

# Pump It Up: Strength Training Basics Using Free Weights

Lisa Washburn, DrPH  
Assistant Professor -  
Health

LaVona Traywick, Ph.D.  
Associate Professor -  
Gerontology

Jessica Vincent  
County Extension Agent -  
Family and Consumer  
Sciences

Lauren Copeland  
Program Technician -  
Health

Muscle mass naturally decreases as people age. This age-related muscle loss is called sarcopenia. Regardless of age, strength training can help preserve and restore muscle mass. According to the Centers for Disease Control and Prevention, strength training is safe and effective for women and men of all ages, including those with health concerns. In fact, those with some health conditions – including heart disease, obesity and arthritis – often benefit most from an exercise program including regular strength training. Increased muscle strength can make a big difference in physical fitness.

## Components of Physical Fitness

The five components of physical fitness include **body composition, cardiorespiratory endurance, flexibility, muscular strength** and **muscular endurance**.

**Body composition** describes the proportion of water, fat, muscle and bone in the body. Body composition should not be confused with Body Mass Index, or BMI. BMI is an indirect way to assess body composition. BMI is calculated from a person's height and weight and is a fairly reliable indicator of body fatness in most people. However, BMI does not take into account the ratio of fat to muscle. People who are very fit with dense muscle mass may have a high BMI but little body fat. Waist



circumference, skinfold thickness or other direct measures of body fat may better indicate body composition as a component of fitness for highly trained athletes.

Body composition is expressed as a percentage of body fat. There are currently no universally accepted norms for body composition. For men, a range of 10 percent to 22 percent body fat is acceptable. The acceptable range for women is 20 percent to 32 percent body fat. Men are considered “at risk” when their body fat is greater than 25 percent. For women, body fat greater than 32 percent or less than 8 percent is considered “at risk.”

**Cardiorespiratory endurance**, or aerobic fitness, refers to the body's ability to perform prolonged exercise at moderate to high levels of intensity. Aerobic, or cardiorespiratory, exercises require supplying oxygen and other nutrients to the muscles. Cardiorespiratory endurance is a measure of how well the heart and lungs supply and use oxygen during aerobic activity. Cardiorespiratory endurance is typically estimated by oxygen consumption, or the amount

Visit our web site at:  
<https://www.uaex.uada.edu>

of oxygen used by muscles during aerobic activity. (For information on aerobic exercise, see *Increasing Physical Activity as We Age: Endurance*, FSFCS32.) When people are described as being “in shape,” it usually means they have good cardiorespiratory endurance.

**Flexibility** is the ability to move a joint through a full, pain-free range of motion. Flexibility is highly specific to the body part and joint, so no single, accurate measure of body flexibility exists. For example, a person may be very flexible in the arms and shoulders but unable to touch his or her toes. That person would have good shoulder flexibility as measured with a “shoulder flexibility test” but poor lower body flexibility as measured with a “sit and reach flexibility test.” Stretching is one key way to improve flexibility. Flexibility becomes even more important as people age. Decreased range of motion affects ability to perform many activities of daily living (ADLs). Regular flexibility exercises can help maintain range of motion. (For information on stretching, see *Increasing Physical Activity as We Age: Stretching*, FSFCS34.) Flexibility is important for the entire body.

## Muscular Strength vs. Muscular Endurance

Strength training works to improve two components of health-related physical fitness: muscular strength and muscular endurance. **Muscular strength** is a measure of how much force the muscles can exert against resistance. In strength training, resistance is usually supplied by some type of weight. Muscular strength is usually expressed in terms of one-repetition maximum (1-RM), or the heaviest weight a person can lift one time in proper form. **Muscular endurance** is a measure of how many times (or how long) the muscles can repeat a movement, or specific exertion of force. In strength training, this usually refers to the number of repetitions performed of a specific exercise before the muscles become tired and need to rest. Both muscular strength and muscular endurance are important to consider when engaging in a strength training program. Muscular endurance is increased by lifting weights of lower resistance or pounds, which decreases intensity, and performing a higher number of repetitions. In contrast, lifting high-resistance or heavy weights, which increases intensity, for just a few reps increases muscular strength. Resistance training improves both muscular strength and endurance. Your exercise routine will determine whether strength or endurance is the primary focus.

