

What Muscle Do You Use When You Run ?

It is challenging to identify a single muscle as the most important during running because it is a complex movement that relies on the coordinated effort of multiple muscles and muscle groups. Each muscle has a specific role and contributes to various aspects of running performance. However, according to a study published in the Journal of Biomechanics, certain muscles exert greater influence at slow to moderate speeds.

The study revealed that the quadriceps and plantarflexors (muscles involved in ankle plantar flexion) are the primary contributors to the acceleration of the body's center of mass during running. Specifically, during the early phase of the stance, the quadriceps muscle group plays a significant role in braking (backward acceleration of the center of mass) and support. In the latter half of the stance, the soleus and gastrocnemius muscles (calves) become the major contributors to propulsion and support. On the other hand, the arms have minimal impact on propulsion or support, generating less than 1% of peak mass center acceleration.

However, several muscles are generally considered crucial for efficient and effective running:

- **Quadriceps and Hamstrings:** The quadriceps, located on the front of the thigh, and the hamstrings, situated on the back, are vital for generating power and controlling leg movement during the running stride. They work together to propel the body forward, flex and extend the knee, and stabilize the leg.
- **Gluteus Maximus:** As the largest muscle in the buttocks, the gluteus maximus plays a crucial role in hip extension. It propels the body forward during the push-off phase and contributes to overall running power.
- **Gastrocnemius and Soleus:** The calf muscles, including the gastrocnemius and soleus, are essential for ankle plantar flexion and providing forward propulsion during running.
- **Core Muscles:** The muscles of the core, such as the abdominals, obliques, and lower back muscles, provide stability and help maintain proper posture while running. They facilitate force transfer between the upper and lower body, contributing to overall running efficiency.

While these muscles are commonly emphasized, it's important to recognize that running involves the entire kinetic chain, including muscles in the feet, lower limbs, hips, and upper body. Moreover, the relative importance of specific muscles can vary depending on factors such as running speed, terrain, and individual biomechanics.

As running speed increases, the contribution of certain muscles changes. For speeds up to 7 m/s, the ankle plantarflexors (soleus and gastrocnemius) significantly contribute to vertical support forces and stride length increases during slow and medium-paced running. However, at speeds exceeding 7 m/s, these muscles contract at high velocities and have less time to generate the required support forces. Consequently, the strategy shifts towards increasing stride frequency, where the leg accelerates more vigorously through the air to achieve the highest running speeds possible. In this scenario, the hip muscles, primarily the iliopsoas, gluteus maximus, and hamstrings, play a crucial role in accelerating the hip and knee joints more forcefully during the swing phase. These findings provide valuable insights into the strategies employed to increase running speed.

MUSCLES USED WHEN RUNNING

