Chapter 10: Weight Management and Energy Balance
Objectives for Chapter 10

• Explain the concept of a healthy weight, and differentiate between the conditions of underweight, overweight, and obesity.
• Define healthy weight and identify how to determine if you are at a healthy weight.
• Explain what energy balance is, what determines your daily energy needs; describe the effects of an energy imbalance.
• Explain the factors that affect body weight.
• Explain how to lose weight healthfully.
• Identify two strategies that help foster healthy weight maintenance.
• Describe how to gain weight healthfully.
• Define disordered eating and discuss the warning signs of and treatment options for eating disorders.
What Is a Healthy Weight and Why Is Maintaining It Important?

• **Healthy weight:** body weight relative to height that doesn't increase the risk of developing weight-related health problems or diseases
  
  • **Weight management:** maintaining weight within a healthy range

• Overweight: 10 to 15 pounds more than healthy weight
  
  • More than 65 percent of Americans are overweight

• Obesity: 25 to 40 pounds more than healthy weight
  
  • Close to 35 percent of those Americans are obese
What Is a Healthy Weight and Why Is Maintaining It Important?, Continued

• Being overweight increases risk of:
  • Hypertension and stroke
  • Heart disease
  • Gallbladder disease
  • Type 2 diabetes
  • Osteoarthritis
  • Some cancers
  • Sleep apnea

• Losing 5 to 10 percent of body weight can produce health benefits
What Is a Healthy Weight and Why Is Maintaining It Important?, Continued

- **Underweight**: weighing too little for your height
  - May be caused by excessive calorie restriction and/or physical activity, underlying medical condition, emotional stress
  - Risks for:
    - Young adults: nutrient deficiencies, electrolyte imbalance, low energy levels, decreased concentration
    - Older adults: low body protein and fat stores, depressed immune system, medical complications
Increase in Obesity Rates in the United States

Obesity Rates in the United States
How Do You Know If You're at a Healthy Weight?

• BMI measurements can provide a general guideline:
  • Body mass index (BMI) = \[
  \text{weight (lb)} \times 703 \div \text{height squared (in}^2\text{)}
  \]
  • BMI ≥ 25 is overweight: modest increase in risk of dying from diseases
  • ≥ 30 is obese: 50 to 100 percent higher risk of dying prematurely compared to healthy weight
  • < 18.5 is underweight; can also be unhealthy
What's Your BMI?

Figure 10.1

* The height is without shoes.
† The weight is without clothing.
How Do You Know if You're at a Healthy Weight?, Continued

• Measure your body fat and its location
  • Average healthy adult male between 20 and 49 years of age: 16 to 21 percent of weight is body fat
  • Average healthy female: 22 to 26 percent body fat
• Techniques to measure body fat include skinfold thickness measurements and bioelectrical impedance
• **Central obesity** (excess visceral fat) increases risk of heart disease, diabetes, hypertension
  • Measure waist circumference
## Ways to Measure Percentage of Body Fat

<table>
<thead>
<tr>
<th>Method</th>
<th>How It Is Done</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skinfold Thickness Measurements</td>
<td><strong>How It Is Done:</strong> Calipers are used to measure the thickness of fat that is located just under the skin in the arm, in the back, on the upper thigh, and in the waist area. From these measurements, percent body fat can be determined.</td>
<td>$</td>
</tr>
<tr>
<td>Bioelectrical Impedance</td>
<td><strong>How It Is Done:</strong> An electric current flows through the body and its resistance is measured. Lean tissue is highly conductive and less resistant than fat mass. Based on the current flow, the volume of lean tissue can be estimated. From this information, the percentage of body fat can be determined.</td>
<td>$$</td>
</tr>
<tr>
<td>Dual-Energy X-Ray Absorptiometry (DXA)</td>
<td><strong>How It Is Done:</strong> An X-ray is used to measure bone, fat, and lean tissue. The type of tissue that the X-ray passes through will absorb different amounts of energy. The amount of energy lost will allow the percentage of body fat to be determined.</td>
<td>$$$</td>
</tr>
<tr>
<td>Underwater Weighing</td>
<td><strong>How It Is Done:</strong> A person is weighed on land and also suspended in a water tank. This is done to determine the density of the body. Fat is less dense and weighs less than muscle mass and will be reflected as such when the person is weighed in the water. The difference of a person’s weight in water and on land is then used to calculate the percentage of body fat.</td>
<td>$$</td>
</tr>
<tr>
<td>Air Displacement Using a BodPod</td>
<td><strong>How It Is Done:</strong> A person’s body volume is determined by measuring air displacement from a chamber. The person sits in a special chamber (called the BodPod) and the air displacement in the chamber is measured. From this measurement, the percentage of body fat can be estimated.</td>
<td>$$$</td>
</tr>
</tbody>
</table>

$ = very affordable  
$$ = less affordable  
$$ = expensive  

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Visceral and Subcutaneous Fat Storage in the Body

Figure 10.2
Waist Measurement
How at Risk Are You?

