

# **Explosive Lifting for Sports**

**ENHANCED EDITION**



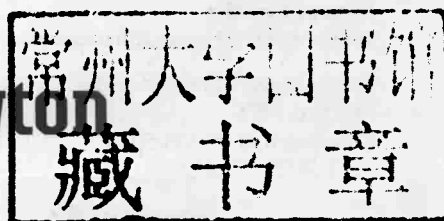
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**Harvey Newton**

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**Human Kinetics**

ISBN-13: 978-1-4504-0168-5 (print)

ISBN-10: 1-4504-0168-6 (print)

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# Acknowledgments

Since I first mounted the competition platform at age 15, weightlifting has provided me a great number of rewards and opportunities. First as an athlete, later as a coach, and finally as an administrator, weightlifting and strength training have always been a large part of my life. Along the way I've made great friends and worked with outstanding colleagues. All of them deserve strong thanks.

From local clubs and clinics to the US Olympic Training Center and beyond, athletes from many different sports and all levels of accomplishment have added to the challenge and enjoyment of teaching explosive-style weightlifting. A heartfelt thank-you for the many opportunities you have provided.

*Explosive Lifting for Sports* provides a great opportunity to share ideas with readers I'd never meet otherwise. Thanks to Michael Mahoney, who years ago encouraged me to write a book on weightlifting. Thanks to Rainer Martens and Human Kinetics for the opportunity to finally do so. A special thanks to my acquisitions editor Ed McNeely, developmental editor Cassandra Mitchell, and assistant editor Dan Brachtesende, who have patiently and professionally supported me throughout this experience. Thanks to all the great HK staff who have contributed to this book.

Tracy Fober deserves special praise as a fresh source of information and support throughout this project.

This book would not have been possible without the great competition photographs of Bruce Klemens. "Köszönöm" to Ms. Aniko Nemeth-Mora, of the International Weightlifting Federation, for her photographic support as well. HK's Tom Roberts worked hard to get the exercise technique pictures just right. Special thanks go to York Barbell Company and the St. Louis Weightlifting Club for the gracious use of their facilities.

I truly appreciate the coaches who contributed their insights into how they utilize explosive lifting for the sports featured in Chapter 11. Finally, I have a special recognition for Jeff Wittmer and Pat Hayes, the lifters who served as models for the bulk of the instructional technique shots.

Weightlifting is a fun, challenging, life-long activity. I trust *Explosive Lifting for Sports* will provide many with the opportunity and direction to maximize their potential.

# Introduction

Sport in the 21st century has evolved to a higher level of performance than ever imagined by our predecessors. Sport performance today is a result of many variables, not the least of which is greatly improved strength and conditioning programs. The creation of a stronger, faster, more powerful body is the priority of most athletes and coaches.

Strength training is an accepted part of training for most sports. In a quest to use the *best* form of strength training, coaches and sport scientists have closely examined the sport of weightlifting. After all, weightlifters are among the strongest, most powerful athletes in the sporting world. However, weightlifting is a complicated sport that requires an understanding of the finer points before you can safely and effectively apply this type of training in your conditioning program.

*Explosive Lifting for Sports* is written for athletes, coaches, sport scientists, students, and fitness professionals who want to understand the subtle nuances of the sport, the lifts, and related training. Through a better understanding of how and why weightlifting movements are performed, you'll be ready to safely and effectively incorporate this training into your workouts.

This introduction explains specific terminology associated with weightlifting and other forms of strength training, along with the rationale for using explosive lifting for improved sport performance. Chapters 1 through 3 discuss the roles of strength, power, and plyometric training and the importance of these aspects in the creation of a more powerful athlete. Chapters 4 through 7 take the reader through a safe and effective learning sequence for the "classic" lifts used by weightlifters. Chapters 8 and 9 cover the proper execution of assistance exercises (also explosive in nature). Finally, chapters 10 and 11 address the basics of training programs and the actual use of explosive lifts for a variety of sports.