## Benefits of Strength Training

Increased bone density is one of the most significant benefits of strength or resistance training. Increased bone density can decrease osteoporosis risk. Strength training is important for senior adults because it may reduce the risk of falling and reduce injuries when a fall does occur. Strength training has also been shown to reduce the risk of developing musculoskeletal disorders and increase functional capacity, which increases quality of life. Many strength training benefits are similar to those of endurance or aerobic exercise.

### General Benefits of Exercise

- Increases lean body mass
- Increases resting metabolic rate
- Improves body composition
- Increases bone density
- Reduces the risk of osteoporosis
- Maintains functional capacity to perform activities of daily living
- Improves nerve-muscle coordination
- Improves balance
- Reduces injury risk
- Reduces pain and disability for those with osteoporosis
- Reduces low back pain
- Enhances athletic performance

## Strength Training Guidelines

Many different strategies for strength training exist. A strength training plan designed for an athlete will differ from that designed for a sedentary, middle-aged adult. There is no single best strategy or plan for strength training, but general guidelines from the American College of Sports Medicine can inform your personal strength training plan. (See Table 1.) Always consult with your physician prior to starting a strength training program.

The following is an example of a strength training exercise routine. Perform two to three sets of eight to twelve repetitions for each exercise. You will need two sets of weights, one heavier for some exercises. For example, most people can lift more weight when performing the biceps curl than the triceps extension.



**Table 1. General Guidelines for Strength/Resistance Training**

<b>Frequency</b>	Each major muscle group should be exercised 2 to 3 days per week
<b>Intensity</b>	To improve strength: <ul style="list-style-type: none"><li>• 40% to 50% of 1 Repetition Maximum (1-RM) for sedentary beginners or senior adults beginning an exercise program</li><li>• 60% to 70% of 1-RM for beginner to intermediate exercisers</li><li>• 80% or greater 1-RM for experienced exercisers</li></ul> (1-RM is the maximum amount of weight you can lift one time.)
<b>Time</b>	• No specific duration has been identified for effectiveness
<b>Type</b>	<ul style="list-style-type: none"><li>• Resistance exercises involving each major muscle group are recommended</li><li>• Exercises should target both agonist (primary) and antagonist (opposing) muscle groups</li><li>• A variety of training methods can be used, such as body weight, free weights, stretch tubes, medicine balls, etc.</li></ul>
<b>Repetitions</b>	<ul style="list-style-type: none"><li>• 8 to 12 repetitions are recommended to improve strength and power</li><li>• 15 to 20 reps are recommended to improve muscular endurance</li></ul>
<b>Sets</b>	<ul style="list-style-type: none"><li>• 2 to 4 sets are recommended for strength (A single set of resistance exercises for each muscle group can be effective depending on the ability of the individual and the amount of weight lifted)</li><li>• Two or more sets are effective in improving muscular endurance</li></ul>
<b>Progression</b>	• Individuals should continue to progressively overload the targeted muscles by gradually increasing resistance, repetitions, number of sets or frequency of training

## Exercise Routine

### Overhead Press

1. Stand with your feet shoulder-width apart and knees straight but not locked.
2. Hold a dumbbell in each hand at shoulder height with palms facing forward.
3. Slowly raise both arms up over your head, keeping your elbows slightly bent and in line with your body.
4. Pause for a breath, approximately 1 second.
5. Lower the dumbbells back to your shoulders.



### Triceps Extension

1. Stand with your feet shoulder-width apart and knees slightly bent.
2. Hold a dumbbell in each hand and raise them over your head.
3. Lower the dumbbells behind your head while keeping your elbows pointed forward.
4. Slowly return the dumbbells to the starting position.

