

BALANCING RESISTANCE TRAINING WITH SPORT PRACTICE DEMANDS— APPRECIATING THE RDL FOR IN-SEASON STRENGTH TRAINING

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With consideration for in-season training, strength and conditioning coaches are tasked with the challenging expectation of providing strength and conditioning progressions (or at a minimum, maintenance), while not interfering with sport practice skill acquisition. Simultaneously, this task also includes ensuring the athlete is fully recovered and rested for optimal performance in competition. When considering in-season strength and conditioning programming, a great deal of attention is placed on deciding the most relevant exercise selections, intensities, volumes, frequency, and timing, relative to practice and competitive schedules. This challenging task is heightened as allotted time with athletes in-season is often reduced due to travel, practice, and game schedules. With a reduction in time and exposure strength coaches have with their athletes, it becomes imperative that every exercise selection is well thought-out, relative to practice and game frequencies and intensities, and adheres to the overall planned mesocycles and macrocycles. This article examines why the Romanian deadlift (RDL) provides a suitable in-season strength training application, and explores the interlinked relationship between the demands of practice and resistance training. It also identifies how the RDL functions with other lower-extremity exercises, specifically the conventional deadlift and the back squat.

The conventional deadlift is an exercise where the athlete can produce large amounts of force through a long range of motion. It has a high total motor unit recruitment, demonstrates positive changes in bone density and lean muscle mass, and is an effective choice for strength improvement (1,7). If an athlete has acquired strength adaptations, movement proficiency, and diminishing returns are observed in the deadlift, variations can be applied. Variations that require lower load can be introduced to manage overall fatigue in-season (4,8,11,15,18). As the focus during in-season shifts to maximizing stimulus while minimizing fatigue, variations can maximize training volume and intensity, reduce the amount of fatigue generated, and minimize interference with sport-specific skill acquisition. The RDL is likely an excellent choice of exercise to implement into in-season strength and conditioning programs.

SELECTION

The RDL takes the quadriceps out of the equation, where the deadlift heavily recruits them to initiate the movement from the floor. Taking the quadriceps out of the equation is good in this case because the goal is to maximally develop the hamstrings and glutes. The RDL involves similar musculature as the deadlift, but with less spinal loading. Spinal loading is an independent fatigue factor that could interfere with in-season practice and competition performance (4,8,11,15,18,25). For example, compression and shear force on the erector spinae has shown to be significantly higher when performing the deadlift compared to the RDL (4). In-season, the focus is to maximize the amount of power output from the training program, while simultaneously minimizing the fatigue it creates to enhance skill acquisition in daily practice. It is important

to choose exercises that can maximally stimulate strength and power, while minimizing interference with other training volume, specifically exercises that recruit the quadriceps and erector spinae to a greater degree than the RDL (15,25).

VARIATION

Due to high practice demands and reduced allotted time with in-season athletes, it becomes increasingly important that exercise selections largely are decided on how each exercise affects the quality of effort and technique of other exercises. A more careful approach to lower-body strength training is required, as evidence shows that the lower body does not recover as quickly as the upper body from heavy-loaded exercises (11). With consideration of the limitations experienced for in-season strength training, the goal is to maintain lower extremity training volume as much as possible in knee joint dominate exercises that reach full ranges of motion. For example, if the goal is to maintain as much volume as possible with the back squat in-season, the RDL may serve as an alternative option to the conventional deadlift to avoid global (overall total) fatigue (2,3,8,11,21). This example demonstrates the interlinked relationship and recommended careful consideration of exercise selections in-season; specifically, how the RDL functions with the back squat and deadlift. There is a dose-dependent response of resistance training volume. When overall strength training volume in-season is decreased, variations in targeted muscular is necessary (2,3,8,11,15,25). A way to maximize training volume throughout a training program is to include variations (2). Variations can eliminate overlapping engaged musculature to avoid additional muscle soreness, yet still elicit power output of targeted muscles (8). The RDL is more dissimilar from a squat than a deadlift. Therefore, due to the lack of overlap between the RDL and the squat, the athlete can perform more volume on both over the course of the training program without fatiguing non-targeted musculature. This can ultimately yield better results with limited amount of time with athletes (18).

Incorporating the RDL as opposed to the deadlift, can help in identifying an arrangement of lower-extremity non-interfering exercises to maximize force responses, avoid reducing squat volume, and ensure sufficient recovery periods (18,25). An example of RDL progressions and variations when transitioning to in-season training are shown in Table 1. This example demonstrates a 12-week progression from the bilateral barbell RDL to the unilateral single-leg RDL, subsequently reducing overall external load yet still effectively recruiting the targeted muscles and movement pattern (22).

Another important aspect that variations have been shown to improve is athletes' motivation. Much of a successful training program relies heavily on the efforts and focus performed by the athletes participating. Varying exercise selection has a positive effect on enhancing intrinsic motivation to strength training (19). As in-season can become monotonous and repetitive, keeping athletes motivated to routine training protocols becomes

increasingly challenging. As practice and competition demands can potentially reduce strength training performance in-season when compared to off-season training, the athlete can focus on positive progressions of the newly introduced exercise variations without comparing to potentially higher off-season numbers that were obtained in a different training environment (19). Therefore, transitioning from the deadlift to the RDL in-season may contribute positively to overall motivation of the athlete.

