

Progression for Teaching Weightlifting Pull Movements for a Rehabilitative Setting

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STRENGTH AND CONDITIONING professionals that work with individuals who have had previous low back injuries may face many challenges. The initial therapy may come from weeks of working with a licensed physical therapist or certified athletic trainer. Regardless of the path taken, the client or athlete will need continued rehabilitation for preparation for their occupation after the injured area is strengthened. Physical therapy is designed to help an individual achieve normal movement and function of the injured area (10).

Occupations can vary from dynamic and explosive in nature to the other extreme of sitting at a desk working on a computer. Clientele who perform physical labor may need extra strength and power production from the muscles while at the same time maintaining safety and efficiency. This does not exclude office occupations in which one may have to lift boxes of paper, office furniture, or other office supplies. Closed-kinetic chain exercises are commonly used in a rehabilitation setting to increase a person's strength and function (10). Pulling movements

are a closed-kinetic chain exercise that is an underutilized training modality that can assist in preparing a client to return to work.

■ Flexibility

Prior to adding pulls to a rehabilitative-conditioning program, flexibility and trunk stability need to be addressed. The joints and the respective muscle groups that are recruited for a pull should be assessed and conditioned. Table 1 has a list of the primary muscle movers of a pull along with the joint movement(s) involved. There are a number of evaluation tech-

Table 1
Muscles and Their Joint Movements

Vastus medialis, lateralis, and intermedius	Knee extension
Rectus femoris	Knee extension and hip flexion
Gluteus maximus	Hip extension
Semitendinosus, semimembranosus, and biceps femoris	Knee flexion and hip extension
Spinal erectors	Spinal extension
Rectus abdominis	Create intraabdominal pressure and spinal flexion
Internal and external obliques	Create intraabdominal pressure, lateral flexion, and torso rotations
Transverse abdominis	Create intraabdominal pressure

niques that can be used for assessing flexibility.

The lumbar spinal erectors, gluteus maximus, and hamstrings can be assessed by using the sit-and-reach test. This test evaluates these muscles as they cross the hip joint and the lumbar vertebrae. The use of a goniometer can also be used with this same movement of hip and lumbar spinal flexion. A person should be able to move through an active range of motion of the pulling technique without trying to extend it with an external resistance (10). Flexibility is one part of the rehab process along with strength and power of the injured area. It is necessary for the strength and conditioning professional to choose testing procedures he/she is familiar with and that are directly related to the needs of the program. Keep in mind that adipose tissue, muscle, and joint design will dictate the range of motion possible.

■ Trunk Conditioning and Stability

Trunk conditioning needs to be addressed in a complete strength and conditioning program along with the pulling movements. Core training is important to overall health performance of the lumbar region (6, 12). Prior to developing any conditioning program that involves a pull, a person requires strong abdominal, lower back, and hip musculature to stabilize the area and reduce injury (3). The specific training aid or exercise that is used is at the discretion of the strength and conditioning professional. Pulling movements occur in one plane of motion (7). Due to this, stabilization exercises should emphasize an individual's ability to maintain a neutral spine position (cervical through lumbar) during the flexion of the hips (4).

Floor exercises, stability balls, disc pillows, balance boards, and other devices are all effective means to strengthen the trunk. Strong abdominal and spinal erectors muscles are essential to maintain a person's own natural spinal curvature (11, 15). Strength in the hip extensors should also be included in core training. To continually provide a challenge to a conditioning program, the addition of unstable training devices to traditional exercises can be an added benefit.

■ Teaching the Pulling Movements

The use of a dowel rod will be sufficient for beginning instruction and muscular coordination improvement prior to advancing to the use of dumbbells for added resistance (6). However, many individuals may not have as much coordination as athletes who are constantly challenging their kinesthetic awareness. Therefore, the pull should initially be taught by positional change of the person's body without any objects being held in the hands. This may eliminate an individual's bad habits of reaching toward the floor with their hands while setting an object down or picking something up. The progression of learning should be as follows: setting the back, lifting from midthigh to hips then knees to hips, squatting technique, and finally lifting from below the knees to hips or the traditional weightlifting pull.

