



**PHYSICAL  
PERFORMANCE  
TESTS & CLEARANCE  
CONSIDERATIONS**

*for Distance Runners  
Following Injury*

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Running is plyometric activity that involves bounding from one leg to the next in a balanced, rhythmic, and repetitive manner.

Despite the seemingly innocuous nature of running, a relatively high incidence of running related injuries (RRIs) has been documented in the medical literature. The vast majority of these RRIs tend to be non-traumatic, overuse injuries involving the soft tissues of the lower extremity.

Sometimes RRIs are little more than a nuisance or “niggle” that make completing a workout relatively more unpleasant. In other cases, runners may be sidelined from training for an extended period of time, especially if they are dealing with a bone stress injury (BSI), meniscal pathology, FAI, or a lower limb tendinopathy.

Given the propensity for runners to sustain an RRI over the course of a year, it behooves practitioners to understand the performance demands of distance running in conjunction with relevant physical performance tests (PPTs) or functional assessments for the sake of refined decision making in order to confidently return runners back to sport and performance.

The aim of this document is to provide a group of practitioner-friendly PPTs, which can be used to establish a runner’s load tolerance while helping to determine if one is ready to transition back to training.

While considerable work still needs to be done on this topic given the lack of standardization and dearth of research related to the validity and reliability of many of these tests, practitioners must still address every runner’s most pressing question, “When can I run?” The primary goal of this battery of tests is to challenge a runner through specific regions, tissues, and movements that mimic the performance demands of running.

The ability to successfully complete these tests should ultimately give both the practitioner and runner greater confidence in the runner’s ability to withstand the performance demands of distance running. Considering that some runners may enjoy consistent and healthy training despite failing some of these PPTs, practitioners should exercise caution in solely relying on this group of PPTs to predict pain and injury. Rather, the goal is to ensure that a runner can directly and confidently load through the involved region(s) with minimal to no pain while ensuring that function has been restored throughout the kinetic chain in hopes of mitigating the chance of re-injury.

## PHYSICAL PERFORMANCE TESTS

1. Single Leg Stance
2. Lateral Step Down
3. Calf/Heel Raise
4. Bridge + Straight Leg Raise
5. Standard Side Plank
6. Side Plank + Hip Abduction
7. Adductor Plank
8. Pogo Jumps
9. Quick Taps
10. Single Leg Hopping

## EQUIPMENT REQUIREMENTS

1. Cushioned mat
2. Stepper
3. Metronome
4. Stopwatch/timer
5. Bench or chair
6. 7-8” step or platform

# Single Leg Stance

## [VIDEO LINK](#)

## RATIONALE

Considering that both feet are never simultaneously in contact with the ground during running, it is important to assess a runner's willingness to accept body weight load and balance on each leg. Research has specifically documented deficits in single leg balance across populations dealing with various lower extremity pathologies such as lateral ankle sprains and lower limb tendinopathy. Specific to runners recovering from a gluteus medius tendinopathy, single leg balance serves as a great "daily load test" to assess irritability and help guide exercise prescription and clinical decision making. Given the non-threatening nature of this assessment, it serves as a sensible preliminary test; especially to ensure that it is safe to challenge a runner with more advanced PPTs discussed below. For the sake of standardization, it is suggested to conduct this assessment barefoot on firm, level ground.

## INSTRUCTIONS

- Stand barefoot on firm level ground with your arms across your chest or resting on your pelvis in a "hands on hip" position.
- Pick a side to balance on and hold it for 20s (eyes open) while keeping the knee of the stance leg straight but not "locked out." Allow the runner to self-select which side they initiate balance on.
- The foot of the stance leg should be positioned straight such the great toe is pointed towards noon on a clock excepting cases of femoral versions.

## SUCCESS

Maintaining single leg balance for 20s on each leg in a relatively wobble-free manner without having to hold one's breath or resort to the use of the arms to offset any loss of balance. Additionally, the performer should maintain their shoulders and hips square and level.



## CONSIDERATIONS

The practitioner should monitor for toe gripping, holding one's breath, excessive trunk lean, and poor control of the pelvis in the horizontal and transverse plane. It is also important to appreciate that one's balance is affected by age as well as diurnal changes. In addition to assessing single leg balance barefoot, it can also be assessed shod in the runner's preferred training shoe though this may negatively impact one's balance.

