# HOW TO IMPROVE ANKLE DORSIFLEXION AND CALF STRENGTH FOR BETTER PERFORMANCE

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*This article highlights four non-traditional calf exercises that can immediately be used in strength programs for the purpose of improving calf strength while also increasing ankle dorsiflexion mobility.*

Calf training is not just for aesthetics, as research on one-repetition maximum (1RM) strength in a calf raise and sprint performance has shown significant correlations for both absolute and relative strength (12). Given that ankle plantarflexion is involved in actions like sprinting, jumping, cutting, etc., these results demonstrate that anyone wishing to improve their field, court, or combat sports performance could benefit from improved calf strength. Therefore, the personal trainer can incorporate calf-specific strength training exercises, such as the exercises provided in the article, to offer positive transfer to improving sprint speed, as well as improving ankle mobility.

## TRADITIONAL CALF EXERCISE AND ANKLE DORSIFLEXION MOBILITY

Traditional calf exercises, such as standing barbell and dumbbell calf raises, standing machine calf raises, and seated machine calf raises, are focused on improving calf strength. However, they do not necessarily improve ankle dorsiflexion mobility because of the foot and ankle positioning they involve. Hence why common ankle mobility exercises are not simply traditional calf raises, and involve different positioning of the foot and ankle.

Several retrospective studies have reported those with chronic knee pain, such as patella tendinopathy or patellofemoral pain syndrome, also displayed decreased ankle dorsiflexion range of motion compared with individuals without chronic knee pain (1,10,15,20). Although it is less clear in the research if limited ankle dorsiflexion is a reliable predictor of increased risk of acute injuries, such as noncontact anterior cruciate ligament (ACL) tears, restricted ankle dorsiflexion motion alters frontal plane knee biomechanics (3,5,7,9,11,14). This could conceivably contribute to a mechanism for the occurrence of ACL, medial collateral ligament (MCL), and meniscus injury in the knee (7,8,17).

Additionally, individuals with restricted ankle dorsiflexion motion may have a diminished ability to absorb kinetic energy at the ankle, which could lead to greater loads on the surrounding soft tissue structures of knee in sports that require jumping (4). Thus, altered frontal plane knee biomechanics, increased knee joint energy absorption, or both are theorized to increase the risk of knee injury. As such, ankle dorsiflexion mobility training should be a key component of knee injury prevention programs (13).

## FOUR NON-TRADITIONAL CALF EXERCISES FOR IMPROVED STRENGTH ANKLE DORSIFLEXION MOBILITY

The following four calf exercises were originally developed by the author to involve foot and ankle positioning that focus on ankle dorsiflexion mobility while increasing the range of motion demand on the calf musculature in order to improve dorsiflexion mobility range of motion and build strength throughout. The rationale for these exercises is the principle of specificity, which dictates that the adaptations to training will be specific to the demands the training puts on the body (2).

The calves are made of the gastrocnemius complex and the soleus. Research shows that doing calf raises (i.e., ankle plantar flexion) with a straight knee creates superior gastrocnemius muscle activity, while doing these raises with a bent knee creates superior soleus muscle activity (6,16,18,19). Therefore, it would be reasonable to incorporate both straight-knee and bent-knee calf exercises to maximize calf strength.

It is for this above reason why the first two exercises featured below involve a straight-knee position, while the second two exercises featured below involve a bent-knee position. It is the author's opinion that combining at least one exercise from each category can make one's calf and ankle mobility training more comprehensive than simply doing only one knee position.

## DUMBBELL SINGLE-LEG LEANING CALF RAISE

- Stand facing a wall with your feet hip-width apart while holding a dumbbell in your left hand.
- Place your right hand on the wall at roughly chest height and lean your body forward while keeping your torso, hips, and knees all in a straight line.
- Bend your right knee and step your left leg backward placing it as far behind you as possible while keeping your heel on the ground and your left foot pointed at the wall.
- Your left knee, hip, and torso should all form a straight line. Lift your right foot off the floor while keeping your right knee bent at around a 90-degree angle.
- While maintaining your body position, lift your left heel as high as you can off of the floor, thus ending up on the ball of your foot.
- Slowly lower yourself until your heel touches the floor to complete the repetition.
- Do not allow your left foot to rotate outwards at any point; keep it straight and pointed at the wall throughout.
- Do not bounce; control the lowering (eccentric) portion of each repetition by allowing your heel to touch the floor gently—not to fully rest on the floor—until all repetitions have been completed. Perform all the repetitions on the same side before switching sides.