RANGE OF MOTION

The RDL requires recruitment of muscles fibers in the hamstring through a longer range of motion than the deadlift, thus the hamstrings have the potential to develop through end ranges of motion more optimally. One predictor of acute injury is localized force transduction exceeding the target tissue's ability to tolerate that force (13,14,15,16). Developing strength through ranges of motion that need to tolerate force could have some potential efficacy in risk reduction for hamstring injury, especially as the muscle adapts to eccentric loading (9,13,14,15,16,17,20,24). The deadlift is a multi-joint movement that involves knee joint and hip joint extension, and recruits additional musculature, which can equate to more overall fatigue (17). The RDL is a single-joint movement that trains hip extension. The primary muscles involved in the RDL are the gluteus maximus and hamstrings (17,21). If the goal is to primarily train hip extension, the RDL is a suitable choice

(7,9,24). Evidence also shows that an athlete is able to recover faster from single-joint exercises compared to multi-joint exercises (3). Athletes gain strength by creating mechanical tension across tissues and joints (27). This is useful to consider when creating in-season training programs.

IN-SEASON APPLICATION

Due to a more localized posterior chain recruitment of major muscle groups, athletes generally cannot lift as much weight when performing the RDL compared to the deadlift, which is a multi-joint exercise and recruits more muscle groups (4). Because an athlete's one-repetition maximum (1RM) in the RDL is generally less than the 1RM in the deadlift, athletes can reach power and strength intensity ratios (80 – 93% 1RM) with less absolute load (4,9,17,21). This can be ideal for in-season, where the focus of strength training is to be non-interfering with sport, relative to the competition and practice schedule (18). The focus of training shifts to maximize strength and power responses with limited fatiguing loads. Generally, the multi-joint angles required of the deadlift involve a heightened focus of technique to spare the spine from loaded flexion. While quality of technique, and focus, is required to perform an RDL, the absolute load required to achieve strength and power is reduced, thus accomplishing the goal of limited load, while maintaining high power musculature responses from the athletes (25,28).

TABLE 1. IN-SEASON RDL PROGRESSION MODEL

Scenario: Male Wrestler, Training Frequency Once Per Week | Primary Hip Extension Exercise Progression

	EXERCISE	INTENSITY	SETS	REPETITIONS
Week 1	Barbell RDL	135 lb	3	4
Week 2	Barbell RDL	140 lb	3	4
Week 3	Barbell RDL	145 lb	3	4
Week 4	Barbell RDL	150 lb	3	4
Week 5	HS SL RDL	60 lb	3	3 each
Week 6	HS SL RDL	65 lb	3	3 each
Week 7	HS SL RDL	70 lb	3	3 each
Week 8	HS SL RDL	75 lb	3	3 each
Week 9	SL DA RDL	60 lb (2 x 30 lb DBs)	3	3 each
Week 10	SL DA RDL	60 lb (2 x 30 lb DBs)	3	3 each
Week 11	SL DA RDL	70 lb (2 x 35 lb DBs)	3	3 each
Week 12	SL DA RDL	70 lb (2 x 35 lb DBs)	3	3 each

Key: HS = hand-supported SL = single-leg DA = double-arm

Additional RDL variations: barbell RDL, snatch grip RDL, trap bar RDL, banded RDL, Landmine RDL, dumbbell RDL, kettlebell RDL, miniband RDL, deficit RDL, SL dumbbell RDL, and SL kettlebell RDL

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FIGURE 1. BARBELL DEADLIFT



FIGURE 2. BARBELL RDL



FIGURE 3. HAND-SUPPORTED SINGLE-LEG RDL



FIGURE 4. DOUBLE-ARM SINGLE-LEG RDL

DISCUSSION

When considering fatigue management and exercise selection, the eccentric component of the RDL should be considered. Placing the muscles under a larger stretch with load may expose the muscle to increased soreness, thus causing a temporary decrease in muscle performance which is a contraindication to the focus in-season (10,12,15,17,20,24). Eccentric contractions, compared to concentric, have been shown to cause more delayed onset muscle soreness.

The chronic use of eccentric contractions results in a noticeable protective adaptation termed the “repeated-bout effect” (9,10,15,17,19,20,26). Thus, it is important that athletes are exposed to variations of the RDL in the off-season prior to RDL introduction in-season to avoid fatigue. Greater force can be produced eccentrically when compared to isometric or concentric movements (24,25,28). Because the goal is to enhance strength and power, the case can be made that as long as the athlete has acquired adaptations, then the eccentric component of the RDL

can benefit the athlete in-season. Based on these interpretations of the evidence above, it is recommended to primarily focus on progression through intensity and variations. The main goal of in-season training is not to increase hypertrophy, but to increase or maintain strength and power.

CONCLUSION

When considering in-season strength training for athletes, priority is given to sport practice. Once a foundation of strength adaptation is accomplished, incorporating the RDL is a viable choice in-season due to strength training time constraints and reduced overall training volumes. The RDL requires a more localized musculature recruitment, while reducing potential interference with other training exercises, such as the squat and deadlift. The RDL has less spinal loading, which reduces the amount of overall interfering fatigue, has a longer posterior chain range of motion to the targeted musculature due to more open knee angle and closed hip angles created, and provides more

opportunity to include variability in programming. Variability helps keep the program new and exciting, which has been shown to have a positive effect on motivation and overall effort given by athletes. Training goals and priorities may differ with various sport demands in-season, training ages, biological ages, and acquired adaptations. This article is meant to provide a general synopsis on why one might consider incorporating the RDL for in-season training.

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