

Variations of the Deadlift

Timothy J. Piper, MS, CSCS, *D
Physical Education Department
Western Illinois University, Macomb

Michael A. Waller, CSCS, *D; NSCA-CPT
Highland Park Hospital Health and Fitness Center
Buffalo Grove, Illinois

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■ Introduction

THE USE OF THE DEADLIFT (DL) and its variations by strength and conditioning professionals is widely accepted as a means of strengthening leg, hip, back, and torso muscles of their athletes and clients. However, an explanation of the different styles used and available in their training programs is often overlooked. This article is an overview of the different DL techniques beyond the standard conventional and sumo stance DLs.

The DL is typically associated with the conventional and sumo styles, commonly used by powerlifters. The conventional style is characterized by a shoulder width stance of the feet (Figure 1) and the arms outside of the thighs (1, 6, 8, 12, 22, 24, 31). The sumo style DL differs primarily by the wide stance used (Figure 2) and a handgrip that is between the thighs (6, 8, 22). The conventional style emphasizes the lower back muscles more than the sumo because the trunk is flexed forward, increasing the torque about the lumbar area (5, 6, 15, 17). Due to

the more erect back alignment throughout the sumo style lift there is a decreased potential for dynamic involvement of the lower back muscles, thus requiring a greater recruitment of the hip muscles to move the load (7, 15, 22, 29).

These 2 styles are the basis of

all other DLs, which are similar, at least in part, to the sumo or conventional technique. All styles strengthen the hip and knee extensors, spinal erectors, abdominals, back, and forearm muscles to varying degrees depending on the style (1, 3, 6, 7, 19, 21, 22, 24, 29, 30).



Figure 1. Conventional style deadlift.



Figure 2. Sumo style deadlift.

Variations

Straight or stiff leg DL (SLDL) is used for the specific strengthening of the lower back and hamstring muscles (2, 16, 19, 23, 25, 28). Setup: Stand with feet shoulder



Figure 3. Straight or stiff leg deadlift. Notice the horizontal distance from the bar to the base.

width apart and an overhand grip just outside the thighs (2). The scapula should be retracted and the head in a neutral position. Execution: Begin the exercise with hip flexion allowing the hips to move posteriorly (16, 25, 28). The knees remain straight, but not locked out at full extension, throughout the movement. The spine maintains its natural s-shaped curvature as the bar descends. The path of the bar has a slight arc moving away from the legs as the hips are progressively flexed. The bar ends directly below the shoulders (Figure 3) (6). Downward movement ceases when a stretch occurs in the hamstring muscles. The lifter then reverses motion. The completion of the lift is when hip and back extension raises the trunk to an erect standing position with the scapulae retracted. Relatively inflexible individuals may not be able to go down very far before hamstring muscles begin to stretch. It is important to stop the exercise at that point rather than lose the arch in the lower back in an attempt to descend further.

Take note that there is greater torque on the hips and lumbar areas because of the horizontal distance from the bar to the base (5, 6, 15, 22). The use of near maximal weight can compromise form by pulling the exerciser forward or causing spinal flexion increasing the chance of injury (27). A slow rate of bar movement, perhaps 6–10 seconds for a complete lift, will also reduce the chance of injuries. The bar may descend to the floor, or having the lifter stand on a box may increase the range of motion of the exercise. Even with proper form this is a high-risk exercise that should only be attempted if the individual has no back restrictions, history of injuries, as well as adequate hamstring/low back flexibility, but even then great caution should be taken (2, 9, 16, 24, 25). Round back lifting, known as kyphotic



Figure 4. Avoid this round back style of lifting during the straight leg deadlift.



Figure 5. Excessive back and hip extension should also be avoided.

lifting posture (Figure 4) during this or other lifts should be avoided for prevention of injury, along with excessive back and hip extension (Figure 5) when standing erect (16, 26–28). An advanced client under supervision, with an established base of strength may undertake this lifting posture to emphasize the spinal erectors (2–4, 14). However, it is not recommended for beginners or unsupervised trainees. This is a very common type of DL observed in many weight rooms but is commonly a contraindicated exercise because of the potential risk to the intervertebral discs.

Other common technical errors in the SLDL include hip flexion beyond a person's ability, hyperextension of the knees, rapid execution of the exercise, and at-

tempting to pull more weight than the muscles have been trained to accommodate (16).

