

Evening hours may pose higher risk for overeating, especially when under stress, study finds

January 16 2018



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Experiments with a small group of overweight men and women have added to evidence that "hunger hormone" levels rise and "satiety (or fullness) hormone" levels decrease in the evening. The findings also



suggest that stress may increase hunger hormone levels more in the evening, and the impact of hormones on appetite may be greater for people prone to binge eating.

The findings were described in a report published Dec. 13 in the *International Journal of Obesity*, and highlight opportunities for people to modify behaviors to preempt overeating.

"Our findings suggest that <u>evening</u> is a high-risk time for overeating, especially if you're stressed and already prone to binge eating," says Susan Carnell, Ph.D., assistant professor of psychiatry and behavioral sciences at the Johns Hopkins University School of Medicine, and the new study's first author. "The good news is that having this knowledge, people could take steps to reduce their risk of overeating by eating earlier in the day, or finding alternative ways to deal with stress," she adds.

Carnell, who also conducts research within Johns Hopkins Children's Center, notes that previous research has shown that levels of ghrelin, a hunger hormone, can rise in response to stress during the daytime. Curious how stress might affect hunger urges at later hours, especially among those with binge eating disorder who often overeat in the evenings, the researchers created an experiment to measure participants' hunger and stress hormones at different times.

For the study, the research team recruited 32 overweight participants (19 men and 13 women), 18 to 50 years of age. Half had previously been diagnosed with binge eating disorder, and 47 percent were African-American. Participants had body mass indices (BMI) ranging from 28 to 52 and were otherwise healthy.

The study protocol required that each participant fast for eight hours, then receive a liquid meal of 608 calories at either 9 a.m. or 4 p.m. Some



130 minutes after the meal, each participant then underwent a standard experimental <u>stress test</u> in which a digital camera recorded their facial expressions while their nondominant hand was submerged in a bucket of cold water for two minutes.

Researchers drew blood from each participant to measure stress and hunger hormones. The subjects were also asked to rate their subjective levels of hunger and fullness on a numeric scale.

Thirty minutes after the start of the stress test, participants were offered a buffet that consisted of three medium pizzas, individual containers of snack chips, cookies and chocolate covered candies, and water.

The research team found that time of day significantly impacted hunger levels, with greater baseline self-reported appetite in the evening compared with the morning.

The team also saw relatively decreased levels of peptide YY, a hormone linked to reduced appetite, glucose and insulin levels, in relation to a liquid meal later in the day.

Carnell says only those with binge eating disorder showed lower overall fullness in the evening. This group also had higher initial levels of ghrelin in the evening and lower initial ghrelin levels in the morning, when compared with those without binge eating disorder.

After the stress test, stress levels spiked and hunger levels rose slowly in all participants in both the morning and evening, but there were overall higher levels of ghrelin in the evening, suggesting that <u>stress</u> may impact this <u>hunger hormone</u> more in the evening than in daytime.

More information: S Carnell et al. Morning and afternoon appetite and gut hormone responses to meal and stress challenges in obese



individuals with and without binge eating disorder, *International Journal* of Obesity (2017). DOI: 10.1038/ijo.2017.307

Provided by Johns Hopkins University School of Medicine

Citation: Evening hours may pose higher risk for overeating, especially when under stress, study finds (2018, January 16) retrieved 21 May 2024 from https://medicalxpress.com/news/2018-01-evening-hours-pose-higher-overeating.html

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