Study finds that environment plays a role in kids' obesity

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Examining disease transmission among African buffalo might seem like an odd way to help identify causes of obesity among humans, but tools developed through the study of the large beasts gave a team of UO researchers the foundation to examine people.

Hannah Tavalire of the university's Prevention Science Institute, along with several of her colleagues, developed a complicated model to determine the roles nature and nurture play when it comes to kids and their weight. Nature—that is, genetics—plays a larger role, but nurture is also substantially responsible for whether a child has obesity.

"Especially in younger children, we saw a big effect of genetics, which is expected early in life, but also there's this pretty powerful impact of home environment," Tavalire said.

When she was working toward her doctorate, Tavalire developed a model that broke down the heritability of disease traits in wild animal populations. That's where the African buffalo come in. It turns out that the genetic variability in populations of wild species is similar to that of humans' family structures and can be modeled in a similar way.

Even working with pairs of twins, it's hard to filter out irrelevant factors that muddy the data because genetic similarity is inextricably linked to shared environment when children are raised together. However, another study at the UO—the Early Growth and Development Study, which includes the UO's Leslie Leve as one of its founders—includes families with adopted children. Using the unique families of that study for the data, Tavalire's statistical approach now allowed for comparisons.

"That allowed us to tease apart nature versus nurture by comparing related siblings who were reared apart," said Tavalire, the study's lead author. "We were able to apply a more flexible statistical method to our dataset."

"Hannah developed this statistical analytic strategy among buffaloes that was perfect for this tough situation to analyze," added Elizabeth Budd, a College of Education Evergreen Assistant Professor, part of the Health Promotion and Obesity Prevention Initiative and a member of the research team. "The design is unique because it is one of the only designs where you can separate the shared environment from the genetics."

Using high body mass index as a measure of obesity, the research team found that heritable factors were responsible for 63 percent of the variation in BMI among five- to 11-year-olds, with environment accounting for 31 percent of that variation. However, in older sibling pairs, 12 to 18 years old, and in sibling pairs with one child under age 12 and one child age 12 or older, neither genetics nor common environment were associated with variation in BMI, while home type, adoptive versus birth, was a strong predictor.

This research, funded by a $3.3 million National

Institutes of Health grant, builds off the Early Growth and Development Study, which Leve and other researchers began roughly 18 years ago and that looked at a group of adoptees shortly after birth. In partnership with colleagues at Penn State University and George Washington University, that study has grown over the past five years to include biological siblings reared either apart or together and nonbiological siblings reared together.

The BMI study required a multidisciplinary team, and it began with two members of the Health Promotion and Obesity Prevention cluster from the College of Education: Budd and Tasia Smith, who passed away in December 2018.

"It was a near-perfect storm of people coming together to try something new in order to answer an age-old research question," Budd said.

The key takeaway of strong common environment effects on BMI during childhood is a positive sign, suggesting that helping families that have young kids create health-promoting home environments could mitigate obesity risk in later childhood and adolescence.

"The role environment plays among the younger sibling pairs to me was a hopeful finding because home environments are more modifiable than genetics, at least for the time being," Budd said. "The finding is supportive of health promotion efforts at the household level."

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