You won't find any in-depth explanation of explosive lifting elsewhere. The community of weightlifters and their coaches is pretty small. Most strength training books, if they cover explosive lifting at all, offer only a very brief explanation, which can be more dangerous than none at all. These lifts must be taught, learned, and executed properly in order to improve performance safely and effectively. Although an aspiring weightlifter will benefit greatly from reading *Explosive Lifting for Sports*, the book was written for the average athlete or coach wanting to incorporate the lifts into a strength training program.

## The Sport of Weightlifting

Weightlifting, a competitive sport that has been part of the modern Olympic Games since 1896, addresses one of our most basic competitive urges:

the demonstration of strength. Although the sport has undergone numerous changes since its first days as an organized competition, weightlifting remains true to its original roots. The question How much can you lift? remains relevant today, even as demands for physical strength in 21st-century daily life have certainly been reduced.

Despite the reduced need for physical strength in most walks of life today, the use of resistance training for improved physical fitness is at an all-time high. Why this recent growth in popularity? After years of fighting for public acceptance, nearly all audiences realize that lifting weights offers many varied benefits, including the following:

- Increased strength and power for improved sport performance
- Improved muscular development and body composition
- Injury prevention or rehabilitation
- Improved health
- An opportunity to participate in competition

As physical fitness has become a more popular free-time activity, so has the manner in which people go about “lifting weights.” It can be downright confusing for the newcomer to wade through all of the information offered on this subject. One of the primary purposes of this book is to clarify the terminology associated with “lifting weights” and to focus clearly on the origin of them all, the sport of weightlifting. This book was not meant to entice newcomers to the sport of weightlifting, although anyone wishing to get a start in this direction will certainly learn the basics of style and technique. Weightlifting techniques will help you maximize the benefits of resistance training, particularly for sports involving strength and power. By incorporating the secrets of weightlifting training offered in this book into your training program, you will be a better performer in nearly any sport.

We no longer have to do battle with “old wives’ tales” about the negative consequences of resistance training. Lifting weights is widely accepted by nearly all coaches, athletes, medical professionals, sport scientists, and the general public. Even more widely accepted, particularly in athletic circles, is the use of weightlifting movements and training for the ultimate goal, improved athletic performance in sports requiring powerful muscular actions.

## Terminology

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*Weightlifting* (one word) refers to the competitive sport of lifting barbells as practiced in the Olympic Games. Both male and female competitors in different weight categories demonstrate their strength in two lifts that require the barbell to be hoisted overhead. The first lift is the *snatch*, in which the barbell is quickly pulled from the ground to arms’ length overhead in one continuous motion. The second lift, the *clean-and-jerk*, is a two-part lift that consists of pulling the barbell from a starting position on the floor to the shoulders (the *clean*), and then after a brief recovery, thrusting the bar overhead by a combined effort of the legs and arms (the *jerk*).



*Powerlifting* is a competitive sport that evolved from weightlifting in the United States in the 1960s. It consists of three barbell lifts (squat, bench press, deadlift). This sport is not included in the Olympic Games.

*Bodybuilding* (or *physique*) is an activity that falls outside the normal sport performance arena. Bodybuilders do not compete by lifting barbells, although they do train with resistance methods and equipment. Bodybuilders simply display their muscularity to a panel of judges who subjectively decide the winner.

*Weight training* is the term used when someone lifts weights for the general purposes of improved health, sport performance, or physical appearance quests not as extreme as those of bodybuilders.

*Strength training*, a relatively new term, is applied to athletes who use resistance training to increase strength with the express purpose of improving performance in their chosen sport. Strength training implies that the athlete is actually using a high enough resistance, applied with a relatively low number of repetitions, to actually gain strength. Not everyone engaged in resistance training actually trains for increased strength.

*Resistance training* is the overall scientifically correct term for all of the previously mentioned forms of training. Resistance training implies the use of some form of external resistance, be it a barbell or dumbbells (free weights), resistance training machines, body weight, elastic tubing, or other forms of resistance applied for any one of the reasons listed earlier.