FIGURE 1. LEANING CALF RAISE - START

FIGURE 2. LEANING CALF RAISE - END

FIGURE 3. LEANING CALF RAISE - BACK VIEW FROM START POSITION

## DUMBBELL FOOT-ELEVATED CALF RAISE

- Stand facing a plyometric box or stable surface that is roughly mid-thigh height with your feet hip-width apart while holding a dumbbell in each hand.
- Place one foot on the platform and lean your hips forward while keeping your torso upright and your bottom knee straight.
- Your back leg—the leg that is on the ground—should be behind your torso as far behind you as possible while keeping your heel on the ground and your left foot pointed straight.
- If the front of your bottom foot is more than 2 – 3 in. behind your same side hip, use a higher platform to elevate your front foot.
- While maintaining your body position, with the leg that is on the floor, lift your heel up as high as you can off of the floor, thus ending up on the ball of your foot.
- Slowly lower yourself until your heel touches the floor to complete the repetition. Do not allow your foot to rotate outwards at any point, keep it straight throughout.
- Do not bounce; control the lowering (eccentric) portion of each repetition by allowing your heel to touch the floor gently—not to fully rest on the floor—until all repetitions have been completed.
- Perform all the repetitions on the same side before switching sides.

FIGURE 4. FOOT-ELEVATED CALF RAISE - START

FIGURE 5. FOOT-ELEVATED CALF RAISE - END

## HALF-KNEELING DUMBBELL CALF RAISE

- Using a mat or rolled towel for comfort underneath your down knee, assume a half-kneeling position on the floor with your torso straight and both knees bent at 90 degrees.
- Move your front foot backwards underneath your same-side thigh as far as you can while keeping your heel on the floor and your foot straight.
- Positioning your working side foot closer to you than if you keep your knee bent at a 90-degree angle increases the range of motion demand on this exercise, thus making it more productive.
- Place either the side of dumbbell, or the bottom of a kettlebell on top of the knee (not on top of your mid-thigh) of the same foot you just moved toward you.
- Push your toes into the ground and lift your heel as high as you can off of the floor, thus ending up on the ball of your foot.
- Slowly lower your heel until it touches the floor to complete the repetition.
- Do not bounce; control the lowering (eccentric) portion of each repetition by allowing your heel to touch the floor gently—not to fully rest on the floor—until all repetitons have been completed.
- Perform all the repetitions on the same side before switching sides.

FIGURE 6. HALF-KNEELING CALF RAISE - START

FIGURE 7. HALF-KNEELING CALF RAISE - END

## DUMBBELL SINGLE-LEG SEATED CALF RAISE

- Sit tall on a bench with your feet roughly hip-width apart.
- Move one of your feet backwards underneath your same-side thigh as far as you can while keeping your heel on the floor and your foot straight.
- Position your working side foot closer to you than if you keep your knee bent at a 90-degree angle increases the range of motion demand on this exercise, thus making it more productive.
- Place either the side of dumbbell or the bottom of a kettlebell on top of the knee (not on top of your mid-thigh) of the same foot you just moved toward you.
- Push your toes into the ground and lift your heel as high as you can off of the floor, thus ending up on the ball of your foot.
- Slowly lower your heel until it touches the floor to complete the repetition. Do not bounce; control the lowering (eccentric) portion of each repetition by allowing your heel to touch the floor gently—not to fully rest on the floor—until all repetitions have been completed. Perform all the repetitions on the same side before switching sides.

FIGURE 8. SEATED CALF RAISE - START

FIGURE 9. SEATED CALF RAISE - END

## PRACTICAL PROGRAMMING RECOMMENDATIONS

The following are general recommendations for utilizing the exercises shared the article.

- Perform 2 – 3 sets of 12 – 30 repetitions per side.
- If one side is less strong, perform two sets on the stronger side and three sets on the weaker side to meet individual needs.
- If using any of these exercises as a part of a warm-up or preparation, do not take the sets to failure to avoid decreasing performance in the subsequent exercises.
- If using these exercises in the strength training portion of the workout, sets can be taken to failure.
- Ensure full range of motion is performed on each repetition in order to maximize benefits.
- Utilize the principle of progressive overload by gradually doing more repetitions over time with the same load or the same repetitions with a heavier load.

