

# Hunger: The Psychology of Why We Crave and When We Stop

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Hunger and satiety are sensations. Hunger represents the physiological need to eat food. Satiety is the absence of hunger; it is the sensation of feeling full.

Appetite is another sensation experienced with eating; it is the desire to eat food. There are several theories about how the feeling of hunger arises. A healthy, well-nourished individual can survive for weeks without food intake, with claims ranging from three to ten weeks. The sensation of hunger typically manifests after only a few hours without eating and is generally considered to be unpleasant. Satiety occurs between 5 and 20 minutes after eating.

Hunger is also the most commonly used term to describe the condition of people who suffer from a chronic lack of sufficient food and constantly or frequently experience the sensation of hunger.

### **Hunger pangs**

When hunger contractions start to occur in the stomach, they are informally referred to as hunger pangs. Hunger pangs usually do not begin until 12 to 24 hours after the last ingestion of food. A single hunger contraction lasts about 30 seconds, and pangs continue for around 30 to 45 minutes, then hunger subsides for around 30 to 150 minutes. Individual contractions are separated at first, but are almost continuous after a certain amount of time. Emotional states (anger, joy etc.) may inhibit hunger contractions. Levels of hunger are increased by lower blood sugar levels, and are higher in diabetics. They reach their greatest intensity in three to four days and may weaken in the succeeding days, although research suggests that hunger never disappears. Hunger contractions are most intense in young, healthy people who have high degrees of gastrointestinal tonus. Periods between contractions increase with old age.

### **Biological mechanisms**

The fluctuation of leptin and ghrelin hormone levels results in the motivation of an organism to consume food. When an organism eats, adipocytes trigger the release of leptin into the body. Increasing levels of leptin result in a reduction of one's motivation to eat. After hours of non-consumption, leptin levels drop significantly. These low levels of leptin cause the release of a secondary hormone, ghrelin, which in turn reinitiates the feeling of hunger.

Some studies have suggested that an increased production of ghrelin may enhance appetite evoked by the sight of food, while an increase in stress may also influence the hormone's production. These findings may help to explain why hunger can prevail even in stressful situations.

The state achieved when the need for food has been satisfied is called satiety. The satiety center in animals is located in the ventromedial nucleus of the hypothalamus.

## Short-term regulation of hunger and food intake

Short-term regulation of hunger and food intake involves neural signals from the GI tract, blood levels of nutrients, GI tract hormones, and psychological factors.

### Neural signals from the GI tract

One method that the brain uses to evaluate the contents of the gut is through vagal nerve fibers that carry signals between the brain and the gastrointestinal tract (GI tract). Studies have shown that through these vagal nerve fibers, the brain can sense a difference between different macronutrients. Stretch receptors work to inhibit appetite upon distention of the GI tract by sending signals along the vagus nerve afferent pathway and inhibiting the hunger center.

### Nutrient signals

Blood levels of glucose, amino acids, and fatty acids provide a constant flow of information to the brain that may be linked to regulating hunger and energy intake. Nutrient signals that indicate fullness, and therefore inhibit hunger include the following:

- Rising blood glucose levels
- Elevated blood levels of amino acids
- Blood concentrations of fatty acids

### Hormone signals

The hormones insulin and cholecystokinin (CCK) are released from the GI tract during food absorption and act to suppress feeling of hunger. CCK is key in suppressing hunger because of its role in inhibiting neuropeptide Y. Glucagon and epinephrine levels rise during fasting and stimulate hunger. Ghrelin, a hormone produced by the stomach, is a hunger stimulant.

### Psychological factors

Psychological states appear to play a role in short-term food intake. Merely repeatedly imagining the consumption of a food, for example, can reduce the subsequent actual consumption of that food by reducing the motivation to consume it. Two psychological processes appear to be involved in regulating short-term food intake: liking and wanting. Liking refers to the palatability or taste of the food, which is reduced by repeated consumption. Wanting is the motivation to consume the food, which is also reduced by repeated consumption of a food and may be due to change in memory-related processes. Wanting can be triggered by a variety of psychological processes. Thoughts of a food may intrude on consciousness and be elaborated on, for instance, as when one

sees a commercial or smells a desirable food. Eating one food can induce a craving for its complements, foods that are perceived to add pleasure to the consumption of that food, by priming a goal to consume those foods. Participants who drank a sip of cola, for example, were subsequently willing to pay more for a voucher for a cheeseburger that they could redeem later than controls who did not drink the cola.

