Single-Leg Squat Progressions

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ABSTRACT

THE EXERCISE TECHNIQUE FOR THE SINGLE-LEG SQUAT AND THE ASSOCIATED PROGRESSIONS ARE OUTLINED IN THIS ARTICLE. FIVE PROGRESSIONS ARE DESCRIBED, WITH INFORMATION PROVIDED TO ASSIST THE STRENGTH AND CONDITIONING COACH TO SELECT THE BEST MODALITY FOR EACH INDIVIDUAL ATHLETE.

TYPE OF EXERCISE
Lower-body strength and single-leg balance exercise.

MUSCLES INVOLVED
Gluteals, quadriceps, rectus femoris, and gastrocnemius.

BENEFITS OF THE EXERCISE
Lower-body strength and power is a key physical quality, which underpins performance in a multitude of sports (6,9). It has been reported that there are significant associations between maximal relative lower-body strength and sprint performance (7,11), an activity that is imperative to success in sports such as all football and rugby codes, soccer, basketball, volleyball, and many others (1,3,4,9). Furthermore, research has identified that significant differences are present between the maximal lower-body strength of higher- and lower-level athletes within the same sport (2,10). As a result, it is apparent that the development and continual improvement of maximal lower-body strength in all athletes is necessary to optimize competitive performance.

It has previously been demonstrated that lower-body strength and power methods, such as bilateral squat and Olympic-style lift variations, offer a high level of utility for all athletic populations. Unilateral exercises, in particular the single-leg (SL) squat, have typically been used for movement screening purposes; however, it is an effective supplementary leg strength exercise as it involves an increased balance demand (5,8). Although for maximal strength training, strength and conditioning coaches typically advocate the major bilateral lifts such as squat and deadlift variations where significant external load is moved, the SL squat is very effective for general strength training of developing athletes (as the load stress is a suitable stimulus), as well as a supplementary exercise to develop single-leg balance and general athleticism. Furthermore, the SL squat provides athletes with extensive travel demands (e.g., professional tennis, surfing, golf, cycling, etc.) with a means to maintain general strength when they do not have access to a weight room or limited equipment.

The SL squat can be prescribed in a range of modalities, depending on the capabilities of the athlete and the desired training adaptations (i.e., using progressions and regressions of complexity and load). For the purpose of this article, 5 variations of the SL squat are outlined. These include assisted SL squat, box SL squat, SL squat off a box, and 2 variations of the plate-loaded SL squat.

COACHING POINTS FOR THE SINGLE-LEG SQUAT

• To set up the athlete for the SL squat, the coach should instruct the
athlete to slowly unweight the non-supporting leg, while maintaining balance and control, with full contact between the foot of the supporting leg and a solid surface.

- Once the nonsupporting leg is clear of the ground, the athlete should be instructed to stand in a strong stable position, looking straight ahead.
- To successfully perform the eccentric phase of the SL squat, it is necessary for the athlete to lower their body, at a controlled tempo, to below parallel while maintaining good posture with a neutral spine.
- While performing the eccentric phase, the athlete should keep their chest up and ensure correct tracking of the patella and lower limb.
- The concentric phase of the SL squat requires the athlete to return to the upright standing position. The tempo of the concentric phase is largely dependent on the desired outcomes of the training; however, the athlete should always maintain good posture.
- To complete the SL squat, the athlete should return to a tall upright position to ensure the repetition (rep) is finished.

**MODIFIED SINGLE-LEG SQUAT**

The assisted SL squat is appropriate for athletes with little to no experience with unilateral lower-body strength training. Additionally, it is also an effective exercise for athletes who lack the concentric and/or eccentric strength to attain a deeper than parallel position in the SL squat. Developing strength, mobility, and control through this full depth is an important step before advancing the exercise. As such, using an assisted version as outlined can develop this range for athletes who are unable to do this initially.

To perform this exercise, the athlete is first required to hold onto a ring, suspension system, or other strap, which is set at approximately chest height, with either 1 or 2 hands. Holding the support, the athlete is then required to step back so that the support is at an angle of approximately 45°, and the athlete’s outstretched arm is slightly bent (Figure 1). Once in a stable position, the athlete raises the nonsupporting leg (either in front of or behind the body) and slowly lowers themselves to a full squat position (Figure 2). After a slight pause at the bottom, the athlete returns to the starting position and completes the desired reps. It is necessary to instruct the athlete to not rely on the support, but rather to use it when there is a lack of control or insufficient strength in the particular range of the movement. Athletes are typically progressed once they can perform >10 reps on each leg, with minimal reliance on the ring or suspension system. Note that a plate-loaded cable can also be used effectively in this exercise instead of a strap support, providing for a counterbalance in the exercise, as a further regression.

**BOX SINGLE-LEG SQUAT**

The box SL squat is an effective progression for the athlete that demonstrates competence with the modified SL squat. For the box SL squat, a box is placed behind the athlete either at or slightly below parallel, with the supporting heel approximately 4–6 in from the edge of the box (Figure 3). The athlete is instructed to raise the nonsupporting leg and slowly lower themselves onto the box, while maintaining control (Figure 4). After a slight pause on the box, the athlete performs the concentric phase explosively to return to the standing position (Figure 5). This variation of the SL squat is effective for athletes who may lack eccentric strength and control, or athletes who need to develop concentric strength without a reliance on the stretch-shortening cycle. The box height can be varied to progress the athlete to competency in completing deeper and deeper squat positions.

**SINGLE-LEG SQUAT OFF A BOX**

The SL squat off a box is appropriate for athletes who possess sufficient strength and control throughout the entire range of the movement. To perform the SL squat off a box, the athlete places the supporting leg on the lateral
edge of a raised box (Figure 6) and performs the SL squat. As a result of placing the athlete on a raised surface, they are able to perform the movement through a full range of motion (i.e., buttocks to heel) (Figure 7), which enables the athlete to increase their functionality, and lower-body strength and stability throughout the entire range. Additionally, as the athlete is supporting their body throughout the entire movement, it also helps with developing general balance.

PLATE-LOADED SINGLE-LEG SQUAT
The plate-loaded SL squat is an effective exercise for athletes who can perform >10 reps of the SL squat off a box. The 2 variations of the plate-loaded SL squat typically prescribed require the athlete to hold the plate either in front of their body (Figure 8) or over their head (Figure 9), while they perform a SL squat off a box. The plate-loaded SL squat is an effective modality to both load the strength component of the exercise and to further challenge the athlete's stability and control throughout the movement. Additionally, the plate-loaded overhead SL squat requires the athlete to demonstrate a high level of thoracic mobility and scapula stability and control, while moving through triple
flexion and extension of the hip, knee, and ankle.

**PRACTICAL APPLICATIONS**

The SL squat is a challenging exercise, which may be underused in training prescription for athletic populations. When prescribed in conjunction with major bilateral lifts such as squat and deadlift variations, it is proposed that improvements in athletic performance and overall lower-body strength may be achieved. Once the athlete develops the necessary strength and movement pattern to perform the basic version of a SL squat, there are numerous progressions that can be prescribed to attain further improvements in unilateral lower-body strength.

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**REFERENCES**


