

Kids' brain responses to food depend on their body composition

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Research using brain imaging technology has revealed a brain response pattern in children that might represent a step along the path to childhood obesity. The study, conducted by Nicole Fearnbach, a graduate student in Penn State University's Department of Nutritional Sciences, scanned children's brain activity while they viewed pictures of high- and low-calorie foods, and found that both lean body mass and body fat are linked to how kids' brains respond to food. Their research is to be presented here this week at the Annual Meeting of the Society for the Study of Ingestive Behavior (SSIB), the foremost society for research into all aspects of eating and drinking behavior.

The researchers focused on a brain region called the substantia nigra, involved in reward, learning, and motor control, which responds to food stimuli. Fearnbach and her colleagues discovered the neural activation in this brain area differed in children of different weight groups. Children with greater lean body weight had more powerful brain response in the substantia nigra when looking at high-calorie foods compared to children with lower lean body weight. The study also found that children with higher [body fat](#) had lower activity in this same brain area when they saw pictures of healthier, low-calorie foods like fruits, vegetables, and grilled chicken.

"We think that kids with more lean body weight might have a greater reward response to higher calorie foods, in part because they have greater energy needs compared to children with less lean body weight. Lean body weight largely determines how many calories we burn each

day through our resting metabolic rate. Bigger kids burn more calories, and our results show that their brains respond differently to foods," explained Fearnbach.

"Interestingly, we also found that children with more body fat had a reduced brain response to lower calorie foods, which tend to be the healthier options," Fearnbach added. "It might be that kids with higher body fat find those healthier foods to be less rewarding. But we don't know yet whether having more body fat is a cause or a consequence of these [brain](#) responses."

The results of this study suggest that children's body composition may influence how their brains respond to food, but it likely depends on whether these foods are high or low in calories. Future research studies are needed to determine how these findings relate to children's food intake or their [body weight](#) over time.

The study, conducted through Penn State's Department of Nutritional Sciences and Social, Life, and Engineering Sciences Imaging Center, involved 38 [children](#) ages 7 to 10 and their parents. Each family participated in five total laboratory visits. Children's body composition was measured to get [lean body](#) weight and [body](#) fat. Children also completed a functional magnetic resonance imaging (fMRI) scan where they looked at pictures of foods that differed in energy content. Foods were either high or low in energy density, which is equal to the number of calories per unit of food weight. The researchers then determined each child's [brain response](#) to these different food categories, and looked at how it was influenced by their [body composition](#).

Provided by Society for the Study of Ingestive Behavior

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