

Healthy eating and activity reverse aging marker in kids with obesity, study finds

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A genetic marker linked to premature aging was reversed in children with obesity during a six-month diet and exercise program, according to a recent study led by the Stanford School of Medicine.

Children's telomeres—protective molecular "caps" on the chromosomes—were longer during the weight management program, then were shorter again in the year after the program ended, the study found. [The research](#) was published last month in *Pediatric Obesity*.

Like the solid segment at the end of a shoelace, telomeres protect the ends of chromosomes from fraying. In all people, telomeres gradually shorten with aging. Various conditions, including obesity, cause premature shortening of the telomeres.

The new study is the first to link a behavioral eating and [physical activity program](#) for weight management in children with obesity to healthy changes in average telomere length. The discovery may help scientists understand how the biological benefits of losing weight, eating healthier and being more physically active occur.

The findings also imply that telomere length may be a good marker for measuring the benefits of healthy dietary changes, physical activity and weight management, as changes in telomere length appeared to be somewhat independent of traditional markers such as [body mass index](#).

"We saw that the recommended behaviors everyone knows about—eating fewer high-fat or high-sugar foods and fewer calories, increasing physical activity, and reducing [screen time](#)—can slow down biological aging associated with obesity in children," said the study's senior author, Thomas Robinson, MD, who is the Irving Schulman, MD, Professor in Child Health and a professor of pediatrics and of medicine.

"It's remarkable to see effects on the chromosomes with behavioral treatments," he said.

Understanding how behavior changes to reduce obesity are biologically linked with other conditions such as heart disease and diabetes would

help scientists understand how the process might be slowed or reversed.

"We know a lot about cardiovascular risk for adults, but for kids, we've just said 'obesity is bad,' yet we don't know, biologically, how cardiovascular risks linked to obesity start in children," said the study's lead author, David Rehkopf, ScD, associate professor of epidemiology and population health and of medicine.

"To have this biological measure with a strong genetic component turn out to be changeable when we give kids resources to be healthier, especially over a short period of time, was very interesting and exciting," Rehkopf said.

Measuring the benefits of diet and exercise

The study included 158 children, all of whom were 8 to 12 years old and had obesity, defined as a body mass index, or BMI, above the 95th percentile for their age and sex. Participants were 55% female and 52% Hispanic. Of these, 57% had severe obesity at the beginning of the study, meaning their BMI was more than 120% of the cutoff for obesity for their age and sex.

Each child participated with one parent in the six-month Pediatric Weight Control Program at Stanford Medicine Children's Health. Parents and children met regularly in groups led by a nutrition educator to learn about a "traffic light" approach to [healthy eating](#).

This method labels the healthiest foods as "green," less-healthy foods as "yellow" and the least-healthy foods as "red," and encourages participants to eat mostly foods designated green, smaller portions of those labeled yellow and fewer labeled red, without completely excluding any foods from the diet.

Participants also learned how to fit physical activity into their lives, reduce screen time and—for the adults—improve parenting practices to help their family reduce weight gain.

The children's telomere length was measured on white blood cells from samples collected before the [weight management](#) program began, at the end of the six-month program and one year after the program ended. Children's body mass index, waist circumference and triceps skinfold thickness (a measure of body fat level) were measured at the same intervals.

Children lost weight during the six-month intervention, with their mean BMI decreasing by about one unit. Their waist circumference and triceps skinfold thickness also decreased. By one year after the program ended, these changes were partially reversed. (At the conclusion of the six-month intervention, participants had been encouraged to maintain their lifestyle changes, but some degree of returning to old habits is common after a weight-loss program ends, the scientists noted.)

From baseline to the end of the six-month program, the children's average telomere length increased significantly. Over the following year, when their healthful habits and BMI were starting to reverse, the change in the average telomere length reversed. The fact that the researchers followed the same children over three points in time renders the result more convincing, they said.

"Most studies of telomeres have compared [older people](#) with younger ones, or sicker people with healthier people, at a single point in time," Robinson said. "Very few of these studies have followed people over time, especially children."

Average [telomere](#) length changed independently of a variety of other measures, including social, psychological, behavioral and physiological

markers, the researchers found. This suggests that [telomere length](#) may be a sensitive biomarker for the metabolic benefits of adopting healthy dietary and [physical activity](#) patterns, they said. Having a better way to measure these benefits could help motivate people who are trying to become healthier, and could reduce fixation on weight alone, which some people find stigmatizing rather than motivating.

"Telomere length seems to be a unique measure that is not just reflecting other changes we saw, which is why it may be a useful biomarker," Robinson said, adding that while future studies are needed for confirmation, "we think it is a measure that could go beyond BMI, blood glucose and blood lipids."

BMI—a height-to-weight ratio—is a useful measure but has been criticized for not always accurately reflecting individuals' health status, the scientists noted.

"I think that getting to why [obesity](#) matters in a molecular way will help us focus on what matters for health, and what resources people need to be healthier," Rehkopf said.

More information: David H. Rehkopf et al, Changes in leukocyte telomere length among children with obesity participating in a behavioural weight control program, *Pediatric Obesity* (2023). [DOI: 10.1111/ijpo.13082](#)

Provided by Stanford University Medical Center

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