The first component of the pull to be taught is what strength coaches commonly call setting the back. The client/patient should be instructed to fill their lungs with air and retract their scapula toward the midline of the body (15). Full scapular retraction will not be efficient or possible when executing a pull due to the shoulder flex-

ion that occurs when grabbing an external load. Attention should be given to keeping the abdominal musculature tense and actively pulling the umbilicus dorsally toward the spinal column. The val-sava maneuver should be avoided but if necessary may be instructed to clients/patients who do not have hypertension or are at risk of cardiovascular disease (1). This may be done by giving the client/patient simple cues such as standing at attention with the "chest out and shoulders back" while contracting the abdominal muscles (13, 15).

Once the individual accomplishes the ability to set the back, instruction in the pull may begin in a top down method. The client/patient is instructed to initiate movement with their hips posteriorly. Learning to "hip hinge" is critical for proper pulling mechanics and can also be taught with a dowel rod against an individual's head, back, and glutes (1, 14). Having a wall behind the individual for their hips to come into contact with is beneficial for safety, as shown in Figure 1. Individuals who have had previous back injuries will also feel more confident initially moving into a trunk flexed position that allows for support of bodyweight when the glutes are in contact with an immovable object such as the wall. Individuals should initially be instructed to keep their hands at the middle of the thighs while the shoulders remain over the knees. By keeping their feet flat on the floor, the client/patient can concentrate on keeping their center of gravity over the arch of the foot—not over their toes (2, 9).

In relation to the floor or lifting platform, the back should be at approximately 30° when the individual reaches the bottom position (hands on the knees) of the pre-



Figure 1. Use of a wall as a guide and safety for the start of pulling movements.

liminary learning phase of the pull (11). Adjustments to foot distance from the wall can be made to achieve this approximate 30° back-to-floor relation. Once in this position, the patient can be instructed to tense the musculature of the glutes and hamstrings while maintaining a set back. After the client/patient is successful at activation of the prime movers (hip extensors), they should be instructed to return to the starting position by contracting the glutes and hamstrings while maintaining a set back.

The Romanian deadlift (RDL) is essentially the “second pull” and is a valuable training movement that can be used in a conditioning program (5, 7). An individual should be instructed to bring the dowel rod or other light object to just above knee level, as is demonstrated in Figure 2 (8, 13). The individual should then be instructed to initiate movement toward the beginning position using their

glutes and hamstrings. It is necessary for the individual to be comfortable performing position changes away from the wall while also being taught how to squat prior to going to pulling movements below the knees.

The squat is preferably taught on a separate day from a pull day as a way for the individual not to confuse the two movements. The client/patient begins by setting their back and having their feet placed hip- to shoulder-width apart. The exact angle of the toes in relation to the heels should be slightly outward. The exact external rotation of the feet is not of great importance compared with the concept that the person’s knees should track in-line with their toes while squatting. Once the above positions are set, movement begins by hip and knee flexion occurring simultaneously in the descent of the squat. Depth is determined either by when the thighs are parallel to the floor or joint range of motion is achieved. At no time during the descent or ascent should the heels leave the floor (2, 9). If the lower extremities lack full strength, the client/patient can hold onto a stationary object to assist with the squat.

Only when a person is able to execute a pull from knees to hips and squat without assistance or pain are they to progress to more difficult pulling movements (13). To begin this phase of progression, the person will stand with a dowel rod in their hands (6). The dowel rod will be at full elbow extension with an overhand grip, and placement of the dowel rod shall be outside the thighs or at shoulder width. Again, hip and knee flexion will initiate the movement along with the hips moving posteriorly as mentioned earlier, lowering the dowel rod until it is at knee level. If the person is pain

free and capable, they should move below the knees with the dowel rod. Once the depth is achieved, the person should pause for a second, maintaining their natural spinal curvature with a back angle relative to the ground of 25–50° (2).

Ascending from below the knee will begin with knee extension to bring the hips and shoulders up simultaneously to maintain back curvature (2). As the knees extend, the lower leg should reach a position of being perpendicular to the floor when the load is at knee level. At this point, the person should be instructed to recruit the glutes and hamstrings to create knee, hip, and back extension, bringing the person to a standing position (8).