The Romanian DL (RDL) is primarily used for the strengthening of the lower back, gluteus and hamstring muscles with decreased low back stress than the SLDL because of the technique. Setup: The stance is similar to that of a conventional DL with an overhand grip or alternating grip (32). The spine is fixed in a naturally arched position both at the beginning and throughout the entire lift. Execution: The RDL is similar to the SLDL, with the exception of the 15° of knee flexion that is employed. All movement is achieved via rotation at the hip joint. The bar descends slowly and closely to the thighs (Figure 6) instead of being directly underneath the shoulders (16, 32). This reduces the torque on the upper body by placing the load closer to axis of rotation and over the base of support (5, 6, 15, 22). The bar descends until it is inferior to the knee joint (16, 32), the lifter feels the need to round the back, he/she has the urge to further bend the knees, or they have reached their maximal range of motion without compromising lifting posture. The key is to focus on rotation about the hip joint as you push your gluteus back, while holding the knees at about 15° of flexion. When ascending, hip and knee extension should occur simultaneously while maintaining some shoulder retraction and the spine's natural curvature (1).

Common mistakes during the RDL are not flexing the knees or extending the knees prior to hip extension during the ascent. Many of our athletes and clients actually comment that they can feel stress is placed higher in the hamstrings if the knees are kept flexed to 15°, whereas they feel more stress at



Figure 6. Romanian deadlift, keeping the bar close to the thighs instead of underneath the shoulders.

the hamstring insertion if the knees are straightened during the lift. Other errors include allowing the lower back to round, kyphosis to occur, pulling the bar against the thighs, and excessive extension of the back when completing the lift (7, 14, 21, 28).

Power rack DLs (PRDLs), also called lockouts are sometimes used by powerlifters trying to strengthen a particular upper portion of their DL (10, 11, 14, 23, 29, 30). A high load is used to overload the back muscles and increase motor recruitment (14, 31). Different grips and stances can be applied to this exercise, but the conventional form will be described here. Setup: The height of the spotting bars should be such that the loaded bar sits superior to the knee joint when standing erect (23). This may be adjusted depending on the specific objective



Figure 7. Maintaining natural back curvature while grasping the bar for a Power rack deadlift.

and the preference of the lifter. Power straps or lifting hooks can also be used for this exercise to prevent the fatigue of the forearm muscles before the back muscles have been stressed to their potential (11). Clients will flex at the knees and hips, slightly retract the scapula, maintain the back's natural s-shaped curvature, and grasp the bar approximately 1–2 in. outside of the thighs (Figure 7). Execution: The lift begins with hip extension followed by knee extension. The lifter completes the lift with slight spinal extension. The spinal erector, gluteus maximus, and quadriceps are the primary movers during lockouts, but its counterparts the latissimus dorsi, rhomboids, and trapezius have an even greater role in stabilization of the upper back (30). An established back and leg strength base is necessary for this exercise due to the high loads used (10). This type of DL can benefit field throwers, weightlifters, Greco-Roman wrestlers, construction workers, and other clientele that require a great deal of back strength in the

final phase of hip and back extension.

Machine DLs (MDLs) have been added to some manufacturers' line of plate loaded and selectorized equipment. This style not only can be done on specifically designed machines but also on preexisting equipment such as the smith rack (Figure 8). Both an advantage and disadvantage is that the plane of motion is fixed, dictating the movement pattern. Although, this could provide benefit for clientele who have difficulty maintaining the correct motor pattern, it can also force some clientele into potentially dangerous positions. MDL can efficiently use weight room space while at the same time strengthening the desired musculature. The need for muscular coordination is reduced in MDL so clientele will not reap the full benefits of the synergistic muscle involvement they would using barbells or dumbbells. Although not commonly used, MDL can provide clients with a new stimulus and add variety to their training program and should not

be overlooked as a beneficial strength-enhancing exercise.

The snatch grip DL (SGDL) places emphasis on the thoracolumbar fascia, erector spinae, and the shoulder girdle muscles that stabilize the scapulae. The positioning of the torso causes a great deal of hip flexion, which increases the load on the lumbar region and hip extensors. This is similar to the RDL, but the wide grip makes this exercise advantageous to clientele requiring increased upper back strength and scapular and spinal stabilization. Setup: The conventional stance is used, but the lifter uses a wide snatch grip (Figure 9). The distance between the hands in the snatch grip is determined from



Figure 8. Demonstration of machine deadlift on preexisting equipment designed for its use or on the Smith rack.



