



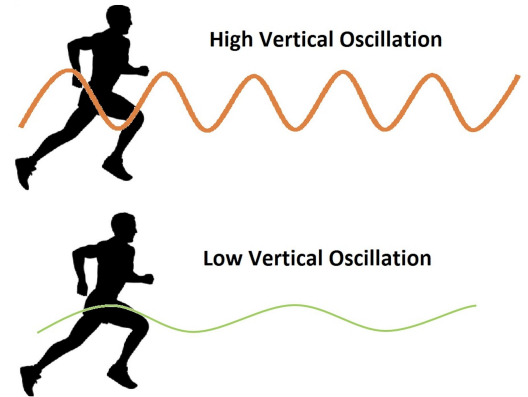
## Running Dynamics library

### Running Vertical Oscillation

The primary goal in running is to propel body forward and move horizontally. Apart from horizontal movement, a bit of vertical movement is needed to create the necessary force required for our running stride.

#### What is Vertical Oscillation (VO)?

Vertical Oscillation (VO), is a measure of how much we move vertically during each stride when running. Vertical Oscillation is one of the key Running Dynamics metrics that reflects the efficiency of our running stride.



#### Why is VO important?

- VO is measured in cm. Ideal range for VO is 5-10cm.
- VO > 10cm means too much vertical oscillation. It also means higher ground impact when landing, which can increase injury risk.
- VO < 5cm means lack of flight in stride, thereby lack of power and pace. It also indicates more time spent on ground (higher GCT), and low running performance.

#### How VO is traditionally measured

The traditional way is by wearing a waist pod, or chest strap.



**With Nohayo's new algorithm the VO measurement can be done using only a watch, ring, or earbuds that has 3D accelerometer. No waist pod or chest strap is needed!**

#### Nohayo VO algorithm performance

The algorithm is implemented in embedded C and can run on wearables like a smartwatch, ring, and earbuds that has a 3D accelerometer and a DSP unit.

The algorithm was compared to Garmin waist pod, and shows accuracy of > 96.5%. The algorithm was tested on 430 running sessions, both outdoor and on a treadmill.