- **Extremely High Risk**
  - BMI 40+ and high waist circumference

- **Very High Risk**
  - BMI 30–39.9 and high waist circumference

- **High Risk**
  - BMI 25–29.9 and high waist circumference
  - or
  - BMI 30–34.9 and low waist circumference

- **Increased Risk**
  - BMI 25–29.9 and low waist circumference

- **Low Risk**
  - BMI under 25

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What Is Energy Balance and What Determines Energy Needs?

• Energy balance is calories in versus calories out
  • **Positive energy balance:** more calories consumed than expended (leads to fat storage, weight gain)
  • **Negative energy balance:** more calories expended than consumed (leads to weight loss)

• Energy needs are different for everyone
  • Energy needs comprise:
    • Basal metabolism
    • Thermic effect of food
    • Physical activities
Energy balance is the relationship between the food we eat and the energy we expend each day. Finding the proper balance between energy intake and energy expenditure allows us to maintain a healthy body weight.

**ENERGY BALANCE**
When the calories you consume meet your needs, you are in energy balance. Your weight will be stable.

**ENERGY DEFICIT**
When you consume fewer calories than you expend, your body will draw upon your stored energy to meet its needs. You will lose weight.

**ENERGY EXCESS**
When you take in more calories than you need, the surplus calories will be stored as fat. You will gain weight.

**ENERGY INTAKE = ENERGY EXPENDITURE = WEIGHT MAINTENANCE**

**ENERGY INTAKE < ENERGY EXPENDITURE = WEIGHT LOSS**

**ENERGY INTAKE > ENERGY EXPENDITURE = WEIGHT GAIN**
The Three Components of Your Energy Needs

- **BMR** 50–70%
- **Physical activity** ~20–35%
- **TEF** 10%

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• Your BMR is the minimum amount of energy you need to function
  • Amount needed to meet basic physiological needs, keep you alive
  • Makes up about 60 percent of total energy needs
  • Many factors affect BMR, chiefly lean body mass
• The thermic effect of food affects your energy needs
  • Amount of calories expended to digest, absorb, and process food (about 10 percent of calories in food eaten)
### Table 10.2 Factors That Affect Your Basal Metabolic Rate

<table>
<thead>
<tr>
<th>Factor</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean body mass</td>
<td>Lean body mass, which is mostly muscle mass, is more metabolically active than fat tissue, so more calories are needed to maintain it. Athletes who have a large percentage of lean body mass due to their increased muscle mass will have a higher BMR than individuals who aren’t athletic.</td>
</tr>
<tr>
<td>Age</td>
<td>For adults, BMR declines about 1 to 2 percent per decade after the early adult years, but it increases by 15 percent during pregnancy. For children, BMR increases during times of rapid growth such as infancy and adolescence.</td>
</tr>
<tr>
<td>Gender</td>
<td>Women have less lean body mass, and typically have a higher percentage of body fat than men. This results in women having up to a 10 percent lower BMR. Women also tend to have a smaller body size.</td>
</tr>
<tr>
<td>Body size</td>
<td>Larger individuals will have a higher BMR due to increased surface area compared with smaller individuals. More surface area means more heat lost from the body, which causes the metabolism rate to increase to maintain the body’s temperature.</td>
</tr>
<tr>
<td>Genes</td>
<td>Research suggests that genes may affect BMR, as individuals within families have similar metabolic rates.</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>African-Americans have BMRs that are about 10 percent lower than that of Caucasians.</td>
</tr>
<tr>
<td>Stress</td>
<td>Hormones such as epinephrine, which are released during emotional stress, increase BMR. Physiological stress on the body caused by injury, fever, burns, and infections also causes the release of hormones that raise BMR. Heat lost from the body through wounds, as well as the response of the immune system during infection, increase BMR.</td>
</tr>
<tr>
<td>Hormones</td>
<td>An increase in thyroid hormone increases BMR, whereas too little of this hormone lowers BMR. Hormone fluctuations during a woman’s menstrual cycle lower BMR during the phase before ovulation.</td>
</tr>
<tr>
<td>Starvation</td>
<td>Both starvation and fasting for more than about 48 hours lower BMR.</td>
</tr>
<tr>
<td>Environmental temperature</td>
<td>Being very cold or very hot can increase BMR, but the change is minimal if you make adjustments in your clothing or in the temperature of your surroundings.</td>
</tr>
<tr>
<td>Caffeine</td>
<td>Caffeine can raise BMR, but only slightly, when consumed regularly in moderate amounts.</td>
</tr>
<tr>
<td>Drugs</td>
<td>Nicotine may increase BMR.* Drugs such as amphetamines and ephedrine increase BMR.</td>
</tr>
</tbody>
</table>

