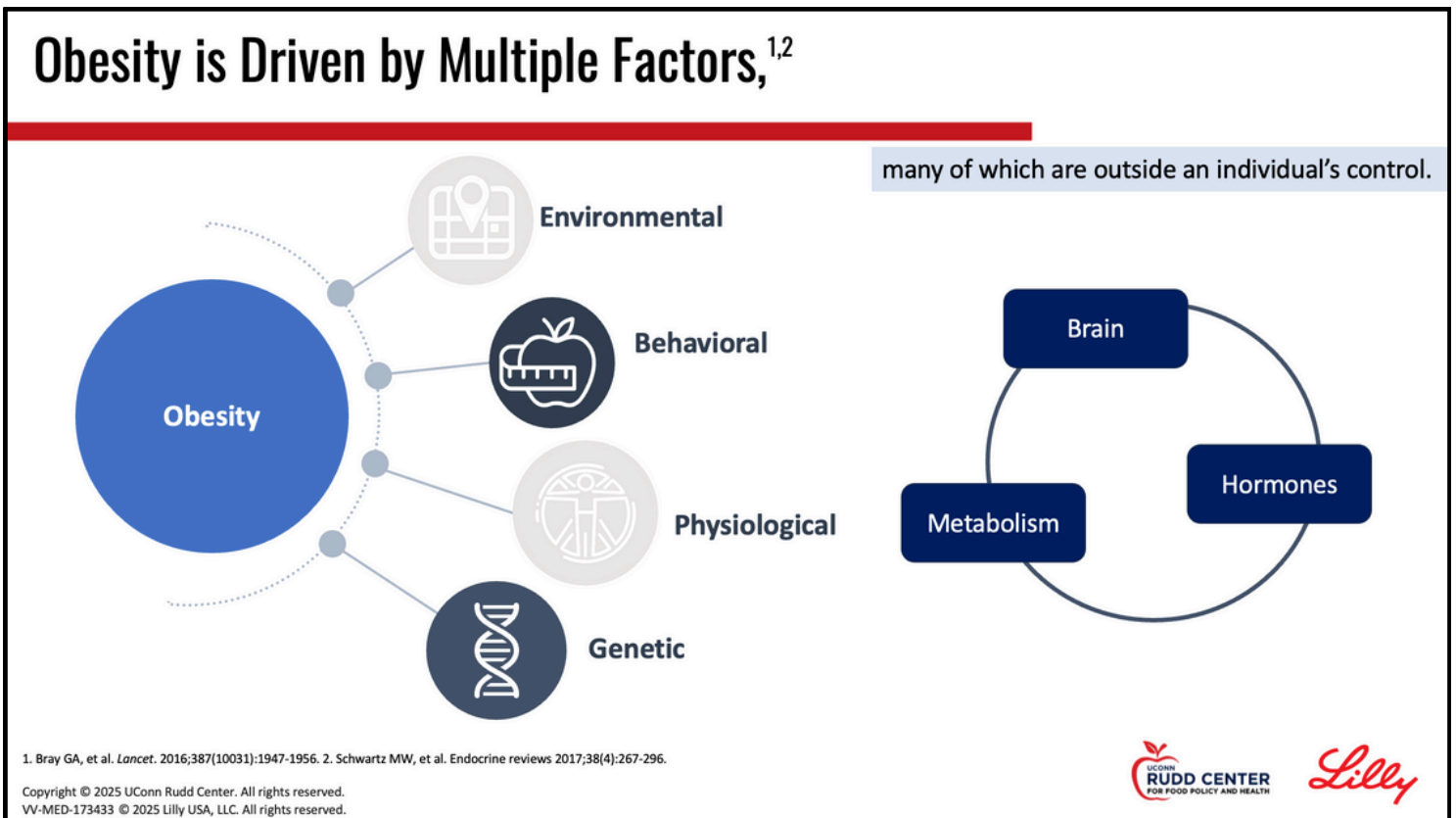


UNDERSTANDING OBESITY AND BODY WEIGHT REGULATION

Multiple factors contribute to obesity

Obesity is a chronic, relapsing and progressive disease driven by the interaction of multiple factors beyond food intake and physical activity, many of which are beyond an individual's control.^{1,2} These include biologic factors, genetic factors, environmental influences, and social determinants of health. The heritability of body weight has been estimated at 40-77%.³ Understanding and acknowledging the complex contributors to obesity is essential to promoting a supportive and collaborative health care environment.



