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Strength training: The quality approach

By Matt Brzycki

With the NCAA current restrictions on the number of hours that an athlete is permitted to spend in basketball-related activities, there is a new emphasis on "quality time." More than ever before, coaches must be able to produce the maximum possible results in the minimum amount of time. Quality and efficiency will be the latest buzzwords for those activities that are considered "athletic-related"—including basketball practices, coach-initiated meetings on athletic matters, required individual workouts and supervised videotape and film reviews of athletic performance. In addition, coaches will be searching for a time-efficient means of administering strength and conditioning programs to their athletes. Indeed, instead of being concerned with the *quantity* of work done in the weight room, coaches will be emphasizing the *quality* of work done in the weight room. Let's face it, gone are the days when a coach "encouraged" an athlete to lift four to six days per week for one to two hours per session. And those hours didn't even count some type of conditioning activity.

How can strength workouts become more time-efficient without sacrificing results? Let's look at the requirements for increasing muscular strength. In order for a muscle to increase in size and strength, it must be fatigued or overloaded. It's that simple. It really doesn't matter whether you fatigue the muscle in one set or several sets—as long as the muscle experiences a certain level of exhaustion. When performing multiple sets (i.e., more than one), the cumulative effect of each successive set creates the muscular fatigue; with a single set-to-failure (i.e., a quality set), the cumulative effect of each successive rep creates the muscular fatigue. In fact, numerous research studies have shown that there are no significant differences when performing either one, two or three sets of an exercise; provided, of course, that the muscle was sufficiently fatigued.

The following is a brief overview for administering a quality strength training program:

The Quality Repetition

A quality program begins with a quality repetition. Indeed, the repetition is the most basic and integral aspect of a strength program. A repetition consists of raising the weight to the mid-range position, pausing briefly, and then returning the weight to the starting, or stretched, position. (Raising a weight is sometimes referred to as the "positive" phase of a movement, and involves a concentric muscular contraction; lowering a weight is typically referred to as the "negative" phase of a movement, and involves an eccentric muscular contraction.)

But what exactly is a *quality* repetition? Well, a quality rep is performed by raising the weight concentrically in a deliberate, controlled manner without any jerking movements. Lifting a weight in a rapid, explosive fashion is ill-advised for two reasons. First of all, explosive lifting introduces momentum into the movement, which makes the exercise less productive and less efficient. To illustrate the effects of momentum on muscular tension, imagine that one of your athletes pushed a 100-pound cart a distance of 50 yards at a steady, deliberate pace. In this instance, she maintained a constant tension on her muscles for the entire 50 yards. Now, suppose she was to push the same cart another 50 yards. This time, however, she accelerated her pace to the point where she was running as fast as possible. If she were to stop pushing the cart after 35 yards, the cart would continue to move by itself because she gave it momentum. So, her muscles had resistance for the first 35 yards, but not for the final 15 yards. The same effect occurs in the weight room. When weights are lifted explosively, there is tension on the muscles for the initial part of the movement, but not for the last part. In effect, the requirement for muscular force is lessened, and the potential strength gains are reduced accordingly.

Secondly, explosive lifting is also potentially dangerous. Dr. Fred Allman, a past president of the American College of Sports Medicine, states, "Many injuries may be the result of weakened connective tissue caused by explosive training in the weight room." Here's why: Using momentum to lift a weight increases the internal forces encountered by a given joint; the faster a weight is lifted, the greater these forces are amplified—especially at the point of explosion. When the forces exceed the structural limits of a joint, an injury occurs in the muscles, bones or connective tissue. Lifting a weight in one to two seconds will guarantee that your athletes are exercising in a safe, efficient manner.

After raising the weight, a momentary pause in the mid-range position will allow your athletes to focus attention on their muscles when the muscles are fully contracted. Further, a brief pause permits a smooth transition between the concentric and eccentric phases of the repetition.