## Resistance Training for Improved Athletic Performance

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Until about 1960, athletes from other sports generally shunned the idea of lifting weights for improved athletic performance. For the most part, runners ran, swimmers swam, divers dove, and that was it. With the passage of time, the idea of athletes using resistance training to increase their performance on the field or court gradually took hold. This was a very slow process, as conventional wisdom at the time suggested that weightlifting or general weight training would cause numerous physical complications that would impair performance. Prominent figures in the physical education field, along with nonbelieving coaches, suggested that lifting weights would make players “muscle-bound,” an expression that was never completely defined. Many assumed that if muscles got larger, players would not be able to move swiftly or with agility. Athletes and coaches feared that lifting weights would actually cause the athlete to become slower.

This argument continued for many years and in some isolated cases continues today. Among the first to slowly accept resistance training were football coaches who quickly noticed that those who trained with weights were bigger, faster, and stronger. Gradually, coaches and athletes in other sports came to embrace the use of resistance training for improved performance. While some holdouts still think that lifting weights will cause undue weight gain or excessive muscular growth, these people are becoming increasingly rare.

Today coaches and athletes generally believe that resistance training creates a stronger, faster player who will be more resistant to injury caused either by continuous practice of the sport or actual contact while engaged in the sport. But, while the concept has been nearly universally accepted, the details of how to best improve performance remain somewhat controversial.

## What Type of Training Is Best?

Here the debate heats up considerably. Among those who embrace resistance training, there remain large and divergent camps as to how best to train. Some of this divisiveness is a result of how these proponents themselves trained as athletes. Those with a weightlifting background prefer the so-called explosive lifts (the snatch, clean, and jerk). Powerlifters encourage the use of heavy loads in the squat, bench press, and deadlift, without much concern for speed. Bodybuilders focus more on muscular development of many small-muscle groups that may or may not contribute to improved performance. To a certain extent this personal preference is understandable.

Another major contribution to the current debate appeared about 1970, with the introduction into the marketplace of more elaborate resistance training machines. In an attempt to convince athletes that *theirs* was the preferred means of training, manufacturers made many claims. These claims, many without qualitative or quantitative research to back them up, became suspect as a means of simply marketing the new machines.

This debate spurred the growth of a group that to date had been small and relatively silent: sport scientists. The growth of sport science in the past 20 years has been nothing short of phenomenal. As these experts took on the task of researching methods of training and how well they worked, however, the split opinions remained.

As we begin the 21st century, debate on the most efficient manner to apply resistance training focuses on several key topics: sport specific versus nonsport-specific training, free weights versus machines, and single sets versus multiple sets.

### Sport-Specific Versus Nonsport-Specific Resistance Training

The term *sport-specific training* implies that exercises should mimic as much as possible the actions of the body during a given sport. This can mean exercising the body's joints and muscles through a range of motion similar to that used in the chosen sport and/or training the body's energy systems as they will be used in the chosen sport.

Sport science tells us that a boxer, who performs in repeated three-minute bouts with one minute of rest between, should train the body's energy system in a similar manner, such as by using interval training as opposed to long, slow distance runs. Likewise, a basketball player does not need to run endless laps around the court but should practice repeated short bursts of speed training and jumping. Despite the wisdom of sport science, however, old-school tradition often wins out.



Among strength and conditioning coaches there is nearly total acceptance of the notion of sport-specific training. We recognize that the *most* specific form of training is the actual performance of the chosen sport. But performing only the sport fails to provide the muscular overload needed to gain additional strength or power. Also, muscular imbalances may occur as a result of only performing a specific sport and not preparing the total body.

Total-body exercises performed explosively (the snatch, clean, and jerk) are considered a close approximation of the joint actions experienced by many athletes, especially those who depend on horizontal or vertical action (football players, basketball players, volleyball players, sprinters, weight throwers, etc.). The lifts are therefore called sport specific.

