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Weathering: How racism impacts the body on a cellular level

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We know health outcomes frequently differ based on race. The 'Weathering theory' could help explain why, at least in the US.



Although it is not new, the concept of weathering gained interest in 2020 after the death of George Floyd and amid a pandemic that laid bare race-based health inequities
Image: Christoph Soeder/dpa/picture alliance

Rocks, soils and minerals — the elements that make up the land we live upon — have no protection from the weather. They are struck by lightning, flooded by rains and baked by blistering sunlight. This natural process, which represents the gradual chipping away of the surface of our Earth, is called weathering.

Over the past two decades, and particularly in the past few years, public health researchers have been using this term in a different context: to describe a process they say occurs in the bodies of Black people who grow up in white American society.

The theory is gaining traction — data from 2021 found deaths due to Covid-19 were 2.8 times higher in Black/African Americans compared to whites, and [studies](#) [↗](#) have linked this to weathering.

The term "weathering" was first used in the context of public health by Arline Geronimus, now a professor of Health Behavior and Health Education at the University of Michigan in the US. While facilitating [research](#) [↗](#) on teenage mothers in the 1990s, she came upon an unexpected finding: babies born to Black mothers in their 20s and 30s had more [health complications](#) than those born to mothers in their teens. This was the opposite of what was observed in white women, who tended to have better outcomes if they gave birth in their 20s and 30s compared to Black women.

Geronimus concluded that the health of Black women deteriorated more quickly than their white counterparts because of racism-induced stress experience in their daily lives.





Geronimus found that Black teenage mothers had better health outcomes than Black mothers in their 20s

Image: Armsamsung/Pond5 Images/IMAGO

'Wear and tear' on the body

Years of research appear to have given credibility to her theory.

Around the same time as Geronimus's initial findings, researchers who study chronic stress introduced the concept of allostatic load, which refers to the 'wear and tear' to the body caused by stress.

A person's allostatic load can be quantified by measuring their levels of a series of different indicators: cortisol, dehydroepiandrosterone (DHEA), epinephrine, norepinephrine, cholesterol, glycosylated hemoglobin, resting systolic and diastolic blood pressure, body mass index, and waist-hip ratio. A high allostatic load is linked to many health problems like [migraine](#) and heart disease.

The higher a person's score, the more likely they are to experience negative health effects. In a 2006 [paper](#) [↗](#), Geronimus and her team set out to measure peoples' allostatic load scores.

They found that the differences in these scores between Black and white and wealthy and poor participants started to widen in their early 20s and grew largest between the ages of 35 and 64. Blacks had higher scores across the board than white participants.

What backed up Geronimus' theory was that these differences could not be connected to poverty: Black women, regardless of income status, were most likely to have high scores, before poor white men and women and poor Black men.

The 'caps' that indicate aging

In recent years, scientists have also started measuring telomeres to better understand weathering. Telomeres are "caps" on the ends of our chromosomes that play a key role in the process of aging. They protect our chromosomes during cell division, like the plastic on the ends of a shoelace protects it from unraveling.

The more our cells divide, the shorter the telomeres become. Once the telomeres are gone, the cell division process ends and they die. Once that happens, our tissues start to age.

That's why the length of our telomeres is relevant for studying aging. The longer they are, the longer it takes for us to experience the detrimental side effects of getting old.

A 2014 [Harvard study](#) [↗](#) found that although telomere length in young Black adults in their 20s was longer than those of their white counterparts, lengths evened out among 50-60-year-olds, indicating the Black adults were aging at a quicker rate. Among 80-year-olds, whites had longer telomeres than the Black participants.





Although Black people often have longer telomeres when they are young, as they get older, their telomeres shorten to the same length as, or smaller than, their white counterparts

Image: Yuri Arcurs/Zoonar II/Imago Images

Weathering across the globe?

Most of the research on weathering so far has been conducted in the US, meaning it's difficult to generalize the theory to other countries round the world.

But Devon Payne-Sturges, a professor at the Maryland Institute for Applied Environmental Health, said it is likely that weathering is occurring "anywhere where you have this social hierarchy where you have a group of people who are discriminated against, put at the bottom of society, more marginalized," she said. "I'm afraid that's just about everywhere."

One thing that could be preventing the concept of weathering from study at an international level could be a lack of data on race. In the US, health data accessed by researchers includes sections that denote race. That is not the case in countries [like Germany](#).

Although it took time — some three decades — to catch on in the US (Geronimus published a book that received widespread media attention in 2023), the concept of weathering could, with more research, help explain race-based health disparities across the globe.

That information could lead to conclusions on how to [improve health](#) in minority groups. One [study](#)  is already on its way: A survey of indigenous mothers in New Zealand found that those who said they had experienced an "ethnically motivated physical attack" had children with shorter telomeres than mothers who didn't report such an attack.

The paper noted that conversely, mothers who had positive feelings about their culture gave birth to babies with "significantly longer" telomeres.

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