

Peer2Peer SERIES

THE ROLE OF MOVEMENT ANALYSIS IN PT & PERFORMANCE

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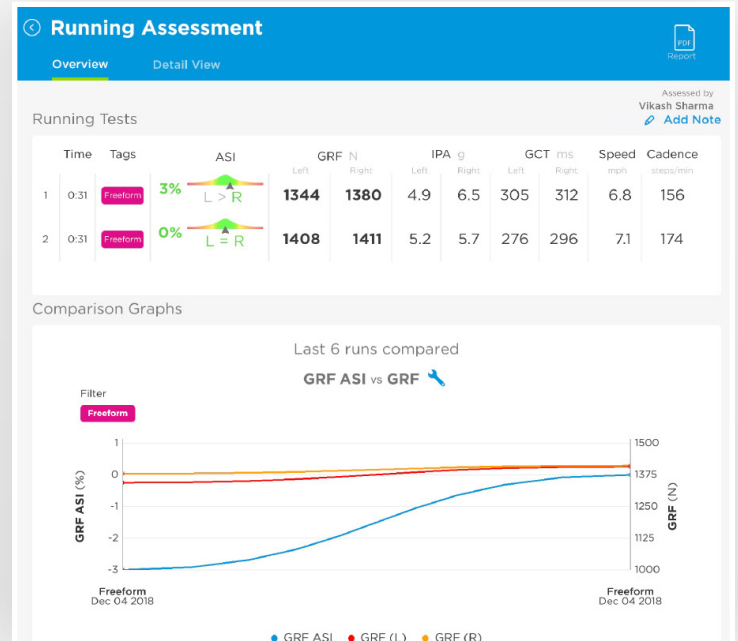
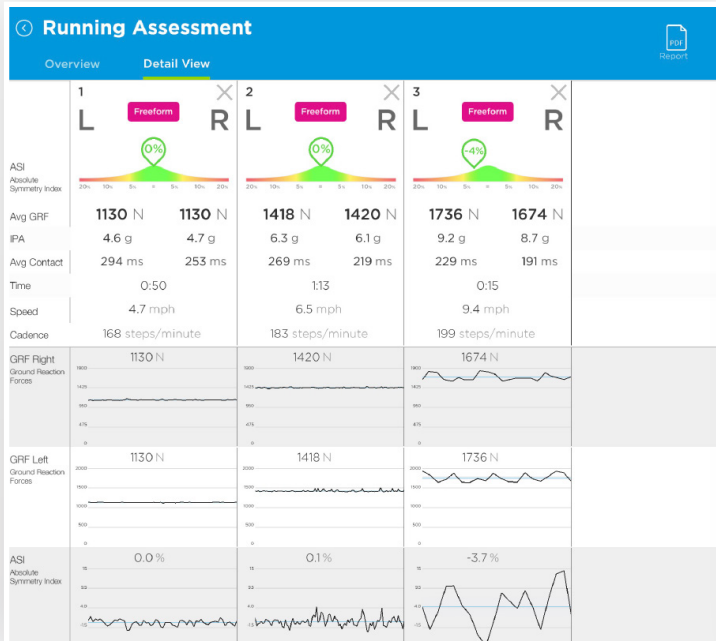
www.perfectstridept.com



Before working for Perfect Stride, I worked as a researcher in a movement analysis lab using 3D motion analysis equipment, force plates and software to track the movements of research participants during activities including running, jumping, throwing and more. While this equipment is precise, it is relatively inaccessible for many physical therapy clinics due to cost, space required, and setup time.

When working with individuals who present with running related injuries or want to maximize their running performance, tracking variables such as ground reaction force, loading rates, contact time, stride length and stride rate can be extremely useful. Our dorsaVi Professional Suite wearable sensor technology allows us to do this and more, without the burden associated with complex 3D motion analysis equipment. We are able to use this software to track the above-mentioned variables with our physical therapy and running performance clients. Set up takes only minutes and we can get the desired information at different running and walking speeds computed into easy to read outputs. Alongside our examination and clinical decision making this information can guide our clients towards the proper training and/or treatment plans.

Using the dorsaVi technology helps us in many ways, but one of my favorites is to help in the reduction of loading forces and loading rates. The relationship between running injuries and the magnitude of vertical force during running has been well documented throughout the literature. “Vertical ground reaction force” (VGRF) is the force that the ground exerts up through a runner’s leg when landing and the rate at which these forces are applied is called “vertical impact loading rate” (VILR). If these forces are applied too quickly and/or not absorbed well, injury risk can be significantly increased. A recent study from the Journal of Orthopedic and Sports Physical Therapy agrees that employing strategies to reduce VGRF and VILR may help to reduce injury risk during long distance recreational running¹. Using the data that is output from our dorsaVi system, we can cue runners to decrease VGRF and VILR, by using verbal and/or visual cues to decrease VGRF and VILR, without giving specifics. This is beneficial because it allows the runner to explore their own strategies for positive change, rather than forcing them into a change that is not natural to them.



Some of the strategies a runner may use to make a change are increasing cadence or reducing vertical oscillation. A recent study from the International Journal of Sports Physical Therapy found that either of these changes can manipulate spatiotemporal running parameters, which may be useful in patients with plantar fasciopathy or patellofemoral (knee) pain². In addition, the findings of this study suggest that running with a modest increase in cadence may be particularly helpful for runners recovering from Achilles tendinopathy.

In order to move faster during walking or running, at least one of two variables must increase, step length or cadence (steps per minute). If step length is too long, it is common for runners to have increased vertical oscillation, which causes energy to be lost to vertical movement, when the goal is horizontal movement. Thus, staying at the same pace, but increasing cadence shortens a runner's stride and can reduce vertical oscillation and improve efficiency. Research also supports that increasing cadence can reduce the risk of a number of running related injuries, likely due to the mechanisms mentioned above. You can accurately measure cadence with a dorsaVi run assessment on a treadmill or with a monitoring session outside the clinic. If you'd like your patients to keep track of their cadence, a simple way for them to measure this themselves is listed here:

1. Download a metronome app from the app store. (I use Metronome by SoundBrenner)
2. Begin your run just like any other run and get in a good rhythm (don't forget your phone!)
3. Once you feel settled in to your pace, take out that metronome app and set it to somewhere between 150 and 160 beats per minute to start.
4. Without adjusting your running, adjust the number of beats per minute to match your step rate.
5. Now you have your cadence!

If cadence is lower than 160 and your patient is getting running related running pain, it could be one factor that is playing into the symptoms.

The research spans far and wide regarding movement analysis, and it is a topic that will continue to be heavily researched in the coming years. As a clinician who has a love for movement analysis and research, I am excited to have access to technology that I can use on a daily basis in the clinic to continue to help clients achieve their goals and look forward to what continued innovation holds for the field in the future.

More information about dorsaVi Professional Suite is available here: www.dorsavi.com/us/en/professional-suite

REFERENCES

1. Tate, JJ Milner, CE. Sound-Intensity Feedback During Running Reduces Loading Rates and Impact Peak. JOSPT. 47(8):565-569.
2. Adams D, Pozzi F, Willy RW, Carrol A, Zeni J. Altering Cadence Or Vertical Oscillation During Running: Effects On Running Related Injury Factors. Int J Sports Phys Ther. 2018;13(4):633-642.