Poor stress responses may lead to obesity in children

February 15 2013

To examine the children's responses to a stressor, the researchers used a "block design test" in which they timed the children as they arranged colored blocks according to a pattern.

Children who overreact to stressors may be at risk of becoming overweight or obese, according to researchers at Penn State and Johns Hopkins University.

"Our results suggest that some children who are at risk of becoming obese can be identified by their biological response to a stressor," said Lori Francis, associate professor of biobehavioral health. "Ultimately, the goal is to help children manage stress in ways that promote health and reduce the risks associated with an over- or under-reactive stress response."

Francis and her colleagues—Douglas Granger, director of the Center for Interdisciplinary Salivary Bioscience Research at Johns Hopkins University, and Elizabeth Susman, Jean Phillips Shibley Professor of Biobehavioral Health at Penn State—recruited 43 children ages 5- to 9-years-old and their parents to participate in the study.

To examine the children's reactions to a stressor, the team used the Trier Social Stress Test for Children, which consists of a five-minute anticipation period followed by a 10-minute stress period. During the stress period, the children were asked to deliver a speech and perform a mathematics task. The team measured the children's responses to these stressors by comparing the cortisol content of their saliva before and after the procedure.

The researchers also measured the extent to which the children ate after saying they were not hungry using a protocol known as the Free Access Procedure. The team provided the children with lunch, asked them to indicate their hunger level and then gave them free access to generous portions of 10 snack foods, along with a variety of toys and activities. The children were told they could play or eat while the researchers were out of the room.

The results appeared online in the December 2012 issue of the journal *Appetite*.

The team found that, on average, the children consumed 250 kilocalories

of the snack foods during the Free Access Procedure, with some consuming small amounts (20 kilocalories) and others consuming large amounts (700 kilocalories).

"We found that older kids, ages 8 to 11, who exhibited greater cortisol release over the course of the procedure had significantly higher body-mass indices [BMI] and consumed significantly more calories in the absence of hunger than kids whose cortisol levels rose only slightly in response to the stressor," Francis said. "We also found that kids whose cortisol levels stayed high—in other words, they had low recovery—had the highest BMIs and consumed the greatest number of calories in the absence of hunger."

According to Francis, the study suggests that children who have poor responses to stressors already are or are at risk of becoming overweight or obese. In her future work, she plans to examine whether children who live in chronically stressful environments are more susceptible to eating in the absence of hunger and, thus, becoming overweight or obese.

"It is possible that such factors as living in poverty, in violent environments, or in homes where food is not always available may increase eating in the absence of hunger and, therefore, increase children's risk of becoming obese," she said.

Provided by Pennsylvania State University