# Lateral Step Down

## [VIDEO LINK](#)

## RATIONALE

Provided that a runner can balance on each leg without any marked issues, the lateral step down (LSD) is the next PPT that deserves consideration. The LSD is a reliable and practical qualitative assessment that affords clinicians with a broad lens into the health and function of the lower extremities for runners as it mirrors various performance requirements of distance running. Research also suggests that single leg tasks demand greater lower extremity control, which has been associated with lower extremity pathology. The LSD specifically challenges the following: 1) tolerance to single leg eccentric contractions, 2) lateral hip strength, 3) lumbopelvic control, 4) ankle dorsiflexion, and 5) tolerance to compression at the patellofemoral joint, ITB, and Achilles tendon. Lastly, it also cycles the runner through ranges of motion that are encountered during the stance phase of the running gait, particularly at the level of the knee and ankle.

## INSTRUCTIONS

- Balance barefoot on the edge of a 7-8" step or platform while assuming a "hands on hip" position or with your arms interlaced across your chest.
- While maintaining an upright torso or trunk position, slowly lower to contact the ground with the heel of the non-balancing leg in a controlled manner while making sure to avoid transferring your weight onto it.
- Return to the starting position.
- Focus on staying in sync to a metronome (30bpm) for the duration of the test.
- Keep the foot of the stance leg straight excepting cases of femoral versions.

## SUCCESS

Completing a minimum of 10 repetitions on each side though while staying in sync to the metronome with no loss of balance or compensatory strategies. In competitive runners, the practitioner should also consider increasing the number of reps to 20 plus.



## CONSIDERATIONS

Practitioners should monitor for toe gripping, holding one's breath, marked trunk lean towards the stance leg, relying on the arms to augment balance, and/or unwanted movement especially in the frontal and transverse plane during the lowering phase of the task. Among runners with limited ankle dorsiflexion, it is not uncommon to observe a hip flexion strategy during the eccentric phase.

# Calf Raises

## [VIDEO LINK](#)

## RATIONALE

The calf muscle complex is often considered the “powerhouse” when it comes to distance running considering its prominent role in gait efficiency, shock absorption, and propulsion.

This is particularly the case for habitual forefoot strikers (FFSs) as well as those who incorporate high intensity interval or track work into their training as higher running speeds tend to result in a more anterior footstrike as does uphill running. Furthermore, the CMC is preferentially affected with masters level athletes leading to decrements in strength and power. Despite the fact that there are no definitive normative values nor uniform description of the calf raise test, it should still be considered an important assessment to assess various properties of the CMC including endurance, strength, fatigue, pain, and function.

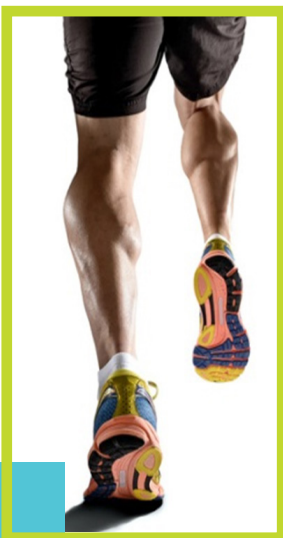
## INSTRUCTIONS

- Stand barefoot on firm level ground with the foot of the non-involved lower extremity positioned on a platform or step to take it out of the equation aside from a balance standpoint.
- The foot of the stance leg should be pointed straight excepting cases of femoral versions.
- Focus on moving in a vertical direction towards the ceiling or sky while pushing through the first and second toe.
- Work through the full available range and stay in sync to a metronome set at 30bpm.

## SUCCESS

- <50 y/o: Completing greater than >25 repetitions for men & women
- 50-60 y/o: Completing >20 reps would be the target
- 60-69y/o: Completing 15-20 reps
- 70+ y/o: Completing 10-15 reps

\*Lastly the test should be stopped if the runner is unable to stay in sync with the metronome or if they cannot reach peak amplitude at the top of the range.



## CONSIDERATIONS

The practitioner should ensure that the performer is not rolling to the outside of the foot as they elevate their heel off the ground while also monitoring for a forward lean, which is a common compensatory strategy. Lastly, this assessment can also be performed on a slight incline (10°) or slant board if the goal is to work the runner through a larger excursion of motion that also involves greater compressive loads at the level of the Achilles tendon.