The person should be successful in coordinating this movement prior to using a heavier external load such as dumbbells. However, some individuals may benefit from beginning with an external load and performing the knees to hips phase of the pull (second pull) only

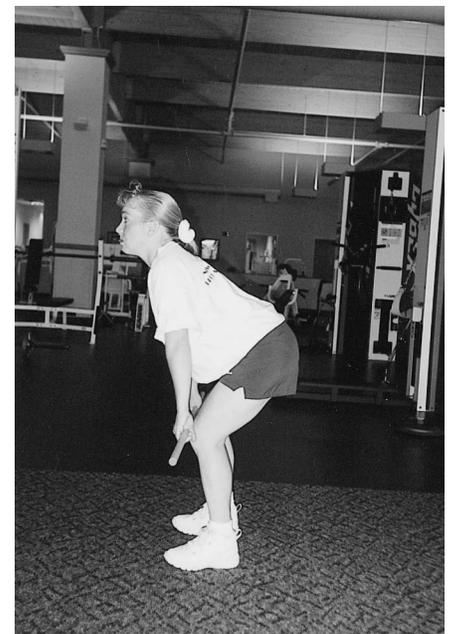


Figure 2. Above-the-knee start position for the second pull.

Table 2
Errors in Pulling Movements

Failure to maintain natural spine curvature
Lack of joint flexibility
Completing knee extension before hip and back extension occurs
Excessive kyphotic arch at beginning phase
Excessive lordotic arch at end of pull
Using a load beyond the person's capability

prior to learning the pull from below knee level. Table 2 lists common errors associated with teaching pulling movements. Only after a person has learned to execute the initial motions with controlled muscular contractions and is pain free should they progress to adding speed to a pull, and then it should be done with a dowel rod (see Figure 3) before adding a heavier load.

■ Application of Pulls

Pulling movements are commonly found in athletic strength and conditioning programs to enhance back and leg power. With lower back injuries as one of the most common ailments in everyday life, it is important to condition that area. The general population in a rehabilitative setting will benefit from the muscular recruitment involved with a weightlifting pull.

The focus of the program should be to improve health or rehabilitate an injury rather than to progress to a pulling movement. Pulling movements are a way of addressing the strength-speed requirements of everyday activities. Table 3 lists a number of example exercises that can be used for increasing back strength and improving a person's lifting mechanics.

Although the objective of a training program is going to vary based on individual needs and limitations, the purpose of pulling movements is to prepare the individual for lifting objects safely. As

an example, Tables 4 and 5 illustrate a program for a person who is continuing to rehabilitate their back preparing for work in a warehouse. Some of the loads being used are based on the power needed at that particular place of employment and what the heaviest object required to lift would be. Other loads will be based on an estimated 1-RM, or a repetition goal can be used instead of a percentage.

A percentage is used to prevent an excessive overload in training that may result in an injury. Percentages are great to use, but these need to be monitored closely with the repetitions being used. Also, injured individuals will not have a significant 1-RM. Therefore, changes in daily training intensity will come in the form of total volume. The volume and intensity that is used will vary according to the person's ability, the therapist/trainer's philosophy, and the time constraints and objectives of the program.

Once a person has successfully progressed to executing a pull with the desired load, then continued modification of the program may improve work performance. If a person reaches their objective of completing a clean-grip pull with 50 kg, then continued modification may improve their work performance and reduce their chances of injury. The modification does not have to be increasing the external load but can be

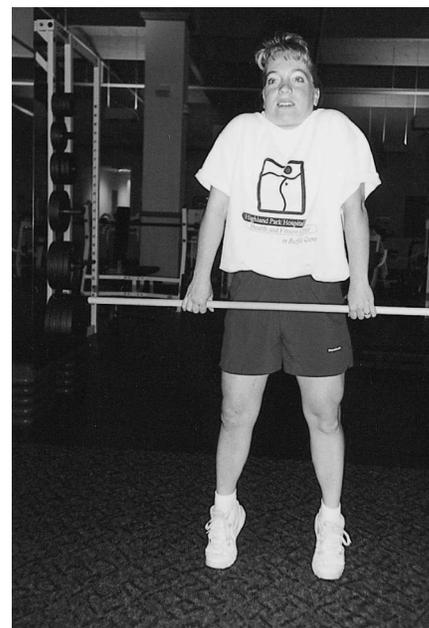


Figure 3. Clean pull with a dowel rod at the end of the progression.

changing the exercise itself. A clean-grip high pull or a snatch-grip pull can be included. Table 6 lists some pulling movements to which a person can progress after the rehabilitation has been completed.

