

Lesson 7.2

Benefits of Flexibility

Student Learning Objectives

After completing this lesson you will be able to

- explain how good flexibility improves your health, wellness, and fitness;
- name some good tests of flexibility and describe how to perform them;
- explain how range of motion is important to performance in physical activity; and
- describe some guidelines for safely using a backpack.

Lesson Vocabulary

cramp, extension, flexion, hypermobility

When you do flexibility exercises, you get health, wellness, and fitness benefits. Can you describe some of the benefits of stretching and good flexibility? Do you have good flexibility? How can you tell whether you have good flexibility? When you finish this lesson, you'll know the answers to these questions. You'll also understand the importance of range of motion to your performance in physical activity and know more about the safe use of backpacks.

What Are the Benefits of Flexibility?

There are many benefits to being flexible, including good health, good posture, reduced risk of injury, and improved performance. One of the health benefits of good flexibility is the prevention of back pain. Back pain is a major cause of missed work and results in millions of dollars in medical expenses each year. As many as 80 percent of American adults experience back pain at some time in their lives. But back pain isn't just a problem for adults. Nearly one-third of preteen children have experienced some type of back pain, and the incidence of back problems among teens is nearly as high as for adults. Having good muscle fitness and flexibility in the back, chest, shoulder, neck,

and upper leg muscles can reduce the risk of back problems.

Poor flexibility can also contribute to poor posture (figure 7.3). Short muscles in the chest

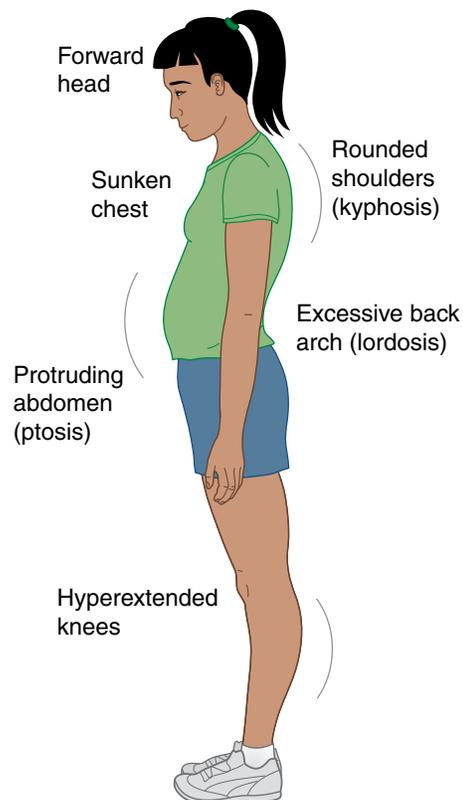


FIGURE 7.3 Poor flexibility can contribute to poor posture.

can lead to rounded shoulders and can cause the head to lean forward. Short muscles in the back and the back of the leg can cause a curve in the lower back that can result in muscle soreness and pain. Regular stretching can help you maintain good posture.

If a muscle is too short, it's at risk of injury. Frequently injured muscles include the hamstrings (the back of the upper leg), the calf (the back of the lower leg), the quadriceps (the front of the upper leg), and the muscles of the lower back. Regular stretching can lengthen these



Science in Action

Backpacks

In this lesson you learned that back pain is a very common problem. What you may not know is that carrying a backpack can be a cause of back pain and other injuries. Medical researchers report that nearly 14,000 children and teens have backpack-related problems each year. The most common injuries are neck, shoulder, and back pain and muscle strains. Improper use of backpacks can also contribute to poor posture and muscle imbalance. The National Safety Council and two different physicians' organizations have made recommendations for safe use of backpacks. The following guidelines summarize the scientific recommendations of these groups:

- Don't carry a backpack that is heavier than 10 to 20 percent of your body weight.
- Limit what you carry. Carry only necessary objects.
- Choose a backpack that has two wide padded shoulder straps and a waist strap.
- Learn how to use shoulder and waist straps properly.
- Always use both shoulder straps to avoid stress on one shoulder and to keep the backpack close to your back.
- Use a waist strap to reduce excess movement of the backpack.
- Organize objects in your backpack. Place heavy objects low and at the center of the backpack.
- If possible, store heavy objects in a desk or locker to avoid overloading your backpack.
- Use the leg muscles when standing up with a backpack. Avoid bending forward at the waist while carrying the pack; this creates considerable stress on the back muscles.
- Do muscle fitness and flexibility exercises to prepare you to carry the backpack efficiently.