Figure 9. Depiction of wide snatch grip for use in snatch grip deadlift.

measuring the distance from the lateral side of one shoulder to the fist of the opposite arm abducted to shoulder level (20). Execution:



Figure 10. One arm deadlift performed with sumo stance while grasping a dumbbell between the legs.

The client pulls the bar off the floor using the hips to lift the bar instead of the back. Throughout the lift the back is held tight and fixed. The bar is kept close to the legs to reduce the amount of torque on the lumbar region (15). Scapular retraction continues throughout the exercise but is not exaggerated when movement is completed (16, 19, 25, 28).

A variation of the snatch grip DL is the Smitty DL, which is performed on a 4–6-in. platform, and movement ceases when the bar is inferior to the patella (18). The technique is otherwise the same, emphasizing hip flexibility and back strength in the limited range of motion. Weightlifters will benefit as well as wrestlers, swimmers, and others requiring the increased strength in the shoulder girdle stabilizers.

One arm DL (OADL) is one of the most difficult DLs to execute in terms of muscular coordination. The OADL can provide an extra stress to the muscular and nervous system, and the variations of the OADL are numerous. Setup: The most common OADL is

performed with a sumo stance while grasping a dumbbell between the legs (Figure 10). The torso should be erect and the lifter should be discouraged from looking at the dumbbell as this would lead to poor lifting posture. Execution: The weight is lifted as in any other DL but requires a great deal more stabilization from the lifting arm and the entire torso and back. An effort should be made to maintain an erect and controlled lifting posture.

Pulling a dumbbell from this position keeps the line of force within the base, and lateral balance in the wrist is minimal. For a greater challenge a barbell can be used, thus decreasing the stability of the base and increasing the muscular strength required in the forearm. This is also the case when using a conventional stance and pulling the weight from the side of the body (Figure 11), which



Figure 11. Conventional one-arm deadlift, which increases opposing abdominal and back strength.



Figure 12. Fat bar deadlift and its emphasis on both grip strength and back strength.

increases opposing abdominal and back strength (29). Due to loading characteristics of all styles of the one arm DL, there is an increased stabilization demand on the contralateral muscles of the abdomen, spinal erectors, shoulder girdle, and forearm muscles to overcome the different application of force. A light load is used for this exercise, focusing on the technique and not how much is lifted (29). The torque that the muscular system applies to it can easily put the spinal column at risk for injury. Advanced clientele who have strength trained for longer than 6

months may add this exercise to their routine. The OADL can be a challenging exercise for advanced clients, forcing them to balance an uneven load while maintaining body alignment.

■ Grip and Implement Variations

Ten second pulls are performed similar in fashion to a conventional or sumo style DL but with the only difference being the duration of the ascent and descent, which take 5–10 seconds each. The duration of the ascent and descent may vary depending on the level of the lifter and their ability to maintain proper lifting posture. Strict form is required throughout the lift to decrease injury potential. This is a very demanding exercise designed to increase the overall endurance and stabilization of the torso.

Dumbbell DLs (DBDLs) can be utilized with any of the previous styles. Dumbbell DL is sometimes called the dumbbell squat. The major difference is that squatting exercises are characterized by weights placed at shoulder level and DLs have weights pulled from below the waist. The DBDL may be a safer alternative to the dumbbell squat because it does not require the individual to lift the weight to shoulder height that could be potentially dangerous with heavier weights.

A major benefit of DBDL is the need to stabilize each weight separately. The DBDL allows for a greater range of motion than the other DL styles performed on the floor with large-diameter weight plates and decreases the amount of time needed to change resistance. If the dumbbells are held on the side of the body in line with the hip joint, the exercise produces less lumbar torque than does the barbell DL (15). One or 2 dumb-

bells may be used. The DBDL is an excellent way to introduce beginners to free-weight lifts or may be used as a part of a natural progression into more advanced DL styles.