*Note: Smoking is not a weight-management strategy. Some people may think that replacing snacks with cigarettes helps them stay slim, but the health risks associated with smoking, such as lung cancer, heart disease, and stroke, make it a foolish habit. Anyone concerned about weight gain when quitting smoking can minimize the chances of this with exercise (plus, you’ll be able to run farther and faster with your cleaner lungs!).


- Physical activity will increase your energy needs
  - Energy expended by sedentary people = less than half of BMR
  - Very active athletes can expend twice BMR
    - Exercise causes small increase in energy expenditure after activity has stopped
- Calculating your energy needs:
  - Estimated energy requirement (EER): daily energy need based on age, gender, height, weight, activity level
What’s Your Estimated Energy Requirement (EER)?

Calculating your EER is a two-step process.

1. First, complete the information below.
   a. My age is___________.
   b. My physical activity during the day based on the chart below is:

<table>
<thead>
<tr>
<th>Physical Activity</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary (no exercise)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Low active (walks about 2 miles</td>
<td>1.11</td>
<td>1.12</td>
</tr>
<tr>
<td>daily at 3–4 mph)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active (walks about 7 miles daily</td>
<td>1.25</td>
<td>1.27</td>
</tr>
<tr>
<td>at 3–4 mph)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very active (walks about 17 miles</td>
<td>1.48</td>
<td>1.45</td>
</tr>
<tr>
<td>daily at 3–4 mph)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   c. My weight in pounds is ____ divided by 2.2 = ____ kg.
   d. My height in inches is ____ divided by 39.4 = ____ meters.

2. Using your answers from each part of step 1, complete the following calculation based on your gender and age.

**Males, 19+ years old**, use this calculation:

\[662 - (9.53 \times \text{a}) + \text{b} \times [(15.91 \times \text{c}) + (539.6 \times \text{d})] = \text{EER}\]

**Females, 19+ years old**, use this calculation:

\[354 - (6.91 \times \text{a}) + \text{b} \times [(9.36 \times \text{c}) + (726 \times \text{d})] = \text{EER}\]
Energy Imbalances over Time Can Lead to Changes in Body Weight

- Reducing calories can lead to weight loss
  - Stored glycogen and fat are used as fuel sources
    - Amino acids from body protein breakdown can be used to make glucose
    - Prolonged fast depletes all liver glycogen
    - Ketone bodies generated from incomplete breakdown of fat
    - Fat stores and about one-third of lean tissue mass depleted in about 60 days
What Are the Effects of an Energy Imbalance?

• Excess calories can lead to weight gain
  • Excess calories are stored as fat, regardless of source
    • Limited capacity to store glucose as glycogen
    • Can't store extra protein
    • Unlimited capacity to store fat
      – Body contains about 35 billion fat cells, which can expand
What Factors Are Likely to Affect Body Weight?

• Factors in weight management: what and how often you eat, physiology, genetics, environment
• Hunger and appetite affect what you eat
  • Appetite is psychological desire for food
  • Hunger is physiological need for food; subsides as feeling of satiation sets in
    • Satiety determines length of time between eating episodes
What Factors Are Likely to Affect Body Weight?, Continued

• Physiological mechanisms help regulate hunger
  • Many hormones play a role:
    • Ghrelin: produced in stomach when empty; increases hunger
    • When fat stores increase, leptin in fat tissue signals brain to decrease hunger and food intake.
    • Cholecystokinin: released when stomach is distended, increasing feelings of satiation, decreasing hunger
  • Protein, fatty acids, and monosaccharides in small intestine stimulate feedback to brain to decrease hunger
    • Insulin also causes brain to decrease hunger
  • Many people override feedback mechanisms, resulting in energy imbalance
Your Brain Controls Hunger and Satiation

Two regions of the brain—the ventromedial nucleus and the lateral hypothalamus—control eating behaviors in response to hormones released from the stomach, pancreas, small intestine, fat cells, and the hypothalamus. The ventromedial nucleus responds to hormones to stimulate satiety. Hunger is triggered by hormones that stimulate the lateral hypothalamus.

**HORMONES THAT STIMULATE SATIETY**

- **INSULIN**: Insulin is released from the pancreas following carbohydrate ingestion.

- **LEPTIN**: Leptin produced in the fat cells is released into the blood to stimulate satiety.