Discussion Question

How will you use these guidelines to help you use your backpack more safely?

muscles and reduce the risk of injury. Also, these muscles may **cramp** during exercise. Statically stretching a muscle that has a cramp can cause the cramp to go away. For example, the calf stretch shown in lesson 7.1 can be used to stop a cramp in the calf muscle.

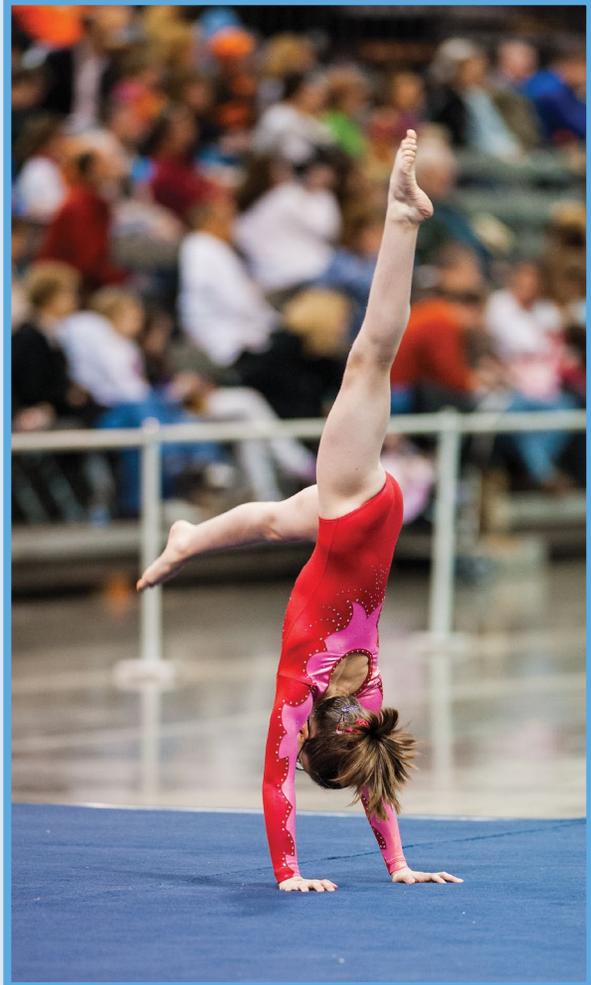
Fit Fact

Muscle Cramps

Muscle cramps are often caused by dehydration (not drinking enough water). Replacing water lost when you sweat can help prevent cramps. Static stretching can help relieve muscle cramps.

Good flexibility can also enhance performance in sports and in daily life. A gymnast or a diver must have good flexibility to perform well. The same is true for skateboarding and playing hacky sack. Without good flexibility, you can't perform at your best. Good flexibility is also necessary for functional fitness. Functional fitness refers to your ability to perform tasks of normal daily life. For example, a person with poor range of motion in the neck would have difficulty backing up in a car because turning the head to look backward would be hard to do. A person with short hamstring muscles would have a hard time bending over to pick up an object from the ground or tie a shoe.

Good flexibility can enhance your performance in many activities.





Range of Motion

Your body joints allow a certain amount of motion in each possible direction, and exceeding that limit can cause injury.