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Lifestyle modification can produce meaningful weight reduction for some patients, but weight regain is common

Although lifestyle interventions can result in clinically meaningful weight reduction for some patients, many do not achieve and maintain a ≥ 5 -10% weight reduction over time. For example, a meta-analysis of 29 studies involving long-term weight-loss maintenance using dietary interventions for obesity indicated that by 4 to 5 years after initial weight reduction, weight regain was common among participants, maintaining an average weight reduction of just 3% below initial weight.⁴ Even with intensive lifestyle interventions and ongoing support, studies suggest that less than one-third of individuals maintain weight reductions of ≥ 10 % at 5-8 years.⁴⁻⁶

Eating behavior is influenced by both internal and external cues

The arcuate nucleus of the hypothalamus integrates internal homeostatic signals and regulates hunger, satiation, and satiety through higher cortical centers that influence the sympathetic and parasympathetic nervous systems, gastric motility, hormone secretion, and other processes relevant to food intake and energy homeostasis. External (environmental) cues influence consumption through the hedonic system, which has a strong impact on intake, as seen in situations where eating occurs after reports of satiation and when there is no nutritional need (e.g., enjoying dessert after a meal).^{7,8}

Homeostatic System:

Neural, nutrient and hormonal signals between various organs

Hedonic System:

Corticolimbic system (liking and reward)

Many other **external factors** influence consumption. Key environmental variables like food availability, variety, energy density, and portion size can lead to heightened intake, which often occurs outside of awareness and is not associated with enhanced satiation.

The neuroendocrine regulation of central nervous system pathways involved in appetite and food intake may be impaired in obesity.⁷ In other words, when it comes to obesity and eating behaviors, biology may drive behavior, rather than the other way around.

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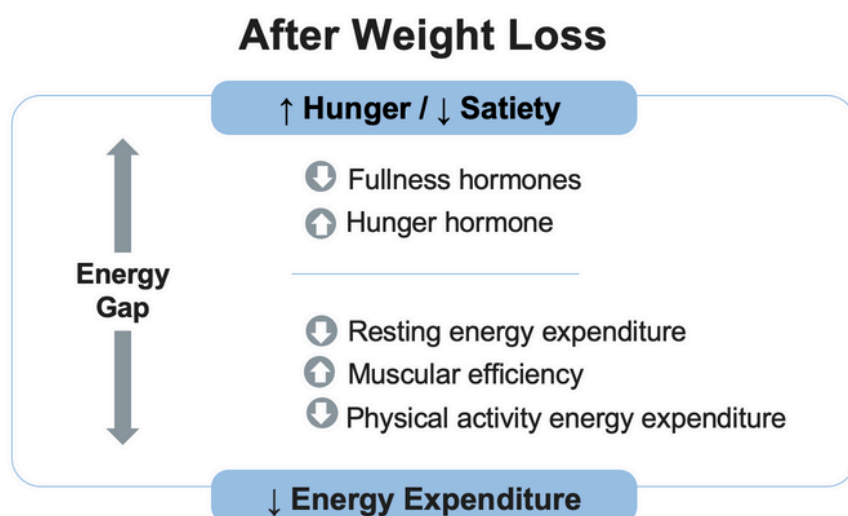
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Hormonal and metabolic changes that occur with weight loss favor weight regain

Weight reduction triggers adaptive changes in hunger and satiety hormones (such as ghrelin, leptin, insulin, GLP-1, PYY, CCK, and amylin) which favor weight regain. At the same time, there is a decrease in energy expenditure (often called metabolic adaptation), which is out of proportion to the amount of weight lost. This creates a gap between desired energy intake and actual energy expenditure (i.e. an energy gap). These hormonal and metabolic changes appear to persist over time, making maintenance of a reduced body weight more challenging.⁹

Why is it difficult to keep weight off, after losing weight?



Melby CL, et al. *Nutrients*. 2017;9(5):468.

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In summary, obesity is a complex disease, with multiple contributing factors, many of which are outside of an individual's control. Understanding and acknowledging this is essential to promoting a supportive and collaborative health care environment.

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