Application of pulling movements in a rehabilitation setting is a step toward preparing a person for more vigorous activities associated with physical labor. As a

Table 3
Exercises for Improved Back Strength and Lifting Mechanics

Dumbbell deadlifts
Sumo stance deadlifts
Straight leg deadlifts (SLDL)
45° back extension
Good morning
Prone back extensions
Supermans
Reverse hyperextensions
Balance board squats/deadlifts
Disc pillow squats/deadlifts

Table 4
Periodized Program for Warehouse Worker

General	First transition
Warm-up	Warm up
Balance board squats 2 × 30	Balance board squats 2 × 30
Body weight squats 2 × 10	Body weight squats 2 × 10
Medicine ball chops 1 kg 2 × 10	Medicine ball chops 1 kg 2 × 10
Second pull with dowel rod 3 × 5	Second pull with bar 4 × 4
Prone back extension 3 × 6	First pull with dowel rod 3 × 6
Standing shoulder press 3 × 8	Standing shoulder press 3 × 8
Incline DB chest press 2 × 8	Incline DB chest press 2 × 8
RDL 2 × 5	RDL 2 × 5
Dumbbell curls 2 × 8	Dumbbell curls 2 × 8
Standing row 3 × 10	Standing row 3 × 12
Abdominals, your choice 2 × 10	Abdominals, your choice 2 × 15-20
Seated torso rotations 1 kg 2 × 12	Seated torso rotations 2 kg 2 × 12
Stretching assisted and nonassisted (5-15 minutes or as needed)	Stretching assisted and nonassisted (5 minutes or as needed)
Intensity 30-55% of estimated 1-RM (2 weeks)	Intensity 55-65% of estimated 1-RM (2 weeks)
Beginning load may be painful	Dependent on rehab population

Table 5
Periodized Program for Warehouse Worker Continued

Preparatory	Second transition
Warm-up	Warm-up
Balance board squats 2 × 30	Balance board squats 2 × 30
Body weight squats 2 × 10	Body weight squats 2 × 10
Medicine ball chops 1 kg 2 × 10	Medicine ball chops 1 kg 2 × 10
Second pull with bar 4 × 2	Second pull with bar 2 × 4
First pull with bar 3 × 4	First pull with bar 2 × 4
Standing shoulder press 3 × 5	Standing shoulder press 2 × 10
Incline DB chest press 2 × 8	Incline DB chest press 2 × 10
RDL 2 × 5	RDL 2 × 5
Dumbbell curls 2 × 8	Dumbbell curls 2 × 10
Standing row 3 × 8	Standing row 3 × 12
Abdominals, your choice 2 × 20-25	Abdominals, your choice 2 × 15-20
Seated torso rotations 3 kg 2 × 12	Seated torso rotations 2 kg 2 × 12
Stretching assisted and nonassisted (5 minutes or as needed)	Stretching assisted and nonassisted (5 minutes or as needed)
Intensity 65-75% of estimated 1-RM (2-3 weeks)	Intensity 60% of estimated 1-RM (2-3 weeks)

general guideline, once an injured area is strengthened, steps need to be made to condition a person for a specific activity such as employment, leisure, or athletics. There is no one specific exercise

that is the best for rehabilitation, but rather there are exercises that can be used for conditioning specific motions. Pulling movements are a means to conditioning upper and lower body muscles for quick,

forceful contractions (2). This is not the only way to rehabilitate a person for activities, but it is one method that can serve as an alternative that is specific to a lifting motion.

Table 6
Progression for Pulling
Movements After
Rehabilitation

- Clean grip pulls midhigh
- Clean grip pulls above knee
- Clean grip pulls below knee
- Clean grip pulls from floor
- Clean grip highpulls
- Snatch grip pulls (same as clean grip pulls)
- Snatch grip highpulls
- Pulls from blocks
- Dumbbell pulls
- Dumbbell highpulls

■ **Conclusion**

Teaching pulling movements to patients/clients will enable them to lift in “real world” situations using their hip and knee extensors as prime movers rather than solely relying on their spinal erectors. Health and strength professionals must continually look outside the box for alternative modes and methods that can best benefit their patient’s/client’s needs safely and effectively. There is no one best way to rehabilitate or train a patient, client, employee, or athlete. Pulling movements as a rehabilitative mode can only improve a person’s strength and muscular recruitment, allowing for a safer return to employment and life. During the process of learning the pull, a person will develop confidence in their lifting ability without compromising their back during activities of daily living. ▲

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