Opponents of explosive or weightlifting training often claim that these lifts bring an increased risk of injury. It is important to note that these lifts are not inherently dangerous; however, unqualified or inadequate coaching can certainly lead to injury, regardless of the exercise selected. Opponents similarly argue that a football lineman is never going to lift a barbell at the snap. This is true, but proponents claim that lifting a barbell from the platform requires the use of joint angles (ankle, knee, and hip) that are similar to those used in the lineman's starting position.

Opponents of explosive lifting often advocate seeking strength gains through nonspecific methods (particularly machines) and then converting those strength gains to useful, sport-specific actions by practicing the chosen sport.

One conclusion (perhaps the only sure one) is that either type of resistance training is better than none at all. Much of the debate depends on what sport is under discussion and how safely sport-specific movements can be performed with either machines or free weights.

For example, I assisted USA Cycling for many years with their strength training, due in part to my experience as a competitive cyclist and weightlifter. After looking at a cyclist's pedal stroke and the muscles (hip and knee extensors) involved, I had no trouble telling a cyclist that she would benefit more from squats than leg extensions. Unfortunately, one coach advised junior cyclists to perform squats with their feet staggered fore and aft about the same distance apart as bicycle pedals. Although this appeared to be quite sport specific, a squat cannot be performed safely in this position. Further, with the already better-than-average leg strength most cyclists possess, the weights used were relatively heavy. Squatting in such an awkward position was asking for trouble. This is an example of taking sport-specific training too far.

## **Free Weights Versus Resistance Machines**

In terms of duplicating specific joint angles and motor pathways, free weights allow for many more sport-specific exercises than do machines. Free weights also usually allow for more precise incremental weight increases than do machines. Lifting free weights generally duplicates day-to-day activities much more closely. One of the biggest advantages of free weights is that your balance is challenged, just as in most sports.

In this age of ever more sophisticated technology we often look to machines or gadgets to provide an easier way to perform our work, including

the work of exercise. Making training easier, however, may not produce the benefits we seek. Unfortunately, some machine manufacturers, in an attempt to “one-up” their competition, go to great lengths to create marketing ploys based on questionable science. While I’ve never seen a barbell company try to sell the advantages of free weights over machines, I have seen numerous machine companies take a swipe at this “stone age” approach to training while lauding their “space age” technology.

## Single Sets Versus Multiple Sets

A set is a unit of repetitions performed continuously. Nearly everyone who uses free weights and sport-specific training methods will opt for multiple sets. Despite this, numerous studies have asserted that a single set of each exercise *nearly* matches the gains of multiple-set protocols. Many of these studies used untrained subjects in their experiments. There is little doubt that in short-term (up to 12 weeks or so) resistance training with novices, a single set does come close to equaling what is achieved with multiple sets. However, since most competitive athletes are *not* untrained subjects, the conclusions reached in these studies may not apply to them. Additionally, experiments carried out for a longer period (up to nine months) clearly indicate the superiority of multiple sets.

In any case, who wants to get *nearly* the same results? Certainly not many competitive athletes I’ve known. True enough, someone strapped for time who seeks only minimal muscular fitness gains can get by, in the short term, by performing only one set of each exercise.

## Advantages of Weightlifting

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Learned properly, explosive weightlifting movements should contribute to improved sport performance. The primary goal of *Explosive Lifting for Sports* is to teach safely and methodically the proper sequences for performing explosive lifts. The snatch, clean, and jerk, properly performed with today’s technique, have been described as “jumping with weights.” This powerful and coordinated effort can be of great assistance to athletes of many sports. A great deal of research has found a high correlation between proficient execution of the classic lifts (the snatch, clean, and jerk) and the vertical jump test. The vertical jump test is widely used to measure power, or explosiveness, a vital component of many athletic events.

Again, those who argue against the use of weightlifting training for athletes in other sports focus on either the possibility of injury or what they consider a lack of focus on sport-specific skills. I repeat the earlier message: There is nothing inherently dangerous about the snatch or clean-and-jerk lifts. Training injuries can occur under all sorts of conditions, including using resistance training machines. The key to avoiding injury is to know *how* to perform movements and do so in a professionally supervised setting.