# Unilateral Bridge + SLR

## [VIDEO LINK](#)

## RATIONALE

The bridge combined with a straight leg raise assesses posterior chain strength, endurance and lumbopelvic hip control. Although many practitioners think of this as targeting the gluteus maximus and hamstrings, it particularly challenges the gluteus medius to counter the weight of the unsupported limb in an effort to maintain a level pelvis in the transverse plane. While a lack of research exists in terms of normative values across populations, a common benchmark that one can generally aim for in most distance runners is a 30s hold on each side though one could also easily perform single leg repetitions in the form of a unilateral bridge.

## INSTRUCTIONS

- Lie on your back with your arms positioned “across your chest.”
- Bend your knees to a point where your feet are resting flat on the floor/mat and roughly shoulder width apart.
- Lift your bottom off the ground until your thighs are parallel with your torso.
- Straighten the knee of the unsupported leg while maintaining the thighs in a parallel position.
- Aim to keep your pelvis square such that if you had a carpenter’s level resting on it that the bubble would remain centered throughout the exercise.
- Avoid letting your bottom sink to the ground.

## SUCCESS

Holding the bridge + SLR position for 30s on each side while maintaining a level pelvis without allowing the bottom to fall towards the ground or sink into hip flexion. Afford 30s between testing sides.



## CONSIDERATIONS

The practitioner should closely monitor the performer to ensure they are not holding their breath while also maintaining a square torso and pelvis. It is not uncommon for individuals to report a cramping sensation during this test, especially if they have not previously performed this exercise or some variant of it.

# Side Plank

**VIDEO LINK:** [Part 1 \(Standard\)](#) | [Part 2 \(Side Plank + Hip Abduction\)](#)

## RATIONALE

In addition to being a routinely prescribed “core strengthening” exercise that challenges the abdominal and trunk musculature, the side plank also affords an invaluable lens into strength and capacity of the lateral hip musculature; especially the gluteus medius. Considering that several plank variations exist, selection and standardization is important. Based on the available body of literature practitioners are encouraged to utilize two specific variations; 1) side plank with legs staggered or 2) side plank coupled with hip abduction. This assessment is particularly salient in working with runners recovering from a gluteus medius strain or tendinopathy given the performance demands of running at the level of the lateral hip. It can also be coupled with other assessments such as sidelying hip ABD strength, single leg balance, and single leg hopping, to gain a more global perspective of comprehensive capacity of the lateral hip region.

## INSTRUCTIONS

- Lie on your back with your arms positioned “across your chest.”
- Lie on the side to be assessed.
- Use your arm on the same side to prop up your up torso.
- Keeping the knees straight, stagger your legs such that the top leg and bottom leg are ~20-30 degrees in front and behind your trunk, respectively.
- Keep your shoulders and hips square and hold for 1 minute on each side.
- For part two, start in the standard side plank position then lift the top leg while positioning it in slight extension or just behind the plane of the body while keeping your foot level.

## SUCCESS

**Part 1:** Holding the side plank position with knees straight and legs staggered for one minute on each side without letting the pelvis sink towards the ground.

**Part 2:** Holding the side plank combined with hip abduction for 20s without losing one’s balance or allowing the pelvis to sink towards the ground.



## CONSIDERATIONS

The practitioner should stop the test if the performer’s hips sink out of position or they can no longer maintain proper trunk position. Provided that the performer successfully completes part one as described in the video, they can progress to part two in which case a successful test involves being able to hold the position for 20 seconds. Lastly, it is important for the practitioner to consider the potential of any shoulder pathology that may compromise the test.

# Adductor Plank

## [VIDEO LINK](#)

## RATIONALE

Although the adductors do not receive the attention they deserve as they relate to running, they are important to assess as part of a comprehensive screen or evaluation. This is particularly the case if you are working with a runner, who is experiencing FAI or who may be recovering from an adductor tendinopathy, strain, or bone stress injury involving the proximal femur or pelvis. While more research needs to be done on this assessment to establish normative values across different demographics, this assessment often proves valuable in assessing one's trunk and adductor strength and willingness to load through these regions and tissues.

## INSTRUCTIONS

- Position the leg that you are going to test on the bench as seen in the video.
- Abduct or draw your shoulder 90° away from your side with your elbow bent 90°.
- Raise your body off the ground such that your body is horizontal or parallel with the ground.
- Hold the position for 20s without breaking form.