Fat bar DLs (FBDLs) are gaining popularity with trainers searching for novel ways to train grip strength along with back strength (Figure 12). Special “fat bars” may be purchased in circumferences ranging from 1.5 up to 4 in. Many trainers have found it easier and more economical to just use normal pieces of water pipe, PVC, or other materials for the FBDL. Care must be taken to use pipe material that will not break under the weight. Any style DL may be utilized for the FBDL depending on the length of the bar used. This DL places a lot of stress on the wrist flexors and should be used sparingly at first to prevent any overuse injuries in the forearms or elbows.

Fingertip DL (FTDL), as well as ring DL (RGDL), require a great deal of finger and forearm flexor strength. The U.S.A. All-Round Weightlifting Association uses these 2 DL variations. They both may be used with any style of deadlifting. These 2 styles of DL are excellent finger and grip strengtheners. Grip on the bar may be either opposing or in the same direction depending on the individual. Caution must be taken when attempting these DL styles. These lifts are commonly associated with a high degree of delayed onset muscle soreness, as well as deep soreness along all of the joints in the fingers. There is also the risk of dropping the weights, causing injury to the knees or feet, if the fingers fatigue or slip on the devices. These exercises should only be used by advanced clientele and very sparingly until the degree of soreness can be assessed and

Table 1
Variations of the Deadlift

Style	Major muscles stressed	Advantages/ Benefits	Activity Applications
Sumo	Gluteus, quadriceps, hip adductors	Decreased lumbar stress, total-body exercise	Wrestling, linebackers, landscaping
Conventional	Gluteus, quadriceps, spinal erectors	Total body exercise	Construction worker, volleyball, sailing
SLDL	Hamstrings, spinal erectors	Beneficial for low back rehabilitation	Diving, equestrian, cycling
RDL	Erector spinae, hamstrings	Learning movement for other exercises	Weight throwing, hiking, hockey
SGDL	Upper back, spinal erectors	Increased scapular stabilization	Weightlifting, gymnastics, ski jumper
PRDL	Spinal erectors	Heavy loads utilized for increased strength	Powerlifting, linemen, construction worker
MDL	Varies with exercise movement	Controlled movement pattern	Varies
DBDL	Varies with exercise movement	Varies with exercise movement	Sailing, landscaping, construction worker
OADL	Abdominals, spinal erectors	Increased trunk stabilization	Weight throwing, rugby, skiing
10 sec. Pulls	Varies with exercise movement	Increased muscular endurance	Equestrian, cycling, running
FBDL	Forearm muscles, varies with exercise movement	Increased grip strength	Rock climbing, gymnastics, rugby
Fingertip/ ring DL	Forearm muscles	Increased grip strength	Rock climbing, archery, basketball, volleyball

the program can be adjusted to meet the individual's rate of adaptation.

■ Importance of Grip

While many of the DLs are prescribed with specific ways in which to grip the bar, all others are typically gripped with an opposing grip. The opposing grip is illustrated in the sumo and conventional DL figures (Figures 1 and 2). Many individuals tend to favor a particular opposing grip, as far as which hand is palm-forward, and will often perform all of their DLs with the same opposing grip. This should be discouraged because it will eventually develop muscle imbalances not only in the forearms but also the back musculature. Lifters should switch their grip on every set so forearm

grip strength imbalances are kept to a minimum.

While this may seem like a minor detail, one particular athlete that the authors trained could DL 500 lb at a bodyweight of 123 lb but developed a pronounced muscle imbalance due to using the exact same grip for every DL attempt in training. Once the individual was forced to switch grips on each set, he adapted within 4 months, corrected the imbalance, and was eventually able to use either grip for submaximal and maximal attempts.

■ Conclusion

All variations of the DL are beneficial exercises, but the application of each should be based upon the goals, needs, and abilities of the individuals. Table 1 offers guid-

ance for the selection and application of the DLs. Sports and daily movements will dictate which DL style should be used. DLs can be an overall strength developer or a source of risk to the client. Limitations of the client, technique, load, volume, order, and recovery are some of the factors that must be considered when determining the benefits and risks. Maximal loads need not be used for DLs to obtain a training response, but rather, correct execution and progressive overload will produce improvement. ▲

■ References

1. Baechele, T.R. *Essentials of Strength Training and Conditioning*. Champaign, IL: Human Kinetics, 1994.
2. Baker, G. Exercise of the