**HORMONES THAT STIMULATE HUNGER**

- **GHRELIN**: Ghrelin is secreted from the stomach when the stomach is empty to stimulate hunger.

- **CCK**: Cholecystokinin (CCK) is released from the small intestine when enzyme enters the duodenum.
What Factors Are Likely to Affect Body Weight?, Continued-1

• Genetics partially determines body weight
  • Risk of becoming obese doubles if parents are overweight, triples if obese, five times greater if severely obese
  • Confirmed by studies of identical twins separated at birth
What Factors Are Likely to Affect Body Weight?, Continued-2

- Genetic differences in level or function of hormones, such as high ghrelin or low leptin levels, increase obesity
  - Many obese have adequate leptin, but brain has developed resistance to it
- Genetic differences in non-exercise-associated thermogenesis (NEAT): energy expenditure in nonexercise movements, such as fidgeting, standing, chewing gum
- "Set point" theory holds that body opposes weight loss and works to maintain a set weight
What Factors Are Likely to Affect Body Weight?, Continued-3

• Environmental factors can increase appetite and decrease physical activity
• Environment of cheap and easily obtainable energy-dense foods stimulates appetite
  • **Gene-environment interaction:** increases risk of obesity in some people
• We work more and cook less
  • 32 percent of calories come from ready-to-eat foods prepared outside of home
  • Frequent dining out associated with higher BMI
What Factors Are Likely to Affect Body Weight?, Continued

- We eat more (and more)
  - Increased availability of food-service establishments and access to large variety of foods, larger portions encourage people to eat more
- We sit more and move less
  - Americans are eating about 600 calories/day more than in 1970
  - Labor-saving devices at work and home, sedentary leisure activities ("screen time") result in decreased energy expenditure
Environmental and Lifestyle Factors of Weight Gain

Less in-home food preparation
More dining out

Larger portion sizes
More energy-dense foods

Higher calorie intake

Lack of physical activity

Weight gain
Higher BMI
How Can You Lose Weight Healthfully?

- National Institutes of Health: overweight individuals should aim to lose about 10 percent of body weight over 6-month period
  - Example: 180-pound person should lose 18 lb/6 months = 3 lb/month, \( \frac{3}{4} \) lb/week
  - To lose 1 pound of body fat, need 3,500-calorie deficit
    - For a weight loss of \( \frac{1}{2} \) to 1 lb/week, need to decrease daily calories by 250 to 500 calories
- Fad diets promise dramatic results but may carry risks
How Can You Lose Weight Healthfully?, Continued

• Successful long-term weight loss requires changes in diet, physical activity, behavior
• Eat smart, because calories count: add satiation to low-calorie meals by including higher-volume foods
  • Eat more vegetables, fruit, and fiber
  • Include some protein and fat in your meals
    • Protein increases satiety most
    • Fat slows movement of food from stomach into intestines
    • Choose lean meat, skinless chicken, fish, nuts, unsaturated oils
ABC News Video: Low-Carb Diet Trumps Low Fat in Weight-Loss Study

Good Morning America
September 2, 2014

>> George Stephanopoulos: A new study that takes on one
Three Pieces of the Long-Term Weight-Loss Puzzle

Figure 10.9
Adding Volume to Your Meals Aids in Weight Loss

Change low-volume...

- 3/4 cup chicken broth: 29 calories
- 1/2 cup chicken (white meat): 106 calories
- 1 cup noodles: 212 calories

Total calories: 347

...to high volume

- 3/4 cup chicken broth: 29 calories
- 1/2 cup chicken (white meat): 106 calories
- 1/2 cup noodles: 106 calories
- 1/2 cup mixed vegetables: 59 calories

Total calories: 300

- 2 slices whole-wheat bread: 138 calories
- 4 oz ham: 125 calories
- 2 oz American cheese: 213 calories

Total calories: 476

- 2 slices whole-wheat bread: 138 calories
- 2 oz ham: 63 calories
- 1 oz American cheese: 106 calories
- 2 slices tomato: 7 calories
- 2 leaves Romaine lettuce: 10 calories

Total calories: 324
The Energy Density of Foods

Table 10.3 The Energy Density of Foods

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>These foods provide 0.7 to 1.5 calories per gram and are high in water and fiber. Examples include most vegetables and fruits—tomatoes, cantaloupe, strawberries, broccoli, cauliflower—as well as broth-based soups, fat-free yogurt, and cottage cheese.</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>These foods have 1.5 to 4 calories per gram and contain less water. They include bagels, hard-cooked eggs, dried fruits, lean sirloin steak, hummus, whole-wheat bread, and part-skim mozzarella cheese.</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>These foods provide 4 to 9 calories per gram, are low in moisture, and include chips, cookies, crackers, cakes, pastries, butter, oil, and bacon.</td>
<td></td>
</tr>
</tbody>
</table>

