



Hunger, Appetite and Satiety

Eating behavior is a complex interplay between hunger, appetite and satiety. Understanding the factors that affect eating behavior is important for understanding what we eat and why.

Need to Eat vs. Want to Eat

Hunger is the physiological need for food. Numerous physiological cues tell us we are hungry, such as an empty or growling stomach, a decrease in blood glucose levels, and alterations in circulating hormones (e.g., increased glucagon and ghrelin and decreased insulin). **Appetite** is the psychological desire to eat, and is associated with sensory experiences or aspects of food such as the sight and smell of food, emotional cues, social situations, and cultural conventions. Hunger acts as the more basic drive, while appetite is more of a reflection of eating experiences. At times we are not hungry but have an appetite (such as seeing a tempting desert after eating full meal) or may be hungry but have not appetite (such as when we are sick). Both hunger and appetite determine what, when, and why we eat (1).

Satiety: A “gut check” on fullness

The other side of hunger and appetite is satiety, which is the physiological and psychological experience of “fullness” that comes after eating and/or drinking. As was true for hunger and appetite, a number of factors influence the experience of satiety including gastric distention, elevations in blood glucose and alterations in circulating hormones (e.g., increased insulin and cholecystokinin, and decreased glucagon).

Fostering a Full Feeling

Generally speaking, feeling full is a function of the amount of food one eats; that is, it typically takes a whole sandwich, not just a bite, to promote satiety. However, sometimes it's not just the amount of foods eaten, but the characteristics inherent in foods that lead to fullness. The water, fiber and macronutrient content of the foods we eat can all influence satiety.

- **Water:** Foods high in water content are known to promote a feeling of fullness. This is because water adds volume but has no calories, thus lowering the overall calorie content of foods. Put more scientifically, we can say that “water lowers a food’s energy density.” Foods with a high water content (and low energy density) include fruits, vegetables, low-fat milk, cooked grains, lean meats, fish, poultry and beans. Dishes like soups, stews and some pasta dishes are high in water content and may have low energy density depending on their preparation. Eating foods of low energy density is a smart step for maintaining a healthy body weight.
- **Fiber:** Like water, fiber has no calories but does add weight to the food; thus it may promote a feeling fullness. Fiber is not digested but needs water to be eliminated; in this process, fiber helps to soften and add bulk to waste in the intestines. Fiber is what gives the structure or “bulk” to natural foods like fruits and vegetables, and foods high in fiber tend to be very filling.

- **Macronutrients:** There are three macronutrients that provide calories to food: carbohydrate, protein and fat. Fat is the most energy-dense macronutrient with nine calories per gram. Carbohydrate and protein are less than half that, each with just four calories per gram. It has long been believed that “fat fills you up,” but while fat does leave the stomach more slowly and may somewhat prolong satiety, research indicates that both protein and carbohydrates may actually be more satiating (1).

Rating a Food’s Fullness Effect: The Satiety Index

In an attempt to determine which foods promote fullness, researchers in Australia developed a satiety rating scale that they called the “satiety index” (2). Two hundred forty calorie portions of 38 different foods representing all the basic food groups were fed to groups of subjects who then rated the foods based on the degree of fullness they provided. Foods ranking highest on this SI tended to be high in water or fiber content as well as lower in fat content. Fruits and vegetables were at the top of the SI list of foods. In fact, the highest SI score was produced by potatoes, which was more than three times the SI of white bread. Other foods ranking high in satiety after potatoes

were fish, oat porridge, oranges, apples, wheat pasta, steak and baked beans (2).

Satiety and Weight Management

Choosing foods based on SI may help with weight management. Unfortunately, you won’t find SI rankings on food packages, so here are a few rules of thumb for choosing foods that will help fill your body up without filling it out:

- Prepare healthy dishes that have a high water content, like soups, stews and pasta dishes (using tomato vs. cream-based sauces)
- Fill up on fruits, vegetables, low-fat or nonfat dairy products and whole grains
- Seek out unprocessed foods, which tend to have a low energy density or few calories per weight
- Get more fiber by eating vegetables, fruits, whole grains and beans
- Choose lean protein sources like fish, poultry, lean meats and beans
- Monitor which foods make you feel particularly satiated
- Slow down when you eat to allow your stomach time to give a proper “gut check” report to the brain so it can register that you are full

- 1) Anderson, GH. Hunger, appetite, and food intake. In: *Present Knowledge in Nutrition* (7th ed.) Ziegler, EE and Filer, L (eds.) Washington, DC: ILSI Press. 1996, pp. 13-17.
- 2) Holt SHA, et al. A satiety index of common foods. *Eur J Clin Nutr.* 1995;49:675-690.

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