

## Principles of Physical Fitness

### Chapter Two

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### Physical Activity and Exercise for Health and Fitness

- Levels of physical activity have declined in recent years and remain low for all Americans
- The Centers of Disease Control and Prevention (CDC) reported the following:
  - 31% participate in some leisure activity
  - 40% are physically inactive
  - About 12% of Americans report exercising vigorously for 20 minutes 3 times per week, but actual studies show only 3% meet that parameter.
  - 54% of Americans with graduate degrees exercise compared to only 37% of high school dropouts

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### Physical Activity on a Continuum

- **Physical activity** is movement carried out by the skeletal muscles that requires energy
- **Exercise** refers to planned, structured, repetitive movement intended to improve or maintain physical fitness
- Levels of fitness depend on the following:
  - Heart's ability to pump blood
  - Energy-generating capacity of the cells
- Physical activity is essential to health and confers a wide variety of health benefits

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### Increasing Physical Activity to Improve Health and Wellness

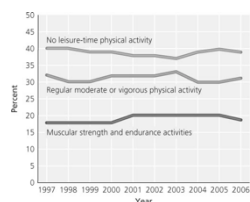
- 2008: The U.S. Dept. of Health and Human Services recommends the following:
  - 150 minutes of moderate-intensity aerobic exercise, or 75 minutes of vigorous-intensity aerobic exercise, per week
  - Increase the volume and intensity of an exercise for more health benefits
  - Healthy adults should do resistive exercises at least twice a week
  - Examples of moderate physical activity:
    - Brisk walking
    - Dancing
    - Swimming
    - Cycling
    - Yard work
  - Example of vigorous exercise: jogging



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## Current Levels of Physical Activity among American Adults



**FIGURE 2.1** Reported physical activity by American adults, 1997–2006.  
SOURCE: Physical Activity Guidelines Advisory Committee, 2008. Physical Activity Guidelines Advisory Committee Report, 2008, Washington, D.C.: U.S. Department of Health and Human Services.

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## Components of Health-related Fitness

- There are 5 areas of fitness which help establish health benefits
- Health-related fitness helps you withstand physical challenges and protects you from diseases
- The 5 components:
  - Cardiorespiratory Fitness
  - Muscular Strength
  - Muscular Endurance
  - Flexibility
  - Body Composition



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## Cardiorespiratory Fitness

- Ability to perform prolonged, large muscle, dynamic exercise at moderate to high levels of intensity.
  - Depends on the ability of the lungs to deliver oxygen from the environment to the bloodstream and the efficiency of the heart and nervous system
- When cardiorespiratory fitness improves:
  - The heart pumps more blood per heartbeat
  - Resting heart rate slows
  - Blood volume increases
  - Blood supply to tissue improves
  - The body can cool itself better
  - Resting blood pressure decreases
- Activities should be continuous, rhythmic movements of large muscle groups.
- Cardiorespiratory endurance exercise examples:
  - Walking
  - Jogging
  - Cycling
  - Aerobic dancing

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## Muscle Strength and Endurance

- **Muscular Strength** is the amount of force a muscle can produce in a single maximum effort
- **Muscular Endurance** is the ability to resist fatigue and sustain a given level of muscle tension for a given time.
- Benefits include:
  - Increased body mass
  - Increased metabolism
  - Increased bone density
  - Reduced effects of sarcopenia
  - Improved self-confidence and ability to manage stress
  - Improved posture and reduction of low back pain

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## Flexibility

- The ability to move the joints through their full range of motion
- Flexibility is affected by many factors such as joint structure, length and elasticity of connective tissue, and nervous system activity.
- Flexibility is needed in everyday routines.
- Benefits include:
  - Lowered risk of back injuries
  - Promotion of good posture and decreased risk of other joint injuries
  - Reduction in age-related stiffness



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## Body Composition

- The proportion of fat and fat-free mass (muscle, bone, water) in the body
- Healthy body composition is comprised of high levels of fat-free mass and an acceptable low level of body fat.
- The relative amount of body fat a person has does have an impact upon overall health and fitness.
- Too much body fat could have the following effects:
  - Heart disease
  - Insulin resistance
  - High blood pressure
  - Stroke
  - Joint problems
  - Type II Diabetes
  - Gallbladder disease
  - Cancer
  - Back pain
- The best way to lose fat is through exercise and a sensible diet.

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## Skill-Related Components of Fitness

- **Speed:** the ability to perform a movement in a short amount of time.
- **Power:** the ability to exert force rapidly, based on a combination of strength and speed.
- **Agility:** the ability to change the position of the body quickly and accurately.
- **Balance:** the ability to maintain equilibrium while moving or while stationary
- **Coordination:** the ability to perform a motor tasks accurately and smoothly using body movements and the senses.
- **Reaction and Movement Time:** the ability to respond and react quickly to a stimulus.

