light on some of these racial disparities and help find ways to mitigate them," Barton said.

Co-authors of the study include research scientist Tianyi Yu and Gene H. Brody, the founder and co-director of the Center for Family

Research, both at the University of Georgia; psychology professors Edith Chen and Gregory E. Miller, who co-direct the Foundations of Health Research Center at Northwestern University; and Qiujie Gong, a predoctoral fellow at the U. of I.

More information: Allen W. Barton et al, Childhood poverty, immune cell aging, and African Americans' insulin resistance: A prospective study, *Child Development* (2022). [DOI: 10.1111/cdev.13795](https://doi.org/10.1111/cdev.13795)

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