



The Exercise Technique Column provides detailed explanations of proper exercise technique to optimize performance and safety.

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Exercise Technique: Deficit Deadlift

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ABSTRACT

THIS COLUMN PROVIDES A THOROUGH DESCRIPTION AND PHOTOGRAPHS OF THE PROPER TECHNIQUE FOR A DEFICIT DEADLIFT. THIS EXERCISE IS AN ADVANCED VARIATION OF THE STANDARD DEADLIFT AND IS DESIGNED TO INCREASE STRENGTH WITHIN THE LOWER-BODY MUSCULATURE. INCORPORATION OF THE DEFICIT DEADLIFT MAY BENEFIT THOSE REQUIRING EXPLOSIVE POWER, SPRINTING, OR JUMPING. FOR A VIDEO ABSTRACT OF THIS ARTICLE, SEE SUPPLEMENTAL DIGITAL CONTENT 1, [HTTP://LINKS.LWW.COM/SCJ/A246](http://links.lww.com/scj/A246).

TYPE OF EXERCISE

The deficit deadlift is a closed-kinetic chain, multijoint exercise designed to increase strength

and hypertrophy of the lower-body musculature.

MUSCLES INVOLVED

Primary musculature includes the following: gluteus maximus, hamstrings group (semimembranosus, semitendinosus, and biceps femoris), quadriceps group (vastus lateralis, vastus intermedius, vastus medialis, and rectus femoris), and erector spinae group (6).

BENEFITS OF EXERCISE

Hamstring injuries are one of the most common impairments that occur among athletes, which account for a majority of all sport-related muscular injuries (10,12,18). In addition, injuries to the hamstring muscle complex have demonstrated a 12% chance of reinjury (18). At a minimum, athletes may lose significant playing time ranging from a few days to over 6 months. It is imperative for strength and conditioning coaches to emphasize the development and preemptive care of hamstring development.

Lower-body resistance training can help reduce the likelihood of hamstring injury. Among many possible explanations, imbalances in strength between the quadriceps and hamstrings can be considered a precursor to injury (7). Previous literature has demonstrated that there are significant differences between levels of strength between the quadriceps and hamstrings, which may predispose individuals to hamstring strains as well as injury to the anterior cruciate ligament (7). When comparing both muscle groups in a concentric state, the ideal hamstring-to-quadricep strength ratio (H:Q) has been reported to reside between 0.50 and 0.80 (8). However, when comparing the eccentric state of the hamstrings to the concentric state of the quadriceps (i.e., the functional ratio), the H:Q should reflect 1.0 (1). Therefore, exercises that provide a low coactivation between the quadriceps

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and hamstrings (i.e., H:Q ratio close to 1.0) are important in rehabilitation and traditional training programs due to their promotion of balance between muscular groups (3). Although no literature exists on the deficit deadlift and coactivation ratios, previous research has demonstrated that deadlift variations report a lower coactivation (i.e., 2.87 ± 1.77) as compared to other lower-body exercises (e.g., single-limb squats, lunges, etc.) making them an ideal exercise for decreasing an H:Q imbalance (3).

The deficit deadlift, a recently popularized exercise, is often used as a progression of the standard variation. The term “deficit” is used in regards to the placement of the bar relative to the shins. The starting position for the traditional deadlift begins with the bar at approximately midtibia, whereas the deficit version elevates the body and positions the bar roughly 3/4 distally from the knee. Chronic training with the use of the traditional deadlift has demonstrated increases in both lower-body and trunk muscular strength, as well as explosive power (6,13). With the incorporation of a raised platform to perform the deficit deadlift, the movement requires a further demand of flexion from the hips, knees, and ankles to set up for the exercise. This increased demand has the potential to increase strength, hypertrophy, and power throughout a greater range of motion (11). In addition, research has demonstrated that powerlifters displayed the lowest peak force during the initial pull of the barbell off the ground during conventional deadlifts (2). Therefore, implementing a deficit position can allow athletes to strengthen muscles through this joint angle and range of motion, ultimately improving force production during the initial portion of the lift (9). This improved strength may transfer to the conventional deadlift and ultimately assist athletes in overcoming a greater load from the floor. These adaptations may also allow for a greater sport-specific transition in the form of greater force production, enhanced power output, improved

sprint performance, and increases in vertical jump (14,16). Thus, the purpose of this column is to describe the proper technique of the deficit deadlift, beginner and advanced variations, as well as the implementation of this exercise into an athlete’s current strength and conditioning program.

STARTING POSITION

To properly execute this exercise, a barbell, flat, level and even surface, and weighted plates are required. The elevated surface is essential to this

exercise to impose the “deficit.” The surface should be at least 2–4 inches tall and can be either a stable, platform box, or 2 weight plates placed side-by-side (Figure 1). The platform, or plates, should be large enough to accommodate the individuals’ feet and allow for proper exercise technique.

- Begin with an individual elevated on a platform of no greater than 4 inches (10 cm) and a barbell in front of the athlete. Bend down in a squatting pattern and grasp the bar with either



Figure 1. Starting and ending position for each repetition.

an alternating or overhand closed grip with arms fully extended.

- The arms should be placed on the barbell slightly wider than shoulder-width apart and just outside of the knees.
- The spine should be in a neutral position and upper thighs parallel to the ground.
- Other key postural adjustments include the following:
 - Scapulae depressed and retracted.
 - Weight distributed predominantly over the heels and midfoot, being certain to maintain this distribution throughout the movement.
 - Shoulders directly over the barbell.
 - The trunk and core musculature braced throughout the movement.
- All repetitions of the exercise will begin from this position (Figure 1).

