

Force it, Use Strength or Muscle the Gear?

By Dario Fredrick, John Hunt & Peter Nicholson

Commonly referred to as “strength” or “strength-endurance” training on the bike, high resistance (low cadence) force training has become a popular aspect of training for endurance cycling performance. Is it effective? If so, how should one train this area of cycling and when should it be trained? Or, should it even be included in one’s training repertoire at all?

When training on the bike, “strength” is technically a misnomer as it refers to a single muscular effort rather than continuous muscular contraction/relaxation cycles such as in pedaling. What we’re referring to is high force – torque to be precise – since in pedaling force is angular. High force/low cadence resistance training can potentially improve the force/torque component of one’s pedal stroke, particularly in high torque situations, such as on steep, seated climbs or in MTB racing where the climbing gradient can be highly varied and require multiple high torque situations. However, force/resistance work is not ideal for all cyclists and should be considered carefully. Force training has its place for some, but tends to be over-utilized by coaches who think it’s a cure-all in terms of raising climbing or TT power. We tend to be conservative in prescribing force training, and to only a handful of athletes.

In our experience, one three-week cycle with a single force workout each week works best, with efforts in the 4-6 min. duration range (power drops too much if you are doing longer efforts at low cadence). Force work should come after a good cycle of zone 3 training and be performed in the zone 3/4 range, making it a relatively high intensity workout.

Force workouts can be a useful addition for people who have to train indoors, and work well when alternating them with high cadence intervals. They can add variety to late base/ early build training phases - if people are getting antsy, as it lets them "go hard" in a very controlled way. However, they can create a deep level of muscular fatigue, so we wouldn't prescribe them for somebody who's going to race on the following weekend. Force training also tends to work best for athletes training with power. If the athlete is using HR, we recommend that they use perceived effort as a gauge of intensity, since very low cadence suppresses HR response to a given workload.

While force training has its place, most developing cyclists really need to improve their ability to turnover a lower gear at a higher cadence when climbing, and raise their muscular endurance and efficiency. We know that the most efficient cadence when climbing ranges from ~70-90 rpm, depending on the power output and the person, and as power increases, optimal cadence increases within that range. The type of rider who can benefit from force work should already be able to turn ~75-85 rpm uphill.

Force training is very difficult to achieve and hard on the body, both muscularly and with regard to joint torque at the knees. We don't recommend it for anyone who has, or has had knee problems. Furthermore, the athlete must already have a moderate to high power

to weight ratio (>4 W / kg at Maximal Steady State \rightarrow 20-30min TT power) and a high level of fitness to benefit from this type of workout, otherwise it can be an excessive stimulus that breaks down muscle, and reduces turnover and suppleness in pedaling. If a rider is power to weight challenged (and doesn't ride low enough gearing) they are likely already doing "strength-like" efforts every time they go uphill.

Force work can be useful for some, but not all cyclists. Become a good climber first – developing a supple pedal stroke at a good cadence (~75-85 rpm) and at moderate intensity (zone 3). These aspects of climbing require muscular endurance training, and should precede force/resistance training on the bike. If implementing force training makes sense for you, remember that it's a strong stimulus that requires significant muscular recovery.

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