A joint is the location where your bones (your body's levers) join together. Each joint allows motion in certain directions, and in each direction there is a range of motion. The amount of movement that a joint allows is called range of motion. Some joints allow movement in more directions than others. For example, the hip joint is where the bones of the pelvis join with the bones of the thigh. The hip joint allows forward and backward movement (see figure 7.4). The thigh can also be moved to the side or rotated (moved in a circle) around the hip joint. The upper arm can be moved in similar ways around the shoulder joint (see figure 7.5).

The knees and elbows have more limited directions of motion (see figures 7.6 and 7.7). They can flex and extend, but they don't bend sideways or twist. **Flexion** refers to reducing the angle of a joint as in bending the elbow to lift a glass of water. **Extension** refers to increasing the angle of a joint as in lowering a glass of water after drinking from it.

You should know how much range of motion a joint will allow when doing flexibility and muscle fitness exercises. Forcing a joint to move beyond a safe range of motion in any direction can result in injury to ligaments, tendons, and muscles. For example, doing an exercise such as a full squat (excessive flexion) adds stress on the knee.

If you know about the normal range of motion of your joints, you can avoid exercises and movements that can cause injury. Stretching to increase flexibility can increase range of motion by lengthening tendons and muscles. However, stretching beyond the normal range of motion can be dangerous, because it can leave a joint too loose to provide needed stability for the body. **Hypermobility** is a term used to describe joints that lack stability and have too much range of motion. When stretching to increase flexibility, don't force joints to

move in directions where they have no range of motion. For instance, twisting or bending sideways at the knee can cause damage to the knee ligaments, which hold the joint together.

Applying the Principle

As you learned earlier, each joint has its own range of motion in each possible direction. Movements that cause a joint to move beyond its normal range of motion in a particular direction can cause small injuries in the joint that can lead to bigger injuries later in life. An example of movements that cause too much range of motion in joints is too much bending (flexion) of the knee by a catcher in baseball. That's why catchers wear special pads on the backs of their legs to stop them from doing a full squat.

Sometimes performance in sport requires excessive range of movement, as in a back bend in gymnastics and dancing. For this reason, it is important for gymnasts and dancers to have both long muscles (to allow range of motions) and strong muscles (to support the joint).

In which direction(s) is it appropriate to move each of these joints? In which direction(s) is it not appropriate? Identify an activity that uses each of these joints in the best range of motion.

- Hip
- Shoulder
- Knee
- Elbow

Principles in Practice

It's important to know how to move joints through a normal range of motion to prevent injury. Move each of the following joints through its comfortable range of motion in each direction to determine your current range of motion: shoulders, elbows, wrists, hips, knees, ankles, and neck. Do you have the same range of motion on both sides of your body?

(continued)

Range of Motion *(continued)*

Avoid exercises and activities that require unsafe ranges of motion, and practice only exercises that have a safe range of motion. All of the exercises in this book have a safe range of motion except those that are shown for the

purpose of describing unsafe exercises. The purpose of exercise is to improve your ability to move, not to damage your joints, muscles, or bones.



Figure 7.4 Running hurdles requires good range of motion in the hips.

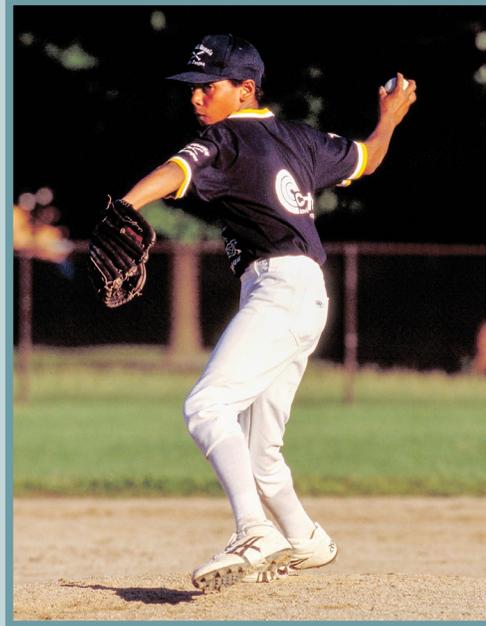


Figure 7.5 Pitching in baseball requires good range of motion in the shoulders.