The Volume of Food You Eat Affects Satiety

**Low-volume, high-calorie**
- 16 oz Dunkin Donuts Coffee Coolata® with cream: **350** calories
- Dunkin Donuts chocolate chunk cookie: **110** calories
- Pizza Hut Pepperoni Lover’s® Pizza
  - 2 slices, large pizza: **570** calories
- Cheese breadstick: **320** calories

**High-volume, low-calorie**
- Pop Secret Snack popcorn,
  - 94% fat free, butter: **110** calories
- 16 oz Dunkin Donuts Hot Latte Lite made with skim milk: **70** calories
- Pizza Hut Veggie Lover’s® Pizza
  - 3 slices, large pizza: **610** calories
- 1 cup Romaine lettuce: **8** calories
  - ½ cup cherry tomatoes: **13** calories
  - ½ cup sliced cucumbers: **7** calories
  - 1 tbs light ranch dressing: **38** calories

**Total Calories**
- **460** total calories
- **180** total calories
- **890** total calories
- **676** total calories

Figure 10.11
How Can You Lose Weight Healthfully?, Continued-1

• Use MyPlate as a weight-loss guide
  • High volume of fruits, vegetables, whole grains, some lean protein, modest amounts of fat
• Diet should contain variety of foods from all food groups
  • Replace higher-calorie foods with lower-calorie options from each food group.
    – Example: replace full-fat dairy with nonfat products
    – Replace sodas with water
How Can You Lose Weight Healthfully?, Continued-2

• Move to lose
  • 45 minutes/day of moderate-intensity activities can prevent becoming overweight and aid in weight loss
    • 10,000 steps/day can reduce risk of becoming overweight

• Break bad habits
  • **Behavior modification:** change behaviors that contribute to weight gain or impede weight loss
    • Techniques include keeping food log, controlling environmental cues that trigger eating, managing stress
## Calories Used during Activities

### Table 10.4 Calories Used during Activities

<table>
<thead>
<tr>
<th>Moderate Physical Activity</th>
<th>Approximate Calories/Hour for a 154-lb Person*</th>
<th>Vigorous Physical Activity</th>
<th>Approximate Calories/Hour for a 154-lb Person*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hiking</td>
<td>370</td>
<td>Running/jogging (5 mph)</td>
<td>590</td>
</tr>
<tr>
<td>Light gardening/yard work</td>
<td>330</td>
<td>Bicycling (&gt; 10 mph)</td>
<td>590</td>
</tr>
<tr>
<td>Dancing</td>
<td>330</td>
<td>Swimming (slow freestyle laps)</td>
<td>510</td>
</tr>
<tr>
<td>Golf (walking and carrying clubs)</td>
<td>330</td>
<td>Aerobics</td>
<td>480</td>
</tr>
<tr>
<td>Bicycling (&lt; 10 mph)</td>
<td>290</td>
<td>Walking (4.5 mph)</td>
<td>460</td>
</tr>
<tr>
<td>Walking (3.5 mph)</td>
<td>280</td>
<td>Heavy yard work (chopping wood)</td>
<td>440</td>
</tr>
<tr>
<td>Weight lifting (general light workout)</td>
<td>220</td>
<td>Weight lifting (vigorous effort)</td>
<td>440</td>
</tr>
<tr>
<td>Stretching</td>
<td>180</td>
<td>Basketball (vigorous)</td>
<td>440</td>
</tr>
</tbody>
</table>

*Note: Calories burned per hour will be higher for persons who weigh more than 154 lbs (70 kg) and lower for persons who weigh less.

## Food Log

**For:** Hannah  
**Date:** Monday, September 6

<table>
<thead>
<tr>
<th>Food and drink</th>
<th>Time eaten</th>
<th>What I ate/ Where I ate it</th>
<th>Hunger level*</th>
<th>Mood †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td></td>
<td>Skipped it</td>
<td>3</td>
<td>G</td>
</tr>
<tr>
<td>Snack</td>
<td>11 a.m.</td>
<td>Oreo cookies, PowerAde from vending machine during morning class.</td>
<td>5</td>
<td>E</td>
</tr>
<tr>
<td>Lunch</td>
<td>1:30 p.m.</td>
<td>Ham and cheese sandwich, 2 large M&amp;M cookies in student union cafeTeria.</td>
<td>4</td>
<td>B</td>
</tr>
<tr>
<td>Snack</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dinner</td>
<td>6:30 p.m.</td>
<td>Hamburger, French Fries, salad at Kitchen table.</td>
<td>4</td>
<td>F</td>
</tr>
<tr>
<td>Snack</td>
<td>7 p.m. to 10 p.m.</td>
<td>Large bag of tortilla chips and entire bag of Pepperidge Farm Milano cookies while studying at Kitchen table.</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Hunger levels (1–5): 1 = not hungry; 5 = super hungry