Mastery of weightlifting is within nearly everyone’s grasp, but as with any technical skill, it takes a great deal of practice. There is little doubt that learning a total-body exercise is more difficult than simply sitting on a machine and

performing a relatively easy exercise such as an arm curl or a chest press. A resistance machine restricts you from doing anything it was not designed to do. A barbell, on the other hand, requires constant attention, focus, and feedback.

If your sport activity does not involve the entire body (such as in archery, paddling, or sailing), you may be better off with a simpler form of resistance training, such as resistance machines or simpler single-joint exercises. But fear should not be a reason for avoiding classic lifts. As is true of any exercise or athletic movement, those who do not know what they are doing or cannot demonstrate proper technique should not be performing the activity.

The lifts described in this book are not difficult to learn. This is particularly true of the noncompetitive movements such as the power snatch, the power clean, various pulling motions related to either of those lifts, the push press, the power jerk, or similar movements.

Males and females of all ages can master the classic lifts and the assistance exercises. Youngsters are quick to learn these lifts. Grandparents in their 70s and 80s regularly compete in masters' competitions. Weightlifting is a life-long sport, enjoyable to all. If you want to take up weightlifting, there isn't much to hold you back.

If you don't want to become a weightlifter, simply use these lifts to improve your sport performance. If you aren't actively involved in a sport or if you are a personal trainer working with both athletic and nonathletic clientele, the use of these lifts for noncompetitive means introduces a challenging, fun way to improve fitness.

Athletes from many sports successfully train on the two competitive lifts or variations of them. As you'll see later in this book, many top coaches of sports such as football, basketball, and volleyball are very positive about the benefits derived from explosive training using weightlifting movements. Their players have benefited from snatch and clean-and-jerk training—perhaps not the full, competitive lifts but variations executed with lighter weights focused on developing power for their sport.

Due to the dynamic, total-body nature of these lifts, anyone practicing them is likely to exert more physical effort with a snatch or clean than with a curl or lat pull-down. Engaging the entire body in a successful performance takes more concentration and effort and as such results in a great expenditure of energy (calories). Heart rate and breathing both are at higher rates when performing these lifts than they are when performing exercises from a seated or prone position.

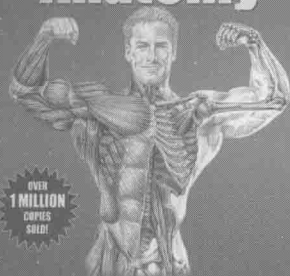
Personal trainers, whether they work with athletes or nonathletes, always look for new ways to stimulate interest in and challenge their clientele. Trainers can easily learn these techniques and use these lifts for a new, different, and highly effective form of training. Except in very rare instances, the snatch and clean-and-jerk lifts or their variations can be safely and effectively performed by anyone engaged in resistance training.

Before we start on the specifics of technique, however, let's look at the science behind the concept of using weightlifting exercises for improved sport performance.

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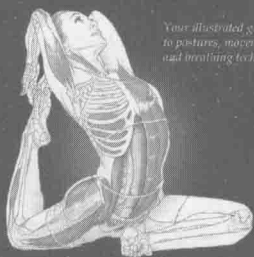


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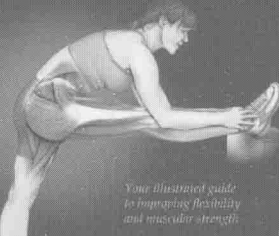
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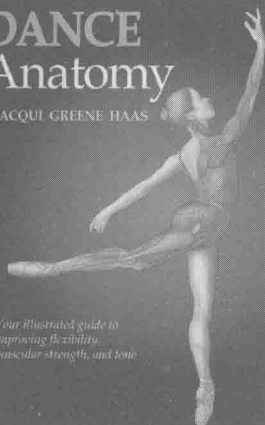
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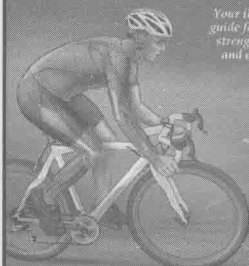
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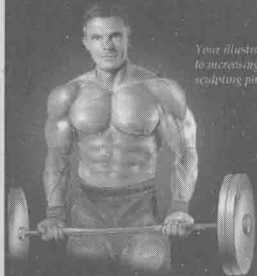