Figure 7.6 The hip allows motion in several directions, while the knee allows motion only in flexion or extension.



Figure 7.7 The elbow allows only flexion and extension, while the shoulder allows motion in several directions.

The Back-Saver Sit-and-Reach Test of Flexibility

The back-saver sit-and-reach test measures the flexibility of your lower back and the muscles on the back of your thigh (hamstrings). As you take the test, use the activity sheet supplied by your teacher to record your results and answer the questions about stretching.

1. Place a measuring stick such as a yardstick on top of a 12-inch-high (31 centimeters) box. Have the stick extend 9 inches (23 centimeters) over the box with the lower numbers toward you.
2. To measure flexibility of your right leg, fully extend it and place your right foot flat against the box. Bend your left leg with the knee turned out and your left foot 2 to 3 inches (5 to 8 centimeters) to the side of your straight right leg.
3. Extend your arms forward over the measuring stick. Place your hands on the stick, one on top of the other, with the palms facing down. The middle fingers should be together with the tips of one finger exactly on top of the other.
4. Lean forward and reach with the arms and fingers four times. On the fourth reach, hold the position for 3 seconds and observe the inch mark below your fingertips. Then record your score to the nearest inch.



5. Repeat the test with the left leg straight. Consult table 7.2 to see if you're in the healthy fitness zone, and write the results on your activity sheet.

Note: Warm up before performing this test.

TABLE 7.2 Healthy Fitness Zone for Flexibility (Back-Saver Sit-and-Reach)

Age	Needs improvement	Healthy fitness zone
Males		
10	Less than 8 inches	8 inches
11	Less than 8 inches	8 inches
12	Less than 8 inches	8 inches
13	Less than 8 inches	8 inches
14	Less than 8 inches	8 inches
15+	Less than 8 inches	8 inches
Females		
10	Less than 9 inches	9 inches
11	Less than 10 inches	10 inches
12	Less than 10 inches	10 inches
13	Less than 10 inches	10 inches
14	Less than 10 inches	10 inches
15+	Less than 12 inches	12 inches

8 inches = 20 centimeters; 9 inches = 23 centimeters; 10 inches = 25 centimeters; 12 inches = 31 centimeters.

Adapted from The Cooper Institute 2017.

What Are Some Good Tests of Flexibility?

To be healthy and to perform effectively, you need good flexibility and full range of motion in all joints. There are many tests of flexibility for many parts of the body. The back-saver sit-and-reach is one of the most common tests and is included in FitnessGram (see table 7.2). If you reach the healthy fitness zone for your age and sex, it shows that you have long muscles in the back of your legs and in your back. Because you might have good flexibility on one side of your body and not on the other, you must do the back-saver sit-and-reach test on both sides.

You can have flexibility in one part of the body and not have it in another. The back-saver sit-and-reach test assesses range of motion in the lower body. A shoulder stretch test, sometimes called the zipper, assesses shoulder flexibility and is an optional test in FitnessGram. Your teacher may have you perform the zipper test.

Once you've taken a flexibility test, you'll need to determine if your score is in the healthy fitness zone. Use table 7.2 to see if you're in the healthy fitness zone for the back-saver sit-and-reach test. If you fall below the healthy fitness zone, you should improve your flexibility. If you're in the healthy fitness zone, you might want to do regular stretching exercises



The “zipper test” is a test of upper body flexibility.

to become even more flexible. Scores above the healthy fitness zone may be beneficial to those interested in athletic and specific types of performance, but they're not necessary to achieve the other benefits described earlier in this chapter.

Lesson Review

- 1 How does good flexibility improve your health, wellness, and fitness?
- 2 What are some good tests of flexibility?
- 3 How is range of motion important to performance in physical activity?
- 4 What are some guidelines for safely using a backpack?

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