† **Moods:**  
A = Happy; B = Content; C = Bored; D = Depressed; E = Rushed; F = Stressed; G = Tired; H = Lonely; I = Anxious; J = Angry
Evaluating Popular Diets

• Reduction of calories, not composition of diet, is key to weight loss
• People who diligently adhere to diets lose the most weight
  • High dropout rates for most extreme diets (Atkins and Ornish diets)
• Beware of fad diet claims and hype:
  • "It's carbs, not calories, that make you fat!"
  • "Lose seven pounds in one week!"
  • Celebrity-endorsed miracle weight-loss products
  • "Natural" substances help lose weight without risk
## Distinguishing Among Popular Diets

<table>
<thead>
<tr>
<th>Dietary Approach</th>
<th>Weight-Loss Claim</th>
<th>What You Eat</th>
<th>Pros</th>
<th>Cons</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Very low-calorie diet (VLCD)  | Severely limiting calories burns fat and reduces body weight | 400 to 800 calories per day; liquid meals containing vitamins, electrolytes, minerals, and essential fatty acids; high in protein (up to 125 g/day) | Quick weight loss of 15-20% in 12-16 weeks; improves glycemic control in type 2 diabetics, reduced hypertension and hyperlipidemia | Numerous side effects: fatigue, hypotension, headaches, dizziness, constipation, and gallstones in long-term use; loss of lean body tissue; regain 50% of weight lost in one year | • Medifast  
• Cabbage Soup  
• Cookie Diet |
| Balanced, reduced Calorie     | Moderate reduction of calories promotes weight loss at a healthy rate | 1,200 to 1,800 calories per day; balanced 45-65% carbohydrate, 20-30% fat, and 10-35% protein; wide variety of foods; portions are controlled | Average weight loss of 1 to 2 pounds per week; approach balances reduced food intake by portion sizes and exercise, which helps maintain lean body mass; incorporates behavior modification | Low adherence rates; some programs require prepackaged foods | • Jenny Craig  
• Weight Watchers  
• Nutri-System  
• The Biggest Loser |
| Restricted carbohydrate, high protein | Insulin promotes fat storage; low glycemic foods are more satisfying, which limits total food intake | < 20% carbohydrate, 55-65% fat, 25-30% protein; less than 100 g carbohydrate per day; excludes most fruits, grains, starchy vegetables, and legumes; allows meat, limited dairy, and fats | Hunger is controlled, weight loss, improved glycemic control; may improve HDL and triglycerides | Reduced glycogen, loss of lean body tissue and electrolytes; side effects include fatigue, headaches, dizziness, and constipation; nutritional deficiencies | • Dr. Atkins  
• South Beach  
• Belly Fat Cure  
• Wheat Belly Diet  
• Paleo Diet |
| High carbohydrate, low fat    | When fat is restricted, fewer calories are consumed | > 65% carbohydrate, < 20% fat, 10-20% protein; low-energy-dense plant foods: fruits, vegetables, whole grains; low or void of animal foods; limited nuts and seeds | Significant weight loss due to low calorie intake; allows you to eat more | Low adherence rates; limited food options; may have poor nutrient absorption due to low fat intake and high fiber | • Ornish  
• Pritikin  
• Pasta Diet |
Control of Appetite: Hunger and Satiety
Practical Nutrition Tips Video: Coffee Shop

Coffee Shop Strategies

with
Joan Salge Blake
Practical Nutrition Tips Video: 100 Calories

What Does 100 Calories Look Like?
Dealing with Extreme Obesity

• BMI > 40 = extreme obesity
  • High risk of heart disease, stroke, dying
  • Requires aggressive weight-loss treatment, including very-low-calorie diets, medications, and/or surgery
  • Very-low-calorie diets (< 800 calories) are short-term and must be medically supervised
  • Medications such as Orlistat, Belviq, and Qsymia can't replace a lower-calorie diet, physical activity, and behavior modification
Dealing with Extreme Obesity, Continued

- Gastric bypass and gastric banding result in higher levels of satiety and lower levels of hunger
  - Results in dramatic weight loss and reduction of hypertension, diabetes, high blood cholesterol, and sleep apnea
  - Small risk of gallstones, death from surgery
- Liposuction is performed for cosmetic reasons
  - Fat may reappear; results are not permanent
  - Complications such as infections, scars, swelling
Surgeries for Extreme Obesity

**Figure 10.13**

(a) In gastric bypass, the stomach is closed off and a small pouch is left that can hold about \( \frac{1}{4} \) cup of food at a time.