## SUCCESS

Maintaining the position for 20s on each side without letting your pelvis sink towards the ground



## CONSIDERATIONS

A few important considerations exist related to this assessment. The first of which is that one should be conservative in conducting this test if there are known bone density issues (i.e. osteoporosis) as the proximal femur is exposed to considerable torque. In the event that a runner presents with a diagnosis of an adductor tendinopathy, low level (3-4/10), stable pain is fine. In contrast, if a runner is recovering from a bone stress injury and they experience any pain with this assessment, stop the test to avoid aggravating their situation. Lastly, if one is looking to perform this test in a more conservative manner, it can be modified by doing it with a shorter lever by bending the knee of the top leg to a 90 degree angle.



# Pogo Jumps

## [VIDEO LINK](#)

## RATIONALE

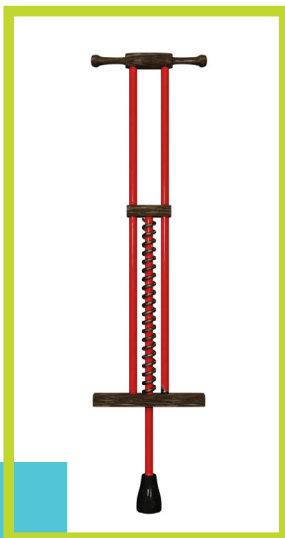
Running is a plyometric activity, which demands the performer to tolerate energy storage and release. Assessing a runner's ability to withstand the stretch shortening cycle is not only easy, but also warranted if the goal is to return to consistent training. Enter pogo jumps. Pogo jumps yield a wealth of information if the goal is to determine if a runner is ready to transition back to training. For a runner to tolerate pogo jumps their bones must be able to withstand shock, their muscles must tolerate eccentric contractions, and their tendons have to store and release energy. This assessment specifically challenges the calf muscle complex, plantar fascia, and bones of the lower extremity. Pogo jumps serve as a particularly valuable assessment in working with runners recovering from pathology such as but not limited to the following: calf strains, Achilles tendinopathy, plantar fasciopathy, and various BSIs that occur among distance runners.

## INSTRUCTIONS

- Start with the performer shod on firm, level ground.
- Set a metronome to 150 beats per minute (bpm).
- Jump in place for one minute while staying in sync with the metronome.
- Focus on short ground contact times (GCTs) such that you are jumping on hot coals.
- Aim to minimize bend in the knee when in contact with the ground.

## SUCCESS

Completing pogo jumps for one minute while maintaining short GCTs.



## CONSIDERATIONS

With elite/higher level runners, it may be reasonable to decrease the metronome as low as 100bpm to ensure that they can withstand the relatively higher loads that they will likely experience during training and racing. Provided that the performer tolerates baseline pogo jumps feel free to incorporate pogo jumps in an anterior-posterior (A-P) and medio-lateral (M-L) direction. In addition to being an invaluable assessment, pogo jumps also serve as a great plyometric exercise during the latter stages of rehab following a RRI. It is recommended to start on level ground before incorporating the use of a small step to jump on and off in the event the goal is to increase the level of difficulty.

# Single Leg Hopping

## [VIDEO LINK](#)

## RATIONALE

Provided that a runner is tolerant of pogo jumps, the next reasonable test is to take a runner through single leg hopping considering the unilateral, plyometric nature of running. It is recommended to initiate this test by having the runner hop in place though they can also be challenged to hop in an A-P & M-L direction to ensure that they can tolerate single leg hopping in a multidirectional manner. This test has particular relevance in working with trail runners given the variable and unpredictable nature of the terrain, though it will also give the runner and practitioner confidence in loading the tissues in a variable manner.

## INSTRUCTIONS

- Start with the performer shod on firm, level ground.
- Set a metronome to 150 beats per minute (bpm).
- Position your arms at your side or in a "hands on hip" position.
- Shift the weight onto the lower extremity to be tested and hop in place for one minute while staying in sync with the metronome.
- Focus on short ground contact times (GCTs) such that you are jumping on hot coals.
- Aim to minimize bend in the knee when in contact with the ground.

## SUCCESS

Completing 30s of continuous hopping on each side while maintaining short GCTs without using the arms to augment balance. For competitive runners, aim for one minute of continuous hopping.