*\*Note: This exercise may be performed using a single dumbbell or a pair of dumbbells.*



## Biceps Curl

1. Stand with your feet shoulder-width apart and knees straight but not locked.
2. Hold weights straight down at your side or slightly in front of thighs, palms facing forward.
3. Slowly bend your elbows to lift the weights towards your shoulders.
4. Lower the weights back down to your side.



## Marching Curl

1. Transfer your body weight to your right leg and bring your left leg up in a high-step march while you bend forward slightly to contract your abdominal muscles.
2. Lower the left leg and repeat on the opposite leg.
3. Continue the movement in a marching rhythm.



## Side Hip Raise

1. Stand with your feet shoulder-width apart, toes facing forward, knees slightly bent. You may hold on to a sturdy chair for support if needed.
2. Slowly lift one leg out to the side, keeping your back straight, torso upright, and your toes facing forward.
3. Slowly lower your leg.
4. Alternate sides, or perform all reps on one side and repeat on the other for one set.

*\*This exercise can be performed with or without ankle weights.*



## Hip Extension

1. Stand with your feet hip-width apart.
2. Shift your weight to your right leg.
3. Keeping your foot flexed and leg straight, raise your left leg behind you until your foot is about 3 to 6 inches off the floor. Try to do this without leaning forward.
4. Tighten your abdominal muscles to help keep from arching your back.
5. Keeping your leg straight, return left foot to the floor.
6. Perform all reps on one side and repeat on the other for one set.

*\*This exercise can be performed with or without ankle weights.*



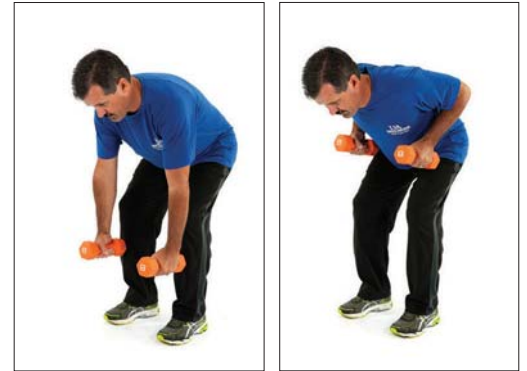
## Dead Lift

1. Stand with feet shoulder-width apart holding free weights in front of your body with palms facing your legs.
2. With knees straight, lower weights towards the top of your feet by bending forward at the hips. (Only bend as far as your hips will flex; beginners aim for mid-shin.) Keep the weights close to your legs.
3. Keeping your back straight, slowly return to standing by raising the torso to stand upright.



## Bent Over Row

1. Stand with feet at least hip-width apart.
2. Expand your chest and squeeze your shoulder blades together.
3. Holding a dumbbell in each hand, slowly bend forward from the hips, allowing your arms to hang and knees to bend.
4. Pull your elbows to your side and raise the upper arm level with or slightly higher than your back.
5. Shift your shoulders back slightly and squeeze between your shoulder blades as you pause.
6. Lower your arms slowly.



## Squat

1. Stand with your feet slightly wider than shoulder-width apart, crossing your arms in front of your chest.
2. Keeping your chest lifted and your back, neck and head in a straight line, slowly lower yourself back, as if you were going to sit in a chair.
3. Stand up slowly, pushing up from your heels through your lower legs, thighs, hips and buttocks. Be sure your knees do not move in front of your toes.

*\*For added resistance, this exercise can be performed by holding free weights in each hand.*



## Calf Raise

1. Stand up straight with your feet shoulder-width apart. (If needed, you may stand behind a sturdy chair, holding on for balance.)
2. Slowly stand on tiptoes, as high as possible.
3. Slowly lower heels to the floor.

*\*For added resistance, this exercise can be performed with ankle weights or by holding free weights in each hand.*



The poster – MP527, *Pump It Up: Strength Training Basics* – is available to order from the University of Arkansas Division of Agriculture, Cooperative Extension Service web site at [www.uaex.uada.edu](http://www.uaex.uada.edu) (click the “Publications” link).