PHASE 1: CONCENTRIC PORTION OF THE DEADLIFT

- With a braced core, begin by lifting the barbell off the floor by extending both the hips and knees at a constant rate.

- Be sure to keep the body weight distributed primarily toward the heels.
- A common error during this portion is extending the knees at a faster rate than the hips. This error may lead to a greater reliance on the erector spinae muscles to complete the concentric portion of the movement; thereby, possibly increasing the risk of injury to the lower back.
- Maintain a neutral spine position throughout the lift, while avoiding any excessive curvature of the spine (i.e., kyphosis or lordosis).
- During the initial portion of the lift (i.e., from the ground to the knee), the bar should be kept close to the body without making contact with the shins (Figure 2A).
- Once the bar has passed the level of the knees (Figure 2B), continue to extend the hips and knees until the body reaches an erect position (Figure 2C).
 - During this portion of the exercise, it is common for the bar to

maintain continuous contact with the upper thighs.

- Avoid fully locking-out the knees at the top of the lift.
- The tempo for the concentric portion of the movement should be approximately 1 second (5).
- Be sure to exhale during this phase of the movement, while avoiding the Valsalva maneuver.

PHASE 2: ECCENTRIC PORTION OF THE DEADLIFT

- Begin to slowly return to the starting position by hinging at the hips, followed by flexion of the knees once the hip hinge has reached $\sim 15^\circ$ (Figure 2B).
- While lowering the barbell, be sure to maintain a neutral spine throughout the exercise.
- As the bar passes below the level of the patella, the hips and knees should continue to flex until a parallel position is reached and the barbell makes contact with the floor (Figure 1).



Figure 2. Concentric—lifting phase of the deadlift. (A) Initial ascent; (B) Mid-phase; (C) End of concentric portion.

- The tempo for this portion of the movement should be approximately 3 seconds.
- Be sure to inhale during this phase of the movement.

VARIATIONS

Beginners are encouraged to master the technique of the traditional deadlift before attempting the deficit deadlift. The lifter must consider their goals, anatomical structure, and skill level before attempting any variation.

DEFICIT HEIGHT

To increase the range of motion during the deficit deadlift, an athlete may implement a greater platform height. Although no published literature has examined the deficit deadlift, the following platform heights are the sole recommendations of the authors. Therefore, standard heights should be between 2 and 4", but it is recommended not to exceed 4". As a guideline, anything greater than 4" may cause the shoulders to drop below the level of the hips, excessive hip flexion in the starting and ending position (e.g., hips significantly below parallel), limited room under the bar for the athlete's feet, or other deviations that would impede the individual from performing the exercise with proper technique. If any deviation occurs, then it is recommended to reduce the height of the platform to complete the exercise.

RESISTANCE BANDS AND/OR CHAINS

Advanced lifters may use resistance bands or chains to increase tension of the lift and to assist with increasing strength at various sticking points of the lift. For example, as previously discussed, Beckham et al. (2) determined the initial pull as a sticking point, whereas Kompf and Arandjelović (9) reported another point when the thigh reached an angle of 60° relative to the ground. Chains can be attached to the loadable sleeves of the bar to train the lifter to produce greater force during the latter stage of the concentric phase.



Figure 3. Hex bar variation (A) Starting position; (B) Top of lift.

HEX BAR

The hex/trap bar can be used in place of the standard deadlift bar. This version may be necessary if the deficit height limits the space for the individuals' feet underneath the traditional bar during the exercise (Figure 3A and 3B). In this variation, the handles of the bar may be placed up or down based on preference, as well as the height of the individual. For instance, taller athletes may need to place the handles up as to allow for proper technique of the movement, and vice versa. Deadlifts using the hex bar have previously demonstrated increased activity of the vastus lateralis, while also limiting strain on the hamstrings and lower back (4). Thus, this variation should be considered for those individuals with poor thoracic mobility/extension.

SETS AND REPETITIONS

Resistance training prescription is relative to the individual's needs; however, the guidelines below, provided by the National Strength and

Conditioning Association (NSCA), are recommended (15).

- Strength: 2–6 sets, 3–6 repetitions, 85–95% 1-repetition maximum
- Hypertrophy: 3–6 sets, 6–12 repetitions, 67–85% 1-repetition maximum
- Endurance: 2–3 sets, >12 repetitions, <67% 1-repetition maximum

Some individuals may notice significant results outside of these ranges. Because of the advanced nature of this lift (e.g., greater range of motion, technique, etc.), advanced programming parameters should be used to maximize biomotor abilities. For example, an individual could use cluster sets, performing one or more repetitions with 10- to 20-second rest intervals between each repetition group, with a minimum load of an individual's 5 repetition maximum and 4–6 repetitions (17).

As recommended by the NSCA (15), individuals can progress using the 2-for-2 progression rule. Once an individual is able to achieve 2 repetitions

above the recommended number on 2 consecutive training sessions on the last set, then an increase in training load is advised.

PRACTICAL APPLICATIONS

The deficit deadlift is a closed-kinetic chain exercise used in strength and conditioning programs for developing power, strength, and hypertrophy of the gluteus maximus and hamstrings. This variation of the traditional movement places the athlete on an elevated surface to allow for a greater range of motion as compared to a conventional deadlift. As with the traditional method, the deficit deadlift may elicit similar outcomes for athletes in the form of improved sprinting ability, increased vertical jump height, and enhanced power output, all which aid in sport performance. In addition, this exercise has the capability to promote a healthy balance between hamstring and quadricep complex strength and can be used in traditional or rehabilitation settings as a means to prevent hamstring injury. Therefore, individuals interested in improving lower-body muscular strength throughout a greater range of motion should consider the incorporation of the deficit deadlift into their training regimen.

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