(b) In gastric banding, a silicone band is placed around the top of the stomach to greatly reduce its size.
ABC News Video: Overweight and Healthy?

World News Tonight
April 9, 2014

>> Diane Sawyer: There is a new debate underway
How Can You Maintain Weight Loss?

• **Weight cycling** (repeated gain and loss of body weight) is a common result of fad diets.
  
• Weight loss can be maintained if healthy habits used during weight loss are maintained.
  
• New, lower weight requires fewer calories to maintain weight.
  
  • Physical activity can close the "energy gap," which is easier than further reducing caloric intake.
  
  • Estimated that the energy gap is about 8 calories per pound of lost weight.
How Can You Gain Weight Healthfully?

• Gaining weight for the underweight is as challenging as losing weight is for the overweight
• Need to add at least 500 calories to daily energy intake for gain of 1 pound/week
  • Choose more energy-dense but nutritious foods from each food group
    • Examples: waffle instead of toast, coleslaw instead of cabbage
  • Eat more snacks during day to add more calories
More- and Less-Energy-Dense Food Choices, by Food Group

Figure 10.14
What Is Disordered Eating and What Are the Warning Signs?

- **Disordered eating**: abnormal and potentially harmful eating behaviors that do not meet specific criteria for eating disorders
- **Eating disorders**: psychological illnesses that involve specific abnormal eating behaviors and other factors
  - In United States, about 20 million women and 10 million men struggle with eating disorders at some point in life
    - Most are adolescent or young adult white, middle- or upper-middle-class females, but increasing among males, minorities, other age-groups
## Table 10.5 Diagnostic Criteria for Eating Disorders

<table>
<thead>
<tr>
<th>Eating Disorder</th>
<th>Diagnostic Criteria</th>
</tr>
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</table>
| **Anorexia Nervosa**            | - Restriction of energy intake relative to requirements leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health  
- Intense fear of gaining weight or becoming fat, even though underweight  
- Disturbance in the way one’s body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight |
| **Bulimia Nervosa**             | - Recurrent episodes of binge eating, which is characterized by BOTH of the following:  
  ➢ Eating in a discrete amount of time (within a 2-hour period) large amounts of food  
  ➢ Sense of lack of control over eating during an episode  
- Recurrent inappropriate compensatory behavior in order to prevent weight gain (purging)  
- The binge eating and compensatory behaviors both occur, on average, at least once per week for three months.  
- Self-evaluation is unduly influenced by body shape and weight.  
- The disturbance does not occur exclusively during episodes of anorexia nervosa. |
| **Binge Eating Disorder**       | - Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:  
  ➢ Eating, in a discrete period of time, an amount of food that is definitely larger than most people would eat in a similar period of time under similar circumstances  
  ➢ A sense of lack of control over eating during the episode (for example, a feeling that one cannot stop eating or control what or how much one is eating)  
- The binge eating episodes are associated with three (or more) of the following:  
  ➢ Eating much more rapidly than normal  
  ➢ Eating until feeling uncomfortably full  
  ➢ Eating large amounts of food when not feeling physically hungry  
  ➢ Eating alone because of feeling embarrassed by how much one is eating  
  ➢ Feeling disgusted with oneself, depressed, or very guilty afterward  
- Marked distress regarding binge eating is present.  
- The binge eating occurs, on average, at least once a week for three months.  
- The binge eating is not associated with the recurrent use of inappropriate compensatory behavior (for example, purging) and does not occur exclusively during the course of anorexia nervosa, bulimia nervosa, or avoidant/restrictive food intake disorder. |
| **Feeding or Eating Disorders Not Elsewhere Classified** | - Disordered eating behaviors that do not meet the criteria for anorexia nervosa, bulimia nervosa, or binge eating disorder, including orthorexia and night eating syndrome. |

What Is Disordered Eating and What Are the Warning Signs?, Continued

• No single factor causes eating disorders
• Sociocultural factors
  • Desire/social pressure to be thin or "cut"
• Genetic factors
  • Eating disorders "run in families"
• Psychological factors
  • Depression, anxiety, perfectionism, sense of control contribute
Factors That Contribute to Eating Disorders

**Sociocultural**
- Pressure to be thin
- Images of celebrities with low body weight
- Messages about food, weight, and dieting from media, family, and friends

**Psychological**
- Depression
- Low self-esteem
- Obsessive-compulsive disorder (OCD)
- Perfectionism
- Need for control

