

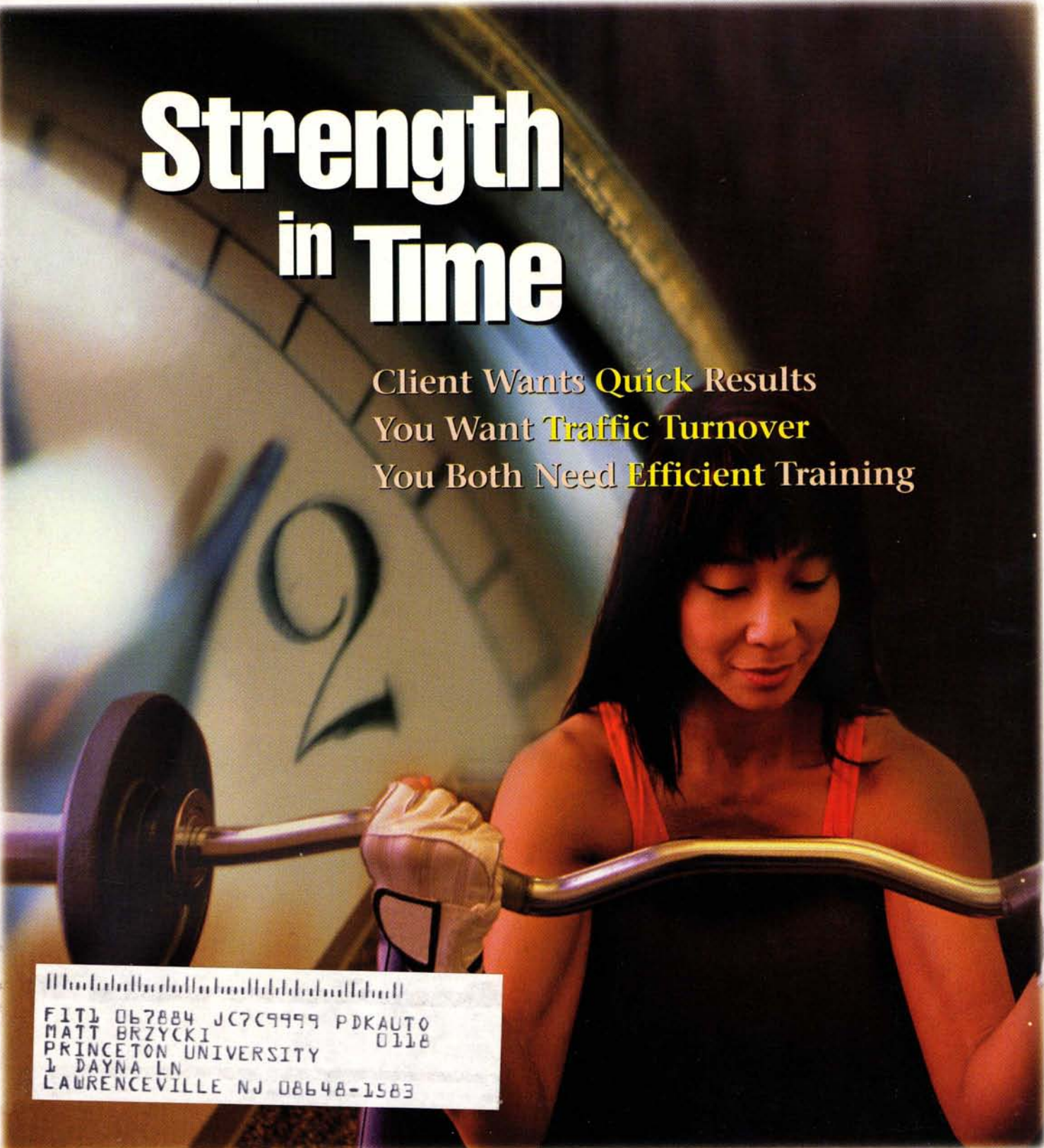
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ISSUES AND SOLUTIONS IN FITNESS SERVICES

JUNE 1997

Strength in Time

Client Wants **Quick** Results
You Want **Traffic** Turnover
You Both Need **Efficient** Training



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EFFICIENT Strength Training

Time is money. Space is money. Giving members the results they want in less time frees up space and allows you to do more business.