## **Long-term regulation of hunger and food intake**

### **Physiological factors**

Leptin, a hormone secreted exclusively by adipose cells in response to an increase in body fat mass, is an important component in the regulation of long term hunger and food intake. Leptin serves as the brain's indicator of the body's total energy stores. When leptin levels rise in the bloodstream they bind to receptors in ARC. The functions of leptin are to:

Suppress the release of neuropeptide Y (NPY), which in turn prevents the release of appetite enhancing orexins from the lateral hypothalamus. This decreases appetite and food intake, promoting weight loss.

Stimulate the expression of cocaine and amphetamine regulated transcript (CART).

Though rising blood levels of leptin do promote weight loss to some extent, its main role is to protect the body against weight loss in times of nutritional deprivation. Other factors also have been shown to effect long-term hunger and food intake regulation including insulin.

### **Psychological factors**

The decision to eat a food again in the future appears to be driven by several psychological factors generally related to memory of the previous consumption episode. People have a better memory for their enjoyment of a food at the end than at the beginning of a past consumption episode - they better remember the last bite than the first. As a consequence, their enjoyment of the last bite of a food (which is usually less enjoyable than the first) is the best predictor of how soon again they wish to eat that food in the future. This greater weighting of the last bite than the first bite is due to an interference in memory, whereby memories for later bites make it harder to remember enjoyment of earlier bites of the food.

## **Set-point theories of hunger and eating**

The set-point theories of hunger and eating are a group of theories developed in the 1940s and 1950s that operate under the assumption that hunger is the result of an energy deficit and that

eating is a means by which energy resources are returned to their optimal level, or energy set-point. According to this assumption, a person's energy resources are thought to be at or near their set-point soon after eating, and are thought to decline after that. Once the person's energy levels fall below a certain threshold, the sensation of hunger is experienced, which is the body's way of motivating the person to eat again. The set-point assumption is a negative feedback mechanism. Two popular set-point theories include the glucostatic set-point theory and the lipostatic set-point theory.

The set-point theories of hunger and eating present a number of weaknesses.

The current epidemic of obesity and other eating disorders undermines these theories.

The set-point theories of hunger and eating are inconsistent with basic evolutionary pressures related to hunger and eating as they are currently understood.

Major predictions of the set-point theories of hunger and eating have not been confirmed.

They fail to recognize other psychological and social influences on hunger and eating.

### **Positive-incentive perspective**

The positive-incentive perspective is an umbrella term for a set of theories presented as an alternative to the set-point theories of hunger and eating. The central assertion to the positive-incentive perspective is the idea that humans and other animals are not normally motivated to eat by energy deficits, but are instead motivated to eat by the anticipated pleasure of eating, or the positive-incentive value. According to this perspective, eating is controlled in much the same way as sexual behavior. Humans engage in sexual behavior, not because of an internal deficit, but instead because they have evolved to crave it. Similarly, the evolutionary pressures of unexpected food shortages have shaped humans and all other warm blooded animals to take advantage of food when it is present. It is the presence of good food, or the mere anticipation of it that makes one hungry.

### **Premeal hunger**

Prior to consuming a meal, the body's energy reserves are in reasonable homeostatic balance. However, when a meal is consumed, there is a homeostasis-disturbing influx of fuels into the bloodstream. When the usual mealtime approaches, the body takes steps to soften the impact of the homeostasis-disturbing influx of fuels by releasing insulin into the blood, and lowering the blood glucose levels. It is this lowering of blood glucose levels that causes premeal hunger, and not necessarily an energy deficit.

### **Behavioral response**

Hunger appears to increase activity and movement in many animals - for example, an experiment on spiders showed increased activity and predation in starved spiders, resulting in larger weight gain. This pattern is seen in many animals, including humans while sleeping. It even occurs in rats with their cerebral cortex or stomachs completely removed. Increased activity on hamster wheels occurred when rats were deprived not only of food, but also water or B vitamins such as thiamine. This response may increase the animal's chance of finding food, though it has also been speculated the reaction relieves pressure on the home population. There is also a difference between the neurological responses in human males and females in response to hunger and satiety.

### **Similar conditions**

A food craving is an intense desire to consume a specific food, as opposed to general hunger. Similarly, thirst is the craving for water.