ISSUES & SOLUTIONS FOR FITNESS FACILITIE

Strength training 201

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When your new strength trainees reach the intermediate level, more intensity, not more time, may be the best way to break the plateau.

During the past few years, several studies have shown significant health and fitness benefits related to regular strength exercise. These include increased muscle mass,[1] increased metabolic rate, reduced body fat,[2] increased bone mineral density,[3] improved glucose metabolism,[4] improved gastrointestinal transit,[5] reduced resting blood pressure,[6] improved blood lipid levels,[7] reduced lower back pain,[8] and reduced arthritic pain.[9]

As a result, more middle-aged and senior adults have started a strength-training program. Some are exercising at home, while others are training at fitness facilities with minimal supervision. However, a large number of previously inactive men and women prefer a more instructional approach to strength exercise, and choose to participate in a strength-training class or work with a personal trainer. In either case, the typical training session is one hour in length, and generally includes a warm-up, cool-down, stretching and strength exercises.

Let's say a person has 40 minutes to strength train all of the major muscle groups, including the quadriceps, hamstrings, hip adductors, hip abductors, chest, upper back, shoulders, biceps, triceps, lower back, abdominals, obliques and neck. This averages about three minutes per station, with roughly half the time for setting up equipment (e.g., adjusting the seat, selecting the weight load, positioning the movement arms, etc.) and half the time for performing the exercise repetitions.

It is, therefore, advantageous that the American College of Sports Medicine strength training guidelines[10] call for at least one set of eight to 12 repetitions for the major muscle groups. If at least three training sets were required to build muscle strength, time limitations would restrict most people to just a few different exercises.

The effectiveness of single-set strength training is supported by a large study in which 1,132 men and women performed one set (eight to 12 repetitions) of 12 exercises, two or three days a week, for a period of eight weeks.[1] In addition to making significant strength gains in all of the major muscle groups, the participants added 2.4 pounds of lean (muscle) weight as a result of their time-effective training program.

While this rate of muscle development typically continues for another eight weeks, Kraemer notes that single-set training programs become considerably less productive after four months of strength exercise.[11] At this point, multiple-set training may be the best means for making further progress and avoiding a strength plateau. Unfortunately, a greater volume of training may require more exercise time than the average adult is willing to commit. If that is the case, an alternative training method is a high-intensity strength-training program.

High-intensity training

High-intensity training is based on two simple procedures for enhancing the strength-building stimulus. The first technique involves extending the exercise repetition by using a slower movement. The second technique involves extending the exercise set by performing a few post-fatigue repetitions with reduced resistance.

Extended repetitions. Slow repetitions produce more muscle force and more muscle tension than fast repetitions. The bad news is that slow repetitions are hard to do; the good news is that you don't need to do very many of them. The most popular slow training protocol is four to six repetitions, at 14 seconds each, with 10 seconds for the lifting movement and four seconds for the lowering movement.

In an eight-week study of beginning exercisers,[12] our facility compared slow training (one set of four to six reps) with standard training (one set of eight to 12 reps). As shown in Figure 1, the slow training group made a 27-pound

strength gain and the standard training group made a 22-pound strength gain.

In a six-week study of intermediate exercisers,[13] we examined the effects of slow positive emphasis training (10 seconds lifting, four seconds lowering) and slow negative emphasis training (four seconds lifting, 10 seconds lowering). As presented in Figure 2, both of these slow training techniques produced significant strength gains (22 pounds and 26 pounds, respectively) in the previously plateaued participants.

Extended sets. Extended sets increase the training stimulus by tiring more muscle fibers. For example, performing three sets of leg extensions with 100 pounds fatigues the same muscle fibers three times. However, performing one set of leg extensions with 100 pounds, then immediately completing a few post-fatigue repetitions with 85 pounds, involves additional muscle fibers. This high-intensity technique is known as breakdown training, and it effectively increases the strength-building stimulus.

In an eight-week study of beginning exercisers,[14] we compared breakdown training with standard training. As shown in Figure 3, the breakdown training group recorded a 25-pound strength gain and the standard training group recorded an 18-pound strength gain.

A similar advanced exercise procedure known as assisted training requires an instructor to manually assist with the lifting phase of a few post-fatigue repetitions. Because muscles produce more force during negative contractions than during positive contractions, the instructor does not assist with the lowering phase of post-fatigue repetitions. We recently compared assisted training and standard training with beginning exercisers. After eight weeks, the assisted training subjects increased their strength by 29 pounds and the standard training subjects increased their strength by 20 pounds (see Figure 4).

