

Adolescent obesity influenced by both community, genetics

June 20 2013, by April Reese Sorrow



Kandauda Wickrama, left, and Catherine O'Neal

(Medical Xpress)—Genetic sensitivity and community adversity combine to increase the risk of obesity among adolescents, according to new research published in the *Journal of Adolescent Health* by University of Georgia researchers Kandauda Wickrama and Catherine Walker O'Neal.

About 30 percent of adolescents are overweight or obese, according to the [Centers for Disease Control and Prevention](#).

"Research has shown community stress does influence weight gain, so we expected adverse communities to lead to higher levels of BMI," or [body mass index](#), said O'Neal, a postdoctoral fellow in the UGA College of Family and Consumer Sciences' department of human development and family science. "But now we know that if you have this genetic sensitivity, you have an increased risk, and we know a little bit better who in that community is most at risk."

Using 13 years of data collected through the National Longitudinal Study of Adolescent Health, researchers examined a sample of 14,563 adolescents to determine risk over time. Genetic makeup, community risk and BMI were collected in 1995, 2001 and 2008. The results showed people with both risk factors had a significantly higher BMI.

This is one of the first studies in gene-environment interaction to define "environment" more broadly than the family unit. The results suggest that what is considered to be an environment needs to be expanded.

Community, or environmental, stress, has an internal cost, O'Neal said. Facing adversity in daily life can cause higher stress and [physiological responses](#), which lead to a higher BMI.

"Thinking about an environment just as our family and those things we come into contact with every day is not enough," she said. "These community factors lead to a high BMI in several ways. Often, these neighborhoods have less favorable structural conditions, fewer sidewalks and poorer lighting so people aren't walking and going outside at night to exercise. Increased violence levels discourage outdoor activity as well. And, they tend to have more fast-food restaurants."

The study also assigned communities a risk factor score based on the number of families living in poverty, single-parent households, unemployment rates and other socioeconomic-related risk factors. Results show community adversity influences the early levels of adolescents' BMI as well as the growth rate of BMI as they age. For each one-unit increase in community adversity, the early level of an adolescent's BMI increases by 1.09, and the growth rate of BMI increases by 0.10 per year.

Genetics also fit into the equation. O'Neal and Wickrama expanded on previous studies, which looked at gene-environment interactions in family environments and health outcomes at a single point in time, rather than examining change over time. By focusing on data from several years, they were able to see how genes and community play into the obesity equation over time.

The researchers looked at an index of four genetic variants linked to the way the brain makes serotonin and dopamine-neurotransmitters associated with emotional status, which have been implicated in environmental sensitivity-and determined the level of genetic agility for each participant. Most individuals average 2.16 of these variants. Those with three or four of the variants, roughly 36 percent of the sample, were considered to have greater genetic sensitivity.

"These genes appear to make you more sensitive to a certain environment, in this case making individuals more sensitive to the effects of the community," said Wickrama, who is a UGA professor of human development and family science in the College of Family and Consumer Sciences .

"We are still trying to figure out the connecting mechanism," O'Neal said. "Based on existing work, it is likely that (serotonin and dopamine) are associated with emotional eating and depression leading to decreased

desire for physical activity."

While the authors recognize a person's [genetic makeup](#) can't be altered, "at the end of the day, we want to know what the factors are that impact body mass," O'Neal said. "We can use this as another piece of the puzzle to figure out how it goes together."

Provided by University of Georgia

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