Scientists Search For Biological and Cultural Causes of Binge Eating

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Is overconsumption of food caused by genetics or is it a cultural issue? Kelly Klump, a professor of neurobiology at Michigan State University, says this behavior is more complex than we might think. It has both biological and cultural underpinnings.

First identified by Albert Stunkard, M.D., a professor of psychiatry at the University of Pennsylvania in 1959, binge eating disorder (BED) affects five percent of American adults. Stunkard researched both genetic and environmental influences on human obesity, specifically
unusual eating patterns. He looked at the amount of food a person consumes in a given period of time. Stunkard was the first researcher to categorize binge-eating disorder as a distinct kind of uncontrollable consumption that is not always driven by hunger or metabolic need. BED involves eating to the point of uncomfortable fullness, sometimes followed by compensation, like purging, vomiting or fasting.

However, unlike sufferers of bulimia—another eating disorder that is primarily characterized by purging after consumption—binge sufferers do not engage in compensatory behaviors as frequently. The aftermath of a binge episode is mainly emotional. Rapid and excessive consumption of food provokes feelings of guilt, shame, and failure. According to the American Psychiatric Association (2000), the main distinguishing feature of BED is powerlessness, coupled with feeling out of control.

There seem to be no biological or clinical differences in how the disorder unfolds in males and females, according to health professionals. While women are more commonly afflicted with binging, this disorder afflicts approximately ten percent of males. Moreover, BED cross-cuts race and ethnicity.

Despite apparent similarities in the way BED affects men and women, Klump found a discernible variation in female rat behavior after observing them in the lab. Her study, conducted last year, provides some conclusive evidence that biology plays a determinate role in eating disorders. The study, published online in the International Journal of Eating Disorders, was the first to establish sex differences in BED using animal models. Klump and colleagues experimented with 30 female and male rats in the lab for over two weeks, replacing their food pellets with vanilla frosting. They found that the rate of binging was six times higher in female rats.

“Most theories on why eating disorders occur more often in females focus on psychological and cultural pressures on women, such as the pressure to be thin. This study provides some of the strongest evidence that biological factors likely contribute as well, since female rats do not face the same pressures,” says Klump.

Klump’s findings open up new venues for research; it draws attention not only to biological factors, but potential neurobiological implications. Klump’s team is currently testing to see if female brains are more sensitive to rewarding stimuli, such as foods high in fat and sugar.

Scientists previously had thought that there was no biological difference between males and females. However, there appears to be a biological difference between the sexes that we need to explore to understand risk factors and mechanisms.

“Women are significantly more likely to binge as a result of cultural pressure to have a slim body. The answers we seek could ultimately help improve therapy—both counseling and medication—for those with BED,” says Klump.

A similar study experimented with animal models to understand biological foundations for binge eating. Led by Gene-Jack Wang of Brookhaven National Laboratory, the study analyzed
physical states linked to BED, such as food deprivation, stress (physiological and environmental), and exposure to palatable foods. The findings revealed the neurobiology of binge eating behavior mirrors substance abuse behavior. Binge eating releases dopamine, a feel-good chemical in the brain, which stimulates reward. Essentially, BED is an addictive disorder.

The researching team has focused on the nucleus accumbens, a region in the forebrain, which constitutes the largest part of the brain. Sometimes called the brain's 'pleasure center', nucleus accumbens is involved in functions ranging from motivation and reward to feeding and drug addiction. Nucleus accumbens plays a role in the reward circuit in the brain, releasing dopamine and opiate, two “feel-good” chemicals from the brain. Palatable fluids and foods, much like other addictive substances, exert their reinforcing effects through the activation of natural reward pathways in the brain via dopamine and opiate, particularly in times of prior food deprivation and stress.

Casey H. Halpern, a professor of neurosurgery, neurology, and psychiatry at The Stanford University Medical Centre, has investigated the link between prior palatable food withdrawal and the likelihood of binging. His research team has discovered that deep brain stimulation might stop binging episodes. They used mouse models and manipulated their fat consumption, intermittently restricting their access to high fat foods. Every other day they fed the mice with high-fat food pellets instead of their regular meal of chicken and vegetables.

The researchers found that withdrawing palatable food (i.e. the high-fat food pellets) greatly increased the likelihood of binge eating behaviour on consequent days. This occurred because the availability of high fat food activated the reward circuit in the brain. After their intermittent feeding experiment, Halpern and her colleagues have identified a link between deep brain stimulation after withdrawal and rapid consumption of food. The team hypothesizes that artificial activation of the reward circuit in the brain could potentially reduce high fat intake, blocking the release of dopamine. By attaching electrodes to the brain, the stimulation activates the dopamine receptors and they inhibit the release of the chemical.

As evidenced by these findings, BED is a complex disorder with a strong neurobiological base. However, it is also highly driven by psychological factors like the need for perfection. Klump’s team has tested animals in the lab, mimicking human binge eating patterns, but as she pointed out: “A rat could care less what it looks like.” In all these experiments, animals are not subjected to the social and psychological pressures that humans face everyday. Sometimes, the strive for the perfect body leads to binging episodes.

There are cultural underpinnings of the disorder, which primarily affect women. Simon Sherry and Peter Hall investigated the link between cultural pressures on women to maintain a slim body and the onset of binging, and they found a connection between perfectionism and binge eating disorder. Sherry and Hall propose the socially prescribed perfectionism (SPP) model, which hypothesizes that binge eating is triggered by interpersonal conflict, low self-esteem, depression, and dietary restraint. After observing 566 women for a week, Sherry and Hall have observed the SPP model in action.
“Disturbances in relationships instigate and maintain binge-eating behavior,” said Sherry. “When participants tracked their mood states prior to binging episodes, negative emotional state was a precursor of binge eating.” Binge eating acted as a maladaptive coping technique to problems in the social and personal sphere.

According to the model proposed by Sherry and his colleague, humans generate their own interpersonal problems through high levels of socially prescribed perfectionism, and then respond to these pressures by binge eating.

“Responding [to numerous social pressures] with binge eating can come back as a trigger to cycling through the process, starting a vicious cycle,” said Sherry.

Humans are complex and their relationship with food goes beyond gratification and reward. To truly understand the nature of binge-eating disorder and its potential treatment, we need to consider both biological and cultural factors.

This feature was produced under the guidance of Science Writer Mentor (SWM) Brian Clark Howard.

Further Reading:

Diagnosis and management of binge-eating disorder

The Biology Behind Binge Eating

Similarity Between Obesity and Drug Addiction as Assessed by Neurofunctional Imaging: A Concept Review

Binge-Eating Disorder: What’s the Best Treatment?

When Food Goes Bad: Binge Eating and Reward