- month. *Strength Cond. J.* 16: 54–55. 1994.
3. Benjamin, R. Foundation training. *Powerlifting USA* 6: 36–37. 1983.
 4. Benjamin, R. Analysis of assistance movements. *Powerlifting USA* 8:24–25. 1985.
 5. Brown, E.W., and K. Abani. Kinematics and kinetics of the dead lift in adolescent power lifters. *Med. Sci. Sports Exerc.* 17:554–563. 1985.
 6. Cholewicki, J., S.M. McGill, and R.W. Norman. Lumbar spine loads during the lifting of extremely heavy weights. *Med. Sci. Sports Exerc.* 23: 1179–1186. 1996.
 7. Comereski, J. Safe back training. *Powerlifting USA* 19: 25. 1995.
 8. Daniels, D. Deadlift tidbits: *Powerlifting USA* 11:30. 1987.
 9. Daniels, D. Strategic deadlift initiative: *Powerlifting USA* 16:42–43. 1993.
 10. Daniels, D. Partial lifts—partial results. *Powerlifting USA* 17:27. 1993.
 11. Daniels, D. Lifting straps. *Powerlifting USA* 19:17. 1996.
 12. Daniels, D. Deadlift details. *Powerlifting USA* 23:25. 1999.
 13. Fahey, T.D. Maximum overload with the power rack. *Powerlifting USA* 18:38–39. 1994.
 14. Farley, K. Analysis of the conventional deadlift. *Strength Cond. J.* 17:55–57. 1995.
 15. Focus on Fitness. *Resistance Training Specialist Programs Level One*. U.S.A.: Focus on Fitness Productions. 1997.
 16. Gardner, P.J., and D. Cole. The stiff-legged deadlift. *Strength Cond. J.* 21:7–14. 1999.
 17. Gedney, J. 10 rep max deadlift routine. *Powerlifting USA* 9:16–17. 1986.
 18. Goss, K. Balancing the deadlift. *Powerlifting USA* 7:30. 1983.
 19. Grymkowski, P., E. Connors, T. Kimber, and B. Reynolds. *The Gold's Gym Encyclopedia*. Chicago, IL: Contemporary Books, Inc. 1984.
 20. Jones, L. *USWF Club Coach Accreditation Course: Club Coach Manual*. Colorado Springs, CO: U.S. Weightlifting Federation. 1991.
 21. Kraemer, W.J. and S.J. Fleck. *Strength Training for Young Athletes*. Champaign, IL: Human Kinetics. 1993.
 22. McGuigan, M.R.M., and B.D. Wilson. Biomechanical analysis of the deadlift: *J. Strength Cond. Res.* 10:250–255. 1996.
 23. Parviainen, J. The Finnish deadlift routine, number two: *Powerlifting USA* 7:17. 1984.
 24. Pearl, B., and G.T. Moran. *Getting Stronger*. Bolinas, CA: Shelter Publications, Inc. 1986.
 25. Rasch, P.J. *Weight Training* (2nd ed.). Dubuque, IA: Wm. C. Brown Company Publishers. 1975.
 26. Reshel, G. Conventional deadlift training. *Powerlifting USA* 17:26–27. 1994.
 27. Schenk, R. Prevent low back injury with the prone press-up. *Strength Cond. J.* 17:32–33. 1995.
 28. Schwarzenegger, A. *Encyclopedia of Modern Bodybuilding*. New York, NY: Simon and Schuster, Inc. 1985.
 29. Simmons, L. So you want to deadlift. *Powerlifting USA* 17: 34–35. 1994.
 30. Starr, B. Deadlift without deadlifting: *Powerlifting USA* 18:10–11. 1995.
 31. Tuten, R., C. Moore, and V. Knight. *Weight Training Everyone*. Winston-Salem, NC: Hunter Publishing Co. 1982.
 32. Whaley, O., and R. McClure. Another perspective on teaching the pulling movements. *Strength Cond. J.* 19: 58–61. 1997.



Piper

Timothy J. Piper, MS, CSCS*D, is an Assistant Professor at Western Illinois University where he has been developing the S&C course offerings since 1994. He is also a volunteer strength coach at the local Salvation Army weight room where he trains athletes of all ages for various sports.



Waller

Michael Waller, CSCS*D, NSCA-CPT, is a YMCA Fitness Leader and Certified U.S.A. Weightlifting Club Coach; he is also Personal Training Coordinator at Highland Park Hospital Health & Fitness Center.