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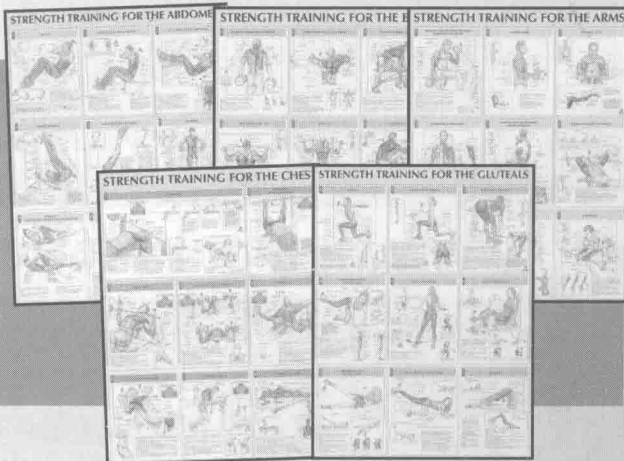
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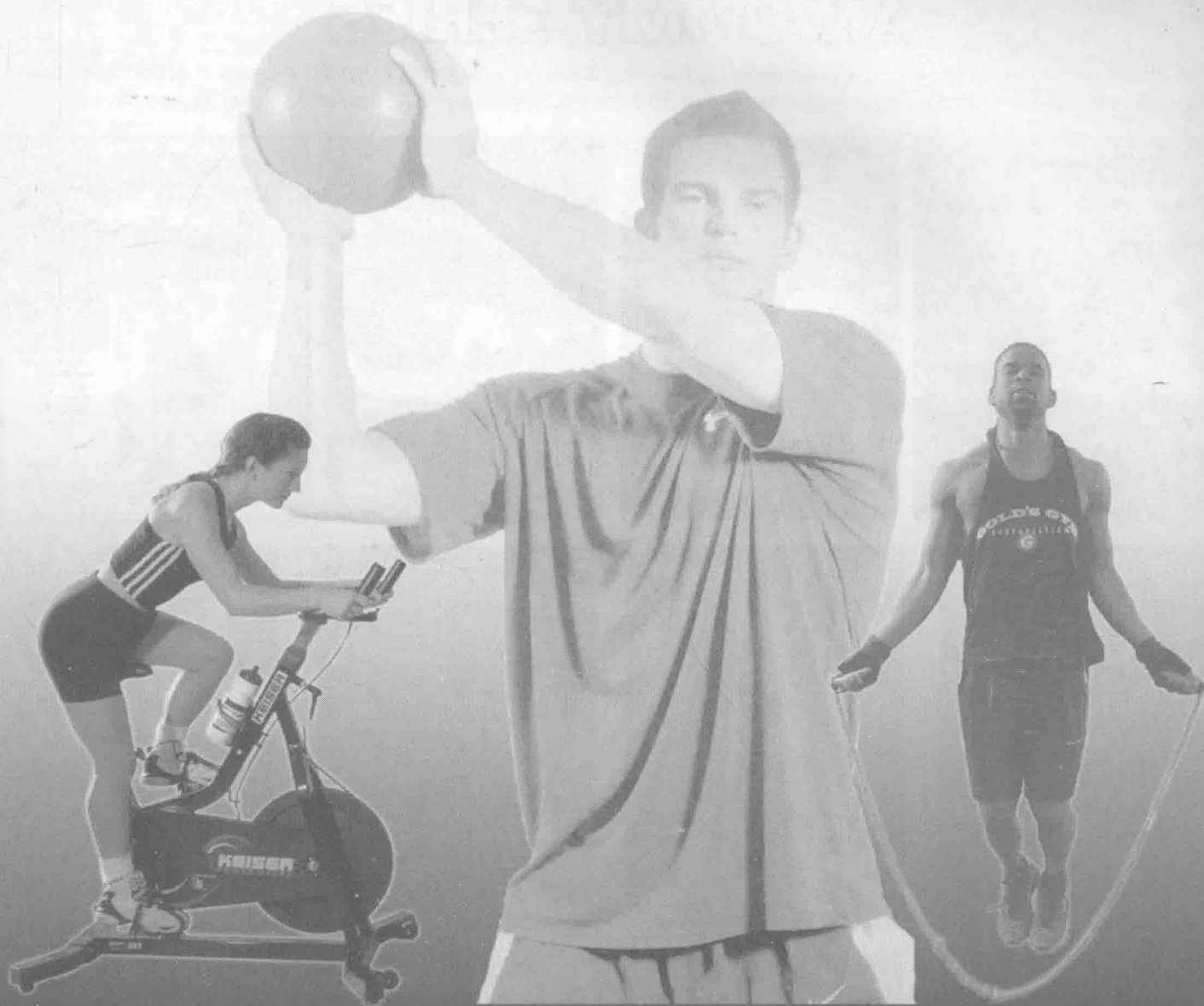


