

## Muscles and Joint Actions of the Squat Video Transcript

Welcome to the AFLCA Exercise Theory video series supplementing Chapter 7, basics of anatomy. In this video, I'm going to take you through the muscles and joint actions involved in the squat exercise during the concentric and eccentric phases.

The squat is a compound exercise, which means that it involves more than one joint; specifically, the knee and the hip joint.

When considering joint actions and muscles used, it makes sense to consider the concentric phase first. This is because whatever muscles are responsible for a joint action during the concentric phase are the same muscles acting on that same joint during the eccentric phase.

During the concentric phase, muscles generate force to shorten. The body moves UP, against gravity.

During the eccentric phase, muscles generate force to lengthen. The body moves DOWN, with gravity.

First let's look at the **knee** joint.

During the concentric phase, the joint action is KNEE EXTENSION. The quadriceps are the muscles responsible for knee extension, specifically: rectus femoris, vastus medialis, vastus lateralis, and vastus intermedius.

The quadriceps generate force, shortening, for knee extension during the concentric phase. Also, the quadriceps generate force, lengthening, for knee flexion during the eccentric phase.

Important! The muscles that work concentrically on a joint are the same muscles that work eccentrically on that same joint.

That's the knee. Let's move to the **hip**.

During the concentric phase, the joint action is HIP EXTENSION. The gluteus maximus and hamstrings are the muscles responsible for hip extension. The three hamstring muscles are the biceps femoris, semitendinosus, and semimembranosus.

Remember, the hamstrings is a two-joint muscle, which means it crosses two joints, the hip and the knee. Here we are considering just the point where it's crossing at the hip.

The gluteus maximus and hamstrings generate force, shortening for hip extension during the concentric phase.

Also, the gluteus maximus and hamstrings generate force, lengthening, for hip flexion during the eccentric phase.

Remember! The muscles that work during the concentric phase at a joint are the same muscles that work at that joint during the eccentric phase.

Let's watch it again. During the concentric phase, the quadriceps power the extension the knee, and the gluteus maximus and hamstrings power the extension the hip. During the eccentric phase, the quadriceps control the flexing of the knee, and the gluteus maximus and hamstring control the flexing the hip.

In general, we know that the squat is a great exercise for your hamstrings, glutes, and quadriceps. This video explains why, in terms of muscles crossing joints, pulling on bones as they shorten or lengthen, and how the body is moving in relation to gravity.

It may be helpful to watch this video a few times, and then to think about what's going on when you're doing your own squats. A true test of your knowledge is if you can explain it to a colleague, what's happening during the up and down phases of the squat.

Thanks for watching!