Ten Things You Should Know About Tempo Training

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6/21/2012 2:05:29 PM

Manipulating time under tension while resistance training is all the rage lately. A number of new research studies provide evidence that varying tempo is one of your best tools for achieving greater strength, size, and athletic performance.

As you will see in this review of the recent research on varying tempo, programming the tempo of each lift is not just for the elite athlete or accomplished bodybuilder. It can be used safely by the novice trainee, the deconditioned individual, or someone recovering from an injury. If you're not already manipulating time under tension for your workouts, this article provides ten reasons why you need to start.

#1 Use Tempo to Get Better Results: Don't Leave Your Success to Chance

Program the tempo of your lifts in order to get better results. Haphazardly changing the time you spend on each phase of a lift is not ideal, nor is using a self-selected speed that is random. This would be like erratically throwing plates on the bar to squat and then doing some squats to parallel and others only a quarter of the way down—you might as well not even train at all!

Prescribing tempo means you choose how long you will spend on the concentric and eccentric phases of the lift. You can also include a pause at the top or bottom of a lift. Programming the amount of time your muscles spend under tension is just as important as programming reps, sets, and loads.

You might think that a longer tempo is always superior, but this is not always so. Rather a varied tempo that is based on proven results is. For example, a study published in the International Journal of Sports Medicine compared the effect of using a fast tempo with a self-selected tempo on strength gains in the bench press after three weeks of training. One group was told to perform the bench press as fast as they could under control, using a load of 85 percent of the 1RM. The second group was simply told to perform the bench press and

received no instructions regarding how quickly to perform the lift—they self-selected their tempo and used the same heavy load.

After three weeks, the fast tempo group increased 10 percent in maximal bench press strength—very impressive gains in only six sessions! The other group that self-selected lifting speed did not gain ANY strength.

The fast tempo group gained strength because they were lifting with more force, which places greater demand on the muscles and leads to greater recruitment of more motor units, particularly the type 2 fast-twitch fibers. It's not that a fast tempo is always superior, just that you can't leave tempo to chance if you want to get results!

#2 Vary Tempo to Get Stronger: Benefits of a Fast Tempo
Let's look more closely at how explosive and fast tempos can produce the impressive strength gains presented in the bench press study mentioned in #1.

It's accepted that to get stronger you need to lift heavy loads. Moving a heavy weight fast, as with Olympic lifts, jump squats, or bench throws, will bring about more central nervous system adaptations, but so will moving an even heavier weight more slowly, as with near maximal squats, bench presses, and deadlifts. By manipulating the amount of time the muscles spend under those loads, you can recruit higher threshold motor units and activate more type II fibers.

For example, a study in the European Journal of Applied Physiology provided a classic look at the difference between heavy, fast training and light, slow training.

Researchers tested three training protocols on a group of untrained women:

- A traditional strength protocol that used a heavy weight of 80 to 85 percent of the 1RM using "normal" tempos of 1.5 seconds for both phases of the lift

- A slow speed protocol using a load of 50 to 60 percent of the 1RM with a 4-second eccentric and 10-second concentric phase to failure

- A muscular endurance protocol using a load of 50 to 60 percent of the 1RM with the "normal" 1.5-second tempo

The traditional strength protocol increased strength the most and produced the greatest increase in overall muscle fiber growth (nearly 40 percent increase in muscle fiber size) and the largest increase in type IIA and IIX fibers. The muscular endurance protocol produced NO changes in strength or muscle fiber size. The slow speed protocol increased both strength and the size of the type IIA fibers by about 10 percent.

#3 Benefits of a Slow Tempo
The study mentioned in #2 shows that although it was not nearly as effective at training the type IIA and IIX fibers as the heavier "traditional" protocol (40 versus 10 percent growth), a slower tempo can provide a significant stimulus to the muscle. By lifting to failure, the slow tempo recruited higher threshold motor units that triggered useful strength and fiber size adaptations.

Slower tempos with lighter weights are an especially useful tool for novice trainees because such protocols produce neuromuscular and hypertrophic adaptations without being dangerous or compromising technique with loads that are too heavy. They are also a staple of programming when recovering from injury to increase blood flow to the injured area, gain strength, and focus on getting to the muscles to fire effectively.

#4 Manipulate Time Under Tension to Lose Fat and Get Stronger
Perhaps the most useful application of tempo for the general population is to use it to improve body composition and lose fat. A study in the journal Applied Physiology, Nutrition, and Metabolism compared the effect of three different lifting tempos on energy expenditure and excess post-exercise oxygen consumption (EPOC).

Greater EPOC means the metabolism is elevated to a significant degree after the exercise bout—your body continues to burn calories at a greater rate for up to 48 hours after an intense workout.

The subjects were trained men who were assigned to perform a workout of 3 sets of 5 reps at 70 percent of the 1RM in the bench press using one of the three following lifting tempos:

- 1.5 seconds for both eccentric and concentric—15 seconds per set
- 4 seconds eccentric and 1 second concentric—25 seconds per set
- 1 second eccentric and 4 seconds concentric—25 seconds per set

Results showed that the 1.5-second tempo required the least energy to perform and EPOC was significantly less than with the other two tempos, which is not surprising since the participants spent less time under the weight. Still, this reminds us that a simple way to burn more energy before and after a workout is to mix up the tempo—and to perform more sets, of course.