*Skill-related fitness tends to be sport specific and is best developed through practice*

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## Principles of Physical Training: Adaptation to Stress

- The goal of physical training is to produce these long-term changes and improvements in the body's functioning.
- Over time, immediate, short-term adjustments translate into long-term changes and improvements.
- These principles include:
  - **Specificity:** the training principle that the body adapts to the particular type and amount of stress placed on it.
  - **Progressive overload:** the training principle that placing increasing amounts of stress on the body cause adaptations that improve fitness.
  - **Reversibility:** the training principle that the body will return to its original homeostatic state when amount of physical stress is removed for a specific time.
  - **Individual differences:** each individual's body adapts to the stress differently.

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### Specificity: Adapting to Type of Training

- To develop a particular fitness or skill component, you must perform exercises designed specifically for that component; this is the principle of specificity.
- Weight training will develop muscular strength but will not be very effective in improving cardiorespiratory endurance or flexibility.
- A well-rounded exercise program includes all components of fitness designed to improve different parts of the body or towards specific sport activities

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### Progressive Overload: Adapting to Amount of Training and the FITT Principle

- The amount of overload is important since too little will not have much effect upon fitness levels and too much will increase the likelihood of an injury.
- Progression is critical since exercising at the same levels will not provide adaptations and can lead to a plateau.
- **FITT**: a principle for overload
  - **F**requency—How often
  - **I**ntensity—How hard
  - **T**ime—How long (duration)
  - **T**ype—Mode of activity



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### Reversibility: Adapting to a Reduction in Training

- The body adjusts to low levels of activity the same way that it does to higher levels.
- Fitness is a reversible adaptation.
- If you stop exercising, up to 50% of fitness improvements are lost within 2 months.
- Not all fitness improvements are lost within 2 months.
- Strength fitness can be maintained as infrequently as once a week compared to cardiovascular or cellular fitness levels.

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### Designing Your Own Exercise Program

- Medical clearance
  - Men under the age of 40 and women under 50: exercise is probably safe
  - PAR-Q
  - GXT
- Assessment
  - Assess your fitness level for all 5 health-related fitness components
- Set goals
- Choose activities for a balanced program

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### Figure 2.3 Physical Activity Pyramid



FIGURE 2.3 Physical activity pyramid.

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### Figure 2.4 Health and fitness benefits of different amounts of physical activity and exercise

	Lifestyle physical activity	Moderate-intensity physical activity	Vigorous-intensity physical activity
<b>Description</b>	Moderate physical activity (150 minutes per week, muscle-strengthening exercises 2 or more days per week)	Cardiorespiratory endurance exercise (30-60 minutes, 3-5 days per week), strength training 2-3 nonconsecutive days per week, and muscle-strengthening exercises 2 or more days per week	Cardiorespiratory endurance exercise (30-60 minutes, 3-5 days per week), strength training 2-3 nonconsecutive days per week, and muscle-strengthening exercises 2 or more days per week
<b>Sample activities or program</b>	<ul style="list-style-type: none"> <li>Walking to and from work, 15 minutes each way</li> <li>Climb to and from work, 15 minutes each way</li> <li>Carrying food for 30 minutes</li> <li>Playing basketball for 30 minutes</li> <li>Muscle exercises such as push-ups, squats, or ball exercises</li> </ul>	<ul style="list-style-type: none"> <li>Jogging for 30 minutes, 3 days per week</li> <li>Block training, total of 30 minutes, 2 days per week</li> <li>Swimming exercises, 3 days per week</li> </ul>	<ul style="list-style-type: none"> <li>Jogging for 45 minutes, 3 days per week</li> <li>Block training, total of 45 minutes, 2 days per week</li> <li>Strength training with weight lifting, 4 sets, 2 days per week</li> <li>Weight training, 3 sets of 10 exercises, 3 days per week</li> <li>Swimming exercises, 6 days per week</li> </ul>
<b>Health and fitness benefits</b>	Lower blood cholesterol levels, reduced body fat, better control of blood pressure, improved respiratory health, and overall better respiratory performance and quality of life, reduced risk of some chronic diseases	Greater amount of activity can help prevent weight gain and promote weight loss	Greater amount of activity can help prevent weight gain and promote weight loss

FIGURE 2.4 Health and fitness benefits of different amounts of physical activity and exercise.

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### Guidelines for Training

- Train the way you want your body to change
- Train regularly
- Start slowly and get in shape gradually
- Warm up before exercise
- Cool down after exercise
- Exercise safely
- Listen to your body and get adequate rest
- Cycle the volume and intensity of your workouts
- Try training with a partner
- Vary your activities
- Train your mind
- Fuel your activity appropriately
- Have fun
- Track your progress
- Keep your exercise program in perspective



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### Figure 2.5 Progression of an Exercise Program

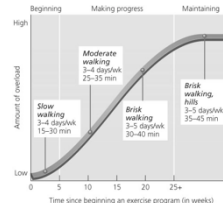


FIGURE 2.5 Progression of an exercise program. This figure shows how the amount of overload is increased gradually over time in a sample walking program. Regardless of the activity chosen, it is important that an exercise program begin slowly and progress gradually. Once you achieve the desired level of fitness, you can maintain it by exercising 3-5 days a week.

SOURCE: Progression data from American College of Sports Medicine, 2009. ACSM's Guidelines for Exercise Testing and Prescription, 8th ed. Philadelphia: Lippincott Williams and Wilkins.

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