**Genetic**
- Biological predisposition
What Is Disordered Eating and What Are the Warning Signs?, Continued

- **Anorexia nervosa** results from severe calorie restriction
  - Self-starvation and excessive weight loss
  - Intense fear of being "fat"
  - Distorted body image: see oneself as fat when underweight
  - Health consequences: electrolyte imbalance (low blood potassium) can be fatal
  - Other risks: decrease in heart rate and blood pressure, lanugo (downy hair), osteoporosis
What Is Disordered Eating and What Are the Warning Signs?, Continued-2

- **Bulimia nervosa** involves cycle of binge eating and purging
  - Purging can include self-induced vomiting; excessive exercising; strict dieting or fasting; abuse of diet pills, laxatives, diuretics
    - Vomiting can cause tears in esophagus, swollen parotid glands, tooth decay, gum disease, broken blood vessels in eyes
  - Potentially fatal electrolyte imbalance can result
What Is Disordered Eating and What Are the Warning Signs?, Continued-3

- **Binge eating disorder** involves compulsive overeating (without purging)
  - Eat in secret, feelings of shame
  - Health effects are those associated with obesity
    - High blood pressure, cholesterol levels
    - Risk of heart disease, type 2 diabetes, gallbladder disease
What Is Disordered Eating and What Are the Warning Signs?, Continued

- Other disordered eating behaviors can be harmful
- Orthorexia: "healthy or righteous eating"
  - Fixation on eating the "right" foods
- Night eating syndrome: combination eating, sleep, mood disorder
  - Person consumes most calories after evening meal, wakes up at night to eat
- Pica: desire to consume nonnutritive substances (clay, dirt, chalk)
  - Can cause medical complications
A Closer Look at Body Image

• Body image is the way you perceive and what you believe about your physical appearance

• **Body dysmorphic disorder:** is a mental illness in which a person's preoccupation with minor or imaginary physical flaws cause significant distress

• Strategies to help maintain a positive body image:
  • Know and accept what determines your physical appearance (genetics, age, etc.)
  • Avoid dieting
  • Avoid comparing yourself to others
  • Recognize that you are a whole person and not just individual parts
  • Respect yourself and others based on the qualities of character and accomplishments, rather than appearance.
What Is Disordered Eating and What Are the Warning Signs?, Continued-5

• There are some common signs of disordered eating
  • Hair loss
  • Significant/sudden weight changes
  • *Russell's sign*: scar tissue on knuckles of fingers used to induce vomiting (bulimia nervosa)
  • Avoiding social situations where food is present
  • Weighing often, obsessively counting calories
  • Denial of problem
### Table 10.6 Warning Signs for Eating Disorders

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Explanation/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight is below 85% of ideal body weight</td>
<td>Refusal to accept and maintain body weight (even if it is within normal range)</td>
</tr>
<tr>
<td>Exercising excessively</td>
<td>Often exercise daily for long periods of time to burn calories and prevent weight gain. May skip work or class to exercise.</td>
</tr>
<tr>
<td>Preoccupation with food, weight, and diet</td>
<td>Constantly worry about amount and type of food eaten. May weigh themselves daily or several times per day.</td>
</tr>
<tr>
<td>Distorted body image</td>
<td>Do not see themselves as they truly are. May comment on being fat even if underweight.</td>
</tr>
<tr>
<td>Refusing to eat</td>
<td>Will avoid food in order to lose weight or prevent weight gain. May avoid only certain foods, such as those with fat and sugar.</td>
</tr>
<tr>
<td>Diet pill use or laxative use</td>
<td>Evidence of pill bottles, boxes, or packaging</td>
</tr>
<tr>
<td>Changes in mood</td>
<td>May become more withdrawn, depressed, or anxious, especially around food</td>
</tr>
<tr>
<td>Hair loss</td>
<td>Hair becomes thinner and falls out in large quantities.</td>
</tr>
<tr>
<td>Avoiding eating around others</td>
<td>Want to eat alone. Make excuses to avoid eating with others.</td>
</tr>
</tbody>
</table>
What Is Disordered Eating and What Are the Warning Signs?, Continued-6

• Eating disorders can be treated
• Multidisciplinary team approach is most effective
  • Psychological, medical, and nutrition professionals
• Nutritional approaches include:
  • Identifying binge triggers, safe and unsafe foods, hunger and fullness cues using food journals
  • Meal plans to ensure adequate calorie/nutrient intake (anorexia nervosa) or to avoid overeating (bulimia nervosa, binge eating disorder)
• Best treated in early stages; no "quick fix"
EDNOS: Most Dangerous, Unheard of Eating Disorder

>>> We were surprised to discover the most common and dangerous eating disorder