By Matt Brzycki

TIME HAS TRULY BECOME a precious commodity. Since most people simply do not have an abundance of free time, individuals are seeking exercise programs that produce maximal results in a minimum amount of time. As such, efficiency should be a major consideration when developing a strength-training program.

Interestingly, science has been unable to determine if one strength-training method is superior to another. Research has shown only that a variety of methods can increase strength. For example, Westcott found no statistically significant differences in the strength increases produced by nine different training routines consisting of various combinations of sets and repetitions.¹

So, just about any type of strength-training program has the potential to produce favorable results. However, many

Many effective methods of strength development are still too inefficient for much of the population.

methods of strength development are inefficient for much of the population. An efficient strength-training program can be designed — using virtually any type of equipment — by applying the following concepts.

The importance of intensity

Intensity level (or effort) is the most important factor in an efficient strength-training program. Essentially, the greater the intensity, the better the response. In the weight room, a high level of intensity is characterized by performing each exercise to the point of muscular fatigue, when muscles are exhausted to the point where no more repetitions can be performed. Failure to reach a desirable level of muscular fatigue, or effort, will result in submaximal gains in muscular strength.²

Evidence for this “threshold” is suggested by the “Overload Principle,” which was proven experimentally more than 40 years ago. The Overload Principle states that to increase muscular size and strength, a muscle must be stressed, or “overloaded,” with a workload that is beyond its present ca-

capacity.² Effort must be great enough to exceed this threshold for muscular fatigue to trigger an adaptive response (muscular growth). Simply, exercise that does not produce enough muscular fatigue will not stimulate muscular growth.

Progressive overload

The term “progressive resistance exercise” was coined more than 50 years ago. Unfortunately, little of what is done in most weight rooms can be considered “progressive.” Performing a set of leg curls for 10 repetitions with 100 pounds today, and still doing this same set a month later, will not increase strength. On the other hand, doing 11 repetitions with 120 pounds a month later increases repetitions by 10 percent and weight by 20 percent.

If a muscle is to increase in strength, it must be forced to do progressively harder work.¹ Muscles must be overloaded with work that is increased steadily and systematically throughout the course of a strength-training program.

To overload the muscles, a person must progressively increase either the weight or the repetitions performed.

Each time the maximum number of repetitions are attained, the resistance should be increased for the next workout. The increase in resistance should be made to a comfortable level. Muscles will respond better if the progressions in resistance are five percent or less, but remember that the resistance must always be challenging.

Number of sets

Graves and his colleagues noted that performing one set to fatigue is a popular and effective method of strength training.³ Indeed, doing a single set to exhaustion is advocated by numerous strength and fitness authorities.⁴ One-set-to-failure has also been endorsed by strength coaches for numerous collegiate and professional teams.

The basis for performing one set of each exercise has powerful and compelling support from scientific research. In a recent review of the applicable literature, Carpinelli found 15 studies that reported the results of subjects who used either one set or multiple sets of an exercise. In eight studies, subjects who performed one set of each exercise produced considerable increases in their strength, with no significant differences in strength improvements between the one-set groups and the two-set groups. In seven studies, subjects

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who did one set of each exercise produced significant increases in their strength with no significant differences in strength improvements between the one-set groups and the three-set groups.⁵

If doing one set of an exercise produces the same results as two or three sets, then a one-set protocol represents a more efficient means of strength training. After all, why perform several sets when similar results can be obtained from one set in a fraction of the time? This is not to say that traditional multiple-set programs are unproductive. It's just that multiple sets are inefficient in terms of time and, therefore, are undesirable for much of the population.

Of course, if a single set of an exercise is to be productive, the set must be done with an appropriate level of intensity (to the point of muscular fatigue).

How many repetitions?