## References

- American College of Sports Medicine (2010). *ACSM's Resource Manual for Guidelines for Exercise Testing and Prescription*, 6th edition. Baltimore, MD: Lippincott, Williams & Wilkins.
- Baltaci, G., Un, N., Tunay, V., Besler, A., and Gerceker, S. (2003). Comparison of three different sit and reach tests for measurement of hamstring flexibility in female university students. *British Journal of Sports Medicine*, 37(1), 59-61.
- Centers for Disease Control and Prevention (2011). *Why Strength Training?* <http://www.cdc.gov/physicalactivity/growingstronger/why/index.html>. Retrieved 11-14-15.
- Garber, C. E., Blissmer, B., Deschenes, M.R., Franklin, B.A., Lamonte, M.J., Lee, I.M., and Swain, D.P. (2011). American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise. *Medicine and Science in Sports and Exercise*, 43(7), 1334-1359.
- Haskell, W. L., Lee, I., Pate, R.R., Powle, K.E., Blair, S.N., Franklin, B.A., and Bauman, A. (2007). Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Medicine and Science in Sports and Exercise*, 39(8), 1423-1434.
- Karageanes, S. J. (2005). *Principals of Manual Sports Medicine*, Philadelphia, PA: Lippincott, Williams & Wilkins.
- Nelson, M.E., Rejeski, W.J., Blair, S.N., Duncan, P.W., Judge, J.O., King, A.C., and Castaneda-Sceppa, C. (2007). Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association. *Medicine and Science in Sports and Exercise*, 39(8), 1435-1445.
- Ratamess, N.A., Alvar, B.A., Evetoch, T.K., Housh, T.J., Kibler, W.B., and Kraemer, W. J. (2009). Progression models in resistance training for health adults [ACSM position stand]. *Medicine and Science in Sports and Exercise*, 41(3), 687-708.
- Traywick, L. (2009). *Increasing Physical Activity as We Age: Exercise Recommendations*, FSFCS30, University of Arkansas Division of Agriculture Cooperative Extension Service.
- Traywick, L. and Cobb, K. (2009). *Increasing Physical Activity as We Age: Endurance*, FSFCS32, University of Arkansas Division of Agriculture Cooperative Extension Service.
- Traywick, L. (2009). *Increasing Physical Activity as We Age: Strength Training*, FSFCS33, University of Arkansas Division of Agriculture Cooperative Extension Service.
- Traywick, L. and Cobb, K. (2009). *Increasing Physical Activity as We Age: Stretching*, FSFCS34, University of Arkansas Division of Agriculture Cooperative Extension Service.
- U.S. Department of Health and Human Services (2008). *2008 Physical Activity Guidelines for Americans*. ODPHP Publication No. U0036.
- Williams, M.A., Haskell, W.L., Ades, P.A., Amsterdam, E.A., Bittner, V., Franklin, B.A., and Stewart, K.J. (2007). Resistance exercise in individuals with and without cardiovascular disease: 2007 update. *Circulation*, 116(5), 572-584.

Photo Credit: Kerry Rodtnick from the University of Arkansas Division of Agriculture.

Printed by University of Arkansas Cooperative Extension Service Printing Services.

**DR. LISA WASHBURN** is assistant professor - health, **DR. LaVONA TRAYWICK** is associate professor - gerontology, **JESSICA VINCENT** is county Extension agent - family and consumer sciences, and **LAUREN COPELAND** is program technician - health. All are with the University of Arkansas Division of Agriculture. Washburn, Traywick and Copeland are located in Little Rock and Vincent is located in Hot Springs.

FSFCS18-PD-12-2014N

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director, Cooperative Extension Service, University of Arkansas. The Arkansas Cooperative Extension Service offers its programs to all eligible persons regardless of race, color, sex, gender identity, sexual orientation, national origin, religion, age, disability, marital or veteran status, genetic information, or any other legally protected status, and is an Affirmative Action/Equal Opportunity Employer.