## CONSIDERATIONS

Considering that most runners do not routinely practice this drill/assessment, the critical elements are for the runner to exhibit repetitive, single leg hopping while staying in sync with the metronome. While some runners may exhibit a mild lateral trunk shift or variable foot position, these are secondary concerns. This assessment is particularly valuable in working with runners recovering from pathology involving the CMC, Achilles tendon, and plantar bones and tissues of the foot. Similar to pogo jumps, this assessment can also serve as a great late stage drill in working with runners to replicate the performance demands of running.

# Quick Taps

## [VIDEO LINK](#)

## RATIONALE

If a runner is tolerant of pogo jumps and single leg hopping you can be confident that they have the requisite tissue capacity to plug back into a walk-run routine. Another simple assessment that can also be used in conjunction with the aforementioned tests are quick taps. While quick taps also challenge runners from an energy storage and release or plyometric standpoint, they demand a greater degree of coordination given the reciprocity of motion between the arms and legs. This PPT is particularly helpful for orthopedists, who often get posed the question by runners of “When can I run?” Beyond this PPT, the only assessment left to conduct would be a formal treadmill or running analysis, which may not always be practical pending the setting and available resources.

## INSTRUCTIONS

- Start with 1 foot positioned on the platform with the other one on the ground.
- Perform quick taps for 1 minute while maintaining compact arms.
- Gently tap the platform with your forefoot and stay light on your feet.
- Maintain reciprocity of motion by coordinating the arms and legs.

## SUCCESS

Completing a 1 minute round of quick taps while maintaining reciprocity of the arms and legs and short GCTs (<0.25s)



## CONSIDERATIONS

It is important to appreciate that irrespective of one's native footstrike pattern, this test will result in the runner contacting with their forefoot. As such it demands the runner to bias the load to the CMC, Achilles tendon, and plantar tissues of the foot.

# PHYSICAL PERFORMANCE TESTS & CLEARANCE CONSIDERATIONS

## *for Distance Runners Following Injury*

### 1. SINGLE LEG STANCE

#### SUCCESS

Maintaining single leg balance for 20s on each leg in a relatively wobble-free manner without having to hold one's breath or resort to the use of the arms to offset any loss of balance. Additionally, the performer should maintain their shoulders and hips square and level.

### 2. LATERAL STEP DOWN

#### SUCCESS

Completing a minimum of 10 repetitions on each side with no loss of balance or compensatory strategies while staying in sync to the metronome. In competitive runners, the practitioner should also consider increasing the number of reps to 20+ in one minute.

### 3. CALF/HEEL RAISE

#### SUCCESS

- <50 y/o: Completing greater than >25 repetitions for men and women
- 50-60 y/o: Completing >20 reps would be the target
- 60-69y/o: Completing 15-20 reps
- 70+ y/o: Completing 10-15 reps

\*Lastly the test should be stopped if the runner is unable to stay in sync with the metronome or if they cannot reach the peak amplitude at the top of the range.

### 4. BRIDGE + STRAIGHT LEG RAISE

#### SUCCESS

Holding the bridge + SLR position for 30s on each side while maintaining a level pelvis without allowing the bottom to fall towards the ground or sink into hip flexion.

## 5. STANDARD SIDE PLANK

### SUCCESS

Holding the side plank position with knees straight and legs staggered for 30-45s on each side without letting the pelvis sink towards the ground.

## 6. SIDE PLANK + HIP ABDUCTION

### SUCCESS

Holding the side plank combined with hip abduction without losing one's balance or allowing the pelvis to sink towards the ground for 20s on each side.

## 7. ADDUCTOR PLANK

### SUCCESS

Performing a 20s hold on each side without letting your pelvis sink towards the ground.

## 8. POGO JUMPS

### SUCCESS

Completing pogo jumps to a metronome set at 150bpm for one minute while maintaining short GCTs.

## 9. SINGLE LEG HOPPING

### SUCCESS

Completing 30s of continuous hopping on each side to a metronome set at 150bpm while maintaining short GCTs without using the arms to augment balance. For competitive runners, aim for one minute of continuous hopping.

## 10. QUICK TAPS

### SUCCESS

Completing a 1' round while maintaining reciprocity of the arms and legs while maintaining short GCTs.

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