A muscle must be exercised for a certain amount of time to increase in size and strength. Optimal time frames are about 90 to 120 seconds for the buttocks, 60 to 90 seconds for the rest of the lower body and 40 to 70 seconds for the upper torso.⁶ The muscles of the lower body should be exercised for a slightly longer period because of their greater size and work capacity.

This information can be used to formulate appropriate repetition ranges. For example, if a weight is raised in about two seconds and lowered in about four seconds, each repetition would be about six seconds long. Based upon the optimal time frames and using a six-second repetition, the buttocks need to be exercised for 15 to 20 reps, the lower body for 10 to 15 reps and the upper torso for about six to 12 reps.

It should be noted that attempting a one-repetition maximum or performing low-repetition movements that are considerably less than the optimal time frames will increase the risk of injury. Likewise, as an exercise exceeds the recommended time frames, it becomes a greater test of aerobic

The most efficient training program produces the maximum results in the minimum amount of time.

endurance rather than muscular strength.

It is safer for certain populations to perform more repetitions than previously suggested to reduce orthopedic stress. The higher repetition ranges will necessitate using somewhat lighter weights, which will, in turn, reduce the stress placed upon their bones and joints. For example, younger teenagers should use slightly higher repetition ranges, such as 20 to 25 reps for exercises involving their buttocks, 15 to 20 reps for their legs and 10 to 15 reps for their upper torso. Similar repetition ranges should also be used by older adults, particularly those with hypertension.

Proper technique

A weight should be raised in a deliberate, controlled manner without any jerking movements.¹ Raising the weight in a rapid, explosive fashion isn't recommended for two reasons: 1) it introduces momentum into the movement, which makes the exercise less productive and less efficient, and 2) it exposes the muscles, joint structures and connective tissue to potentially dangerous forces which magnify the likelihood of incurring an injury. The weight should be raised in about one to two seconds.⁷

After raising the weight, there should be a brief pause in

the position of full muscle contraction or the "mid-range" position.⁷ Pausing momentarily in this position emphasizes the muscles when they are fully contracted, permits a smooth transition between the raising and the lowering of the weight and helps eliminate the effects of momentum.

A study by Hather and co-workers found that the lowering of the weight must be emphasized to attain optimal results from strength training.⁸ Emphasizing the lowering of the weight makes the exercise more efficient since the same muscles that are used to raise the weight are also used to lower it. This makes each repetition more efficient and each set more productive. It should take about three to four seconds to lower the weight back to the starting/stretched position.⁷

In effect, each repetition should be roughly four to six seconds in length. A 16-week study by Hurley and others demonstrated a 50-percent increase in upper-body strength and a 33-percent increase in lower-body strength in a group that performed each repetition by raising the weight in two seconds and lowering the weight in four seconds.⁹

Finally, a repetition should be done with the greatest possible range of motion that safety allows. Exercising with a full range of motion allows a person to maintain, or perhaps increase, flexibility.¹⁰ Furthermore, a full range of motion ensures that the entire muscle is being exercised, thereby making the movement more efficient.¹⁰ In other words, full-range exercise is necessary for a full-range effect.

Duration of the workout

More isn't necessarily better when it comes to strength training. Common sense suggests that as you increase the length of an activity, you must decrease your level of effort. Stated otherwise, you cannot exercise with a high level of effort for long periods of time.

Carbohydrates are the body's preferred fuel during intense exercise. Most people exhaust their carbohydrate stores after about one hour of intense exercise.¹¹ Therefore, strength workouts should be completed in one hour or less.

Efficient strength training is achieved with a minimum amount of recovery between exercises. The length of the recovery interval depends upon a person's present level of fitness. Initially, a recovery time of three minutes may be necessary, but with improved fitness, the pace should be quickened to the point where a person is moving as rapidly as possible between exercises. (The speed with which the repetitions are performed should not be quickened, just the pace between exercises.)