The above are general guidelines to use as a starting point in applying these exercises. The personal trainer must use their better judgment to increase or decrease total work volume each week on any of these exercises to meet the individual demands of the client or athlete.

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## ABOUT THE AUTHOR


*Nick Tumminello has become known as the "Trainer of Trainers" for his ability to provide simple, honest, and immediately applicable solutions to common problems fitness and conditioning professionals face. He has worked with a variety of clients, including National Football League (NFL) athletes, professional mixed martial arts (MMA) fighters, bodybuilders, figure models, military personnel, first responders, and everyday fitness enthusiasts. Tumminello is the 2016 NSCA Personal Trainer of the Year, and the editor-in-chief of the* Personal Training Quarterly *journal. He is also the author of three books, and the creator the NT Loop bands.*

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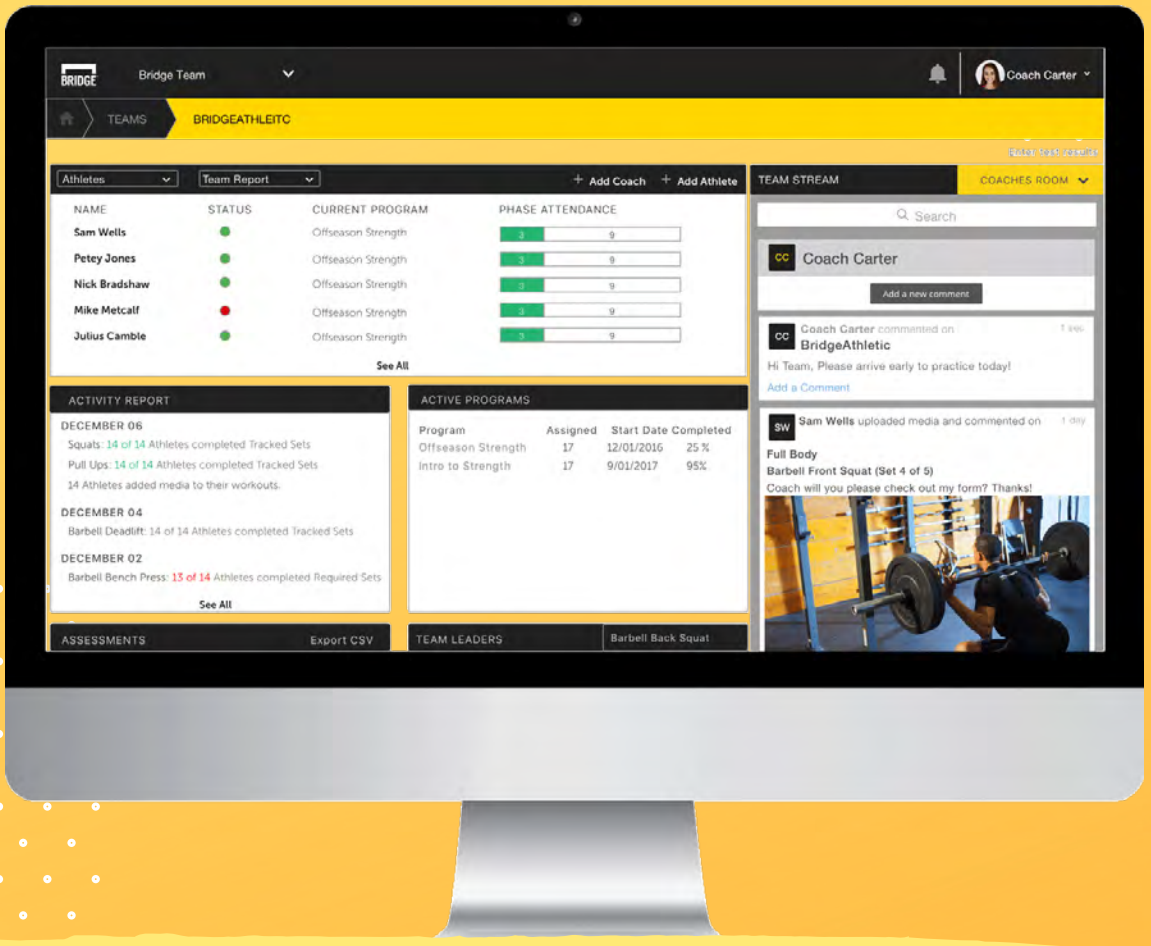


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