It should take about three to four seconds for your athletes to lower the weight eccentrically to the starting, or stretched, position. Because you can lower more weight than you can raise, it stands to reason that the lowering portion of the movement should be accentuated for a longer



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time. The lowering of the weight should also be emphasized because it makes the exercise more efficient: the same muscles that are used to raise the weight concentrically are also used to lower it eccentrically. The only difference is that when you raise a weight, your muscles are shortening against tension, and when you lower a weight, your muscles are lengthening against tension. So, by emphasizing the lowering of a weight, each repetition becomes more efficient and each set becomes more productive. Because a muscle under tension lengthens as you lower it, lowering the weight in a controlled manner also ensures that the exercised muscle is being stretched properly and safely.

In effect, a quality repetition should be roughly four to six seconds in length. Most strength coaches who are opposed to explosive, ballistic movements in the weight room consider a four- to six-second rep as a general guideline for lifting "under control" or "without momentum."

Finally, a quality rep is done throughout the greatest possible range of motion that safety allows — from a position of full stretch to a position of full muscular contraction and back to a position of full stretch. Exercising throughout a full range of motion will allow your athletes to maintain (or perhaps increase) their flexibility, which reduces their potential for injury. Furthermore, it ensures that they are exercising their entire muscle—not just a portion of it—thereby making the movement more efficient. Indeed, studies have shown that full-range exercise is necessary for a full-range effect. This does not imply that limited-range movements should be avoided altogether. During rehabilitation, for example, an athlete can exercise throughout a pain-free range and still manage to stimulate some gains in strength. However, full-range movements are more productive and should be performed whenever possible.

The Quality Set

A series of quality repetitions is a quality set. A quality set is one that involves a relatively high level of intensity. This level of intensity is best achieved when training to the point of concentric muscular failure — when the muscles are exhausted to the extent that the weight cannot be raised for any additional repetitions. When concentric muscular failure is reached, the cumulative effect of each preceding repetition has fatigued the muscle, thereby providing a very sufficient and efficient stimulus for muscular growth.

In general, concentric muscular failure should occur in 15-20 reps when exercising the hips, 10-15 reps for the legs and 8-12 reps for the upper torso. It should be noted that attempting a one-repetition maximum, or performing low-repetition movements (i.e., less than three reps), significantly increases the risk of an injury. Likewise, once an activity exceeds the recommended number of reps, it becomes a test of endurance rather than strength.

If concentric muscular failure occurs before an athlete reaches the lower level of her repetition range, the weight is too heavy and should be reduced for her next workout; if an athlete exceeds the upper level of her repetition range before she experiences muscular exhaustion, the weight is too light and should be increased for her next workout by five percent or less.

If an athlete is just beginning an exercise program, or if she changes the exercises in her routine, it may take several workouts before she finds a challenging weight. That's okay—simply have her continue to make progressions in the resistance as needed.

The Quality Workout

A group of 15-17 quality sets comprises a quality workout for basketball. A quality workout emphasizes the major muscle groups because those are the areas that are most frequently injured. (According to data collected for the NCAA Injury Surveillance System, the top three body parts injured during the 1991-92 women's college basketball season

were the ankle, the knee and the lower leg.) Moreover, a quality workout exercises the muscles from largest to smallest: the hips, legs (hamstrings, quadriceps, calves/dorsi flexors), upper torso (chest, upper back, shoulders), arms (biceps, triceps, forearms), abdominals and lower back. A quality workout is performed two to three times per week on nonconsecutive days to allow for adequate recovery. Finally, the transition/recovery time between exercises should be minimal, so that the duration of a quality workout is less than one hour per session.

The Quality Program

A quality program is composed of quality workouts. The trademark of a quality program is being safe, productive, efficient, comprehensive and practical. A quality program encourages progression in the weight used or the repetitions performed from one workout to the next. For this reason, it is important for your athletes to maintain accurate records as a way of monitoring their performance and making each workout more meaningful. Lastly, a quality program involves your entire team, not just a select few players. ♦