Volume of exercises

For most people, a comprehensive strength-training workout can be performed using 14 exercises or less. The focal point for most of the exercises should be the major muscle groups (i.e., the hips, legs and upper torso). Include one exercise for the hips, hamstrings, quadriceps, calves/dorsiflexors, biceps, triceps, abdominals and lower back. Because the shoulder joint allows movement at many different angles, two exercises should be selected for the chest, the upper back (the "lats") and the shoulders.

For some individuals, a thorough workout may require slightly more than 14 movements. For instance, a comprehensive workout for someone involved in combative sports, such as boxing or judo, must include an additional two to

Continued on page 38

stronger than the spotter, there are two simple solutions. Perform all exercises one arm or leg at a time, or work the lifter to fatigue in the raising phase before incorporating the lowering phase.

Individuals need to be trained as both lifters and spotters. Participants need to learn how to interact effectively in both roles.

Manual resistance guidelines

Here are some important guidelines for performing manual resistance exercises:

- Perform each exercise to temporary muscular exhaustion. Exhaustion should occur within 12 to 15 repetitions.
- Perform only one set of each exercise to exhaustion.
- Perform each repetition in a slow, controlled manner.
- Use a variety of manual resistance exercises with

Efficient Training

Continued from page 32

four neck exercises to strengthen and protect their cervical areas against possible traumatic injury. Additionally, anyone involved in a sport or activity that requires grip strength, such as softball or golf, should perform one forearm exercise.

There is nothing wrong with performing more movements to emphasize a particular body part, as long as there are continued improvements in strength. However, if strength begins to level off or "plateau" in one or more exercises, it's probably due to overtraining.

Sequence of exercises

A strength-training program should begin with exercises that influence the largest muscles and proceed to those that involve the smallest muscles.^{1, 10} Exercises for the hips should be performed first, followed by the upper legs (hamstrings and quadriceps), the lower legs (calves or dorsiflexors), the upper torso (chest, upper back and shoulders), the arms (biceps, triceps and forearms), the abdominals and, finally, the lower back.

It's important to note that the mid-section should not be fatigued early in the workout. The abdominals stabilize the rib cage and aid in forced expiration during intense activity. Therefore, early fatigue of the abdominals detracts from the performance of other exercises that involve larger, more powerful muscles.

Frequency of training

Intense strength training places great demands on the muscular system. The muscles must receive an adequate amount of recovery between strength workouts to adapt to those demands. Muscles do not get stronger during a workout, they get stronger during the recovery from a workout. When weights are lifted, muscle tissue is broken down and the recovery process allows the muscle time to rebuild itself. Think of this as allowing a wound to heal. Leaving it alone permits the damaged tissue time to heal. There are individual variations in recovery ability since everyone has different levels of tolerance for exercise. However, a period of about 48 to 72 hours is usually necessary for muscle tissue to recover sufficiently from an intense strength-training workout.

Adequate recovery is also required to return your carbohydrate stores to their pre-exercise levels. Research by Piehl demonstrates that almost 46 hours are needed to replenish depleted carbohydrate stores following intense physical ac-

each workout.

- Workout three times a week. Always skip a day between workouts.
- Use manual resistance as a supplement to traditional forms of strength training.

Manual resistance is a productive, motivating and time-efficient form of strength training. While different from more conventional forms of strength training, manual resistance offers strength training enthusiasts a creative, fun and intense means of improving muscular strength and endurance.

Manual resistance training can be used for all levels of strength training enthusiasts, for groups and for pairs. While it should not totally replace dumbbells, barbells and machines, it provides a means to improve muscular strength, endurance and tone, while helping to reduce member boredom and frustration, and facility congestion. **FM**

activity.¹² As such, it's suggested that strength training be performed on nonconsecutive days — such as on Monday, Wednesday and Friday. This is consistent with the American College of Sports Medicine, which recommends that strength training be performed two to three times per week.¹³

Quantity vs. quality

When it comes to strength training, more isn't necessarily better. The quality of the work performed in the weight room should be emphasized rather than the quantity. The most efficient program is one that produces the maximum possible results in the least amount of time. **FM**

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