#5 Program Rest Periods to Lose Fat
Using a slower tempo, such as 4010 used in the EPOC study above, will bring about more metabolic adaptations. You'll experience increases in energy stores like creatine phosphate and muscle glycogen, but it will also produce a hypertrophic and fat burning response. The 4010 tempo was more metabolically taxing, meaning more growth hormone will be released, which is the principal hormone you want to elevate to lose fat.

A simple way to produce more growth hormone and burn fat is to use shorter rest periods between sets or sprint repetitions. Rest periods—a side variable to tempo that must be accounted for—of 60 seconds will result in significantly more growth hormone release than 90 or 120 second rest periods.

#6 Vary Tempo to Activate Protein Synthesis and Build Muscle
A study published in the Journal of Physiology, shows how slower tempos that may not be as metabolically taxing will produce greater protein synthesis, especially when paired with adequate nutrition.

This study used trained men and had them perform 3 sets of leg extensions at 30 percent of the 1RM to failure with two tempos: A fast tempo of 1 second for both phases, or a slow tempo of 6 seconds for both phases. Participants ingested 20 grams of whey protein immediately after exercise and at 24 hours of recovery.

Results showed that the 6-second tempo resulted in significantly greater protein synthesis at all time points—it was three-fold higher at 24 hours post-workout compared to the fast 1-second tempo, indicating a prolonged hypertrophic effect.

A point needs to be made about using slow tempos for muscle building—the lifts were performed to failure to produce maximal fiber activation. As shown in the studies mentioned above, lifting very heavy loads at greater speeds most easily activates the higher threshold fibers, but it is possible to apply similar stress with lighter loads if muscle failure is reached.

#7 Get More Powerful By Varying Tempo
The bigger the high-threshold motor units of the muscle, the greater the potential for power output. This is the reason strength and power athletes tend to have a greater percentage of fast-twitch muscle fibers, and varying tempo is the best way to train those higher threshold, powerful fibers.

A complicated study published in the European Journal of Applied Physiology showed that ballistic and fast tempos will allow you to produce the most power output. Researchers used five different loads (40, 50, 60, 70, and 80 percent of the 1RM) and tested four lifting speeds:

- Slow with 2.8 seconds for both concentric and eccentric motion
- Medium with 1.4 seconds for each motion
- Fast with 1 second for each motion
- Ballistic which was as fast as possible with a bench throw

Results showed that the ballistic trials produced the greatest power and force output. This indicates that power training with a bench throw or squat jumps—a comparable lift for the lower body—have more carryover than a fast but measured tempo when training for sports that require force to be applied at high speeds against opponents.

The slow and medium tempos resulted in less peak force output, but force was more constant throughout the entire motion in the slow and medium tempos than the fast speed. This led to greater fatigue, and more metabolic stress in the slower tempos.

#8 More Ways To Burn Fat with Tempo Variations
In the study described above, a notable finding that might surprise you was that the slower tempos with lighter loads produced greater metabolic stress, making them better for hypertrophy and fat burning. The slow and medium speeds with the 40 percent load allowed participants to perform significantly more reps, although there was a greater drop in maximum force output than lifting at a heavy 80 percent load.

Technical failure will occur more rapidly when heavier weights and more power is produced. Researchers stress that the lighter weights at variable speeds will allow for longer time under tension and greater buildup of lactic acid, which is associated with greater fat burning.

#9 Achieve Greater Hypertrophy with Tempo Variations
The final finding in the study from #7 is that faster lifting speeds can be used as a more advanced hypertrophy technique. The fast speed resulted in much greater force output throughout the lift until the end of the concentric phase.

There was a drop off in force at the end of the lifting motion that indicated muscle relaxation, which is good for additional blood flow via a muscle pump mechanism. This is beneficial for those interested in gaining mass or who simply like that pumped up feeling after training.

#10 Improve Athletic Performance by Using Inter-Repetition Rest
Inter-repetition training (also called cluster training) is when you introduce a rest interval after every repetition or after a certain number of repetitions within a set. It allows you to increase the amount of weight lifted in the set and maintain more power as you progress through the workout because of the short recovery periods—you avoid the slowing of movement speed (or repetition power) as fatigue increases.

The Journal of Strength and Conditioning Research published a study that tested the effect of inter-repetition rest on peak power output during multiple sets of the power clean. Participants were trained men, and they performed 3 sets of 6 reps of the power clean at 80 percent of the 1RM, with no inter-repetition rest, or with 20 or 40 seconds rest with the bar on the ground.

Results showed that peak power significantly decreased by 16 percent during the “no rest” sets compared to a decrease of 5.5 percent in the 20-second rest sets and only a drop of 3 percent in the 40-second rest sets. Peak force and velocity dropped off by 10 percent in the “no rest” sets, whereas participants maintained peak force throughout the set in the other two rest groups.

Researchers suggest that the short recovery between reps in the two inter-repetition rest models allowed for recovery of short-term energy substrates such as phosphocreatine, which is resynthesized in about 22 seconds.

You obviously wouldn't use inter-repetition reps every training session, but it's a valuable method for training the anaerobic energy system and achieving new levels of power output.

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