

# ***FLEXIBILITY***



*Sports Medicine  
Division*

---

---

Flexibility is the range of motion of a joint. It is somewhat genetically determined but can be increased and refined through proper stretching exercises. The terms flexibility and stretching are often used synonymously. However, an athlete can be flexible without stretching and conversely, an athlete can stretch without gaining flexibility.

Each sport has specific flexibility requirements. Some sports, such as gymnastics and figure skating, require extensive flexibility for successful participation. Other sports require joint specific flexibility. For example, swimmers need shoulder flexibility and track hurdlers need hip flexibility.

Some athletes are successful in spite of flexibility problems. However, adequate flexibility permits better technique -- which should lead to better performance!

In the past, medical practitioners tested athletes and classified them as flexible or non-flexible. Theory followed that flexible athletes were more prone to ligament injuries since their joints were hypermobile or loose. Flexible athletes were given strengthening programs so muscles could protect loose joints. Inflexible athletes were more prone to muscle injuries since their muscles absorbed forces not dissipated by joint range of motion. These athletes were given flexibility programs to increase joint range of motion.

Later studies did not support this theory. Additionally, more sensitive tests found athletes could have a flexible upper body and an inflexible lower or vice versa. An athlete may be flexible in some joints but not in others.

.....

## ***STRUCTURES LIMITING FLEXIBILITY***

Flexibility is determined by the bony construction of a joint and the soft tissues surrounding it. Soft tissues include ligaments, joint capsules, tendons and muscles crossing the joint, subcutaneous fat, and skin overlying the joint.

Certain joints permit more motion because of their construction. Ball and socket joints, like the shoulder and hip, permit the most motion. Hinge joints, such as the fingers, permit motion only in one direction. Some joints, like the radio-ulnar joint at the elbow, pivot one bone on another. The small joints between the spinal vertebrae permit small sliding-type motions individually, though several joints may combine to produce larger motions.

The joint capsule and ligaments support the joint and permit motion determined by a joint's anatomical construction and oppose any abnormal motion. If the joint capsule or ligaments are injured, resulting scar tissue may limit motion. Conversely, a torn joint capsule or ligament may permit too much motion or motion in inappropriate directions.

Tendons and muscles crossing a joint also affect its range of motion. If the muscles and tendons are tight, joint motion is limited. This tightness is alleviated through aggressive stretching.

If the skin over a joint has been injured, it may lose its elastic properties and not stretch. For example, a scar from a burn may not stretch as the joint moves, limiting motion.

If a person is overweight (not usually a problem with athletes), motion may be limited by two body parts running into each other. For example, hip motion may be limited by a large abdomen hitting the thighs rather than hamstring muscle tightness.

## ***TYPES OF STRETCHING***

Four types of stretching are commonly used.

1. ***Ballistic stretching*** uses a bouncing motion to increase joint range of motion. While an argument may be made that sports are ballistic in nature and stretching should be similar for specificity of training, ballistic stretching causes a protective muscular reflex, the stretch reflex, to fire and shorten the muscle while it is being stretched. Since the athlete is trying to lengthen the muscle while the stretch reflex is contracting it, there is an increased chance of injury while stretching ballistically.
2. ***Static stretching*** applies a slow, controlled lengthening force to the muscle until a comfortable stretching sensation is felt. This position is held for 30 seconds. As the stretching sensation diminishes, tension is increased to re-establish the original sensation. Research shows that one 30 second stretch is effective for increasing flexibility.
3. ***Contract-relax stretching*** uses neuromuscular reflexes to stretch more effectively. A muscle is first contracted isometrically, without joint motion, for 3-5 seconds then stretched statically for 15-30 seconds. This contract-relax-stretch pattern is repeated 3-5 times for maximal results. This stretching usually requires a partner.
4. ***Dynamic stretching*** actively, and sometimes quickly, moves a body part to the end range to stretch any desired muscle. Each stretch is held briefly and repeated 5-10 times. This type of stretching asked the body to move through a range of motion similar to that during actual movement.

These types of stretching all increase joint range of motion. Some are easier to perform than others. Some take more time. Some have a lesser risk of injury. All must be done in a controlled manner. If a stretching sensation is felt anywhere other than in a muscle or tendon, the position is wrong and needs to be re-evaluated. Stretching should increase the length of muscles and tendons and not stress joints or ligaments.