We also examined the effects of breakdown training and assisted training with intermediate exercisers.[15] As presented in Figure 5, both of these extended set procedures produced significant strength gains (15 pounds and 17 pounds, respectively) over the six-week training period.

Actually, the presence of an instructor may have a significant impact on strength development. In two of the studies,[13,15] the participants performed two exercises (low-back and abdominal machines) in the standard manner. Although they did not use any advanced training in these exercises, their previously plateaued weight loads increased 12 pounds in six weeks, indicating that just being observed by an instructor can enhance the training effect. Apparently, people use better exercise form and give greater training effort when an instructor is watching.

While it is satisfying to see strength gains, many intermediate trainers want more muscle as well. As shown in Figure 6, subjects who used a combination of high-intensity techniques added almost three pounds of muscle during the six-week training period.[16] They also lost more than three pounds of fat for an impressive improvement in body composition.

Summary

Bodybuilders, weightlifters and athletes who strength train for competitive purposes typically perform multiple exercise sets to achieve their performance objectives. This high-volume training approach works well, especially for those with genetic potential for large muscles. However, the average fitness enthusiast who desires greater strength development may have a difficult time factor. Many adults are limited to relatively brief exercise sessions and, therefore, require a more time-efficient training approach. High-intensity training provides a productive alternative to multiple exercise sets. FM

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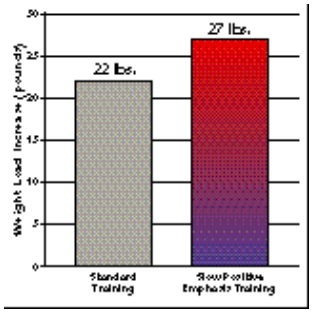
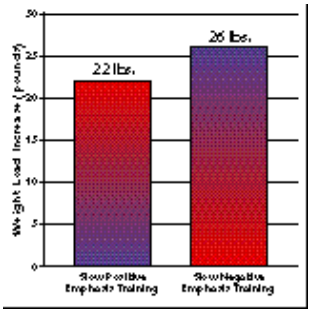
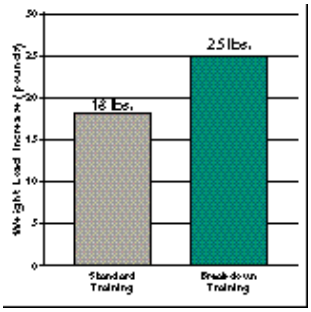


Figure 1. Average increase in exercise weight loads after eight weeks of standard or slow positive emphasis



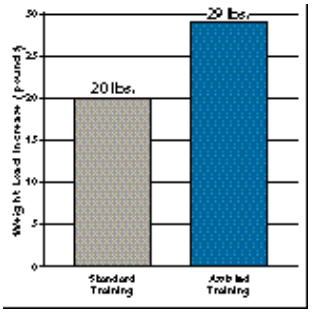
training with beginner level subjects (N=152).

Figure 2. Average increase in exercise weight loads after six weeks of slow positive emphasis or slow negative



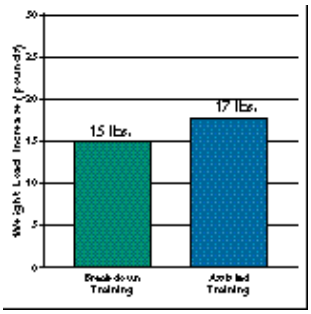
emphasis training with intermediate level subjects (N=15).

Figure 3. Average increase in exercise weight loads after eight weeks of standard or breakdown training with



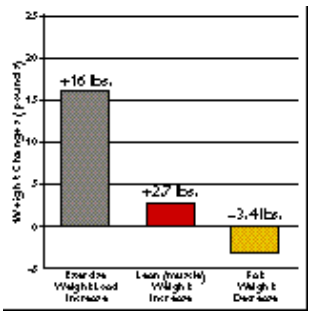
beginner level subjects (N=45).

Figure 4. Average increase in exercise weight loads after eight weeks of standard or assisted training with beginner level subjects



(N=42).

Figure 5. Average increase in exercise weight loads after six weeks of breakdown or assisted training with



intermediate level subjects (N=7).

Figure 6. Average changes in exercise weight loads and body composition for six-week studies involving high-intensity training techniques with intermediate level subjects (N=35).