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# Training for Optimal Strength

Strength is a key component of success in many sports. However, as we discussed in the introduction, just adding resistance training does not guarantee improved strength. Many athletes who engage in resistance training with elastic tubing, aquatic training, body weight, or even light to moderate weights fail to produce actual gains in strength. They may receive other benefits, such as injury prevention, but this type of training has limited benefits in terms of strength development.

Why some forms of resistance training may not produce gains in strength becomes clear when we define the term *strength*. Although the definition of *strength* is often debated, for our purposes strength is the ability to exert a maximal force against a resistance. Strength gains are fairly easily achieved with the appropriate use of resistance training of a sufficiently high intensity

to elicit a strength response. Actual gains in strength normally require the use of either free weights or resistance machines.

Another important ingredient for success in many sports is power. Power is the subject of the following chapter, but for right now, keep in mind that power is the product of strength *and* speed. So, our discussion in this chapter about strength is crucial to the next step, improved power.

Let's look at what strength is and the characteristics of a training program designed to improve strength.

## Types of Strength

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The term *strength* is often linked to other words to describe a particular type of strength (speed strength, explosive strength, isometric strength). Rather than explore further the many scientific avenues associated with strength research, we will contain our discussion of strength to the basics. However, it is important to recognize two different types of, or ways to evaluate, strength: absolute strength and relative strength.

*Absolute strength* is synonymous with maximum muscular strength. Absolute strength is also low-speed strength, as in the sport of powerlifting, in which the lifts are not performed quickly because of the nature of the lifts and the massive weights that must be moved a good distance. Absolute strength improvement is crucial to many sports, particularly those that involve moving a heavy resistance (football, wrestling, weightlifting, powerlifting). Most sports, however, do not allow for such slow execution of movement.

It is important to know how crucial strength is for your sport and where you currently fit in that sport's strength continuum. More on this later.

The other form of strength that is important to address is *relative strength*. Relative strength is easily defined as your strength-to-weight ratio. How strong are you when strength is expressed as a percentage of your body weight? As we'll see later, male weightlifters have lifted more than three times their body weight overhead in the clean-and-jerk lift. Women have succeeded with more than twice their body weight. Contrary to powerlifters, weightlifters must execute their movements with blinding speed or they will simply lose the battle to gravity.

As you may imagine, lighter lifters have a better chance of lifting a higher percentage of their body weight than those at the higher end of the body weight continuum. Regardless of the lift, an athlete weighing 150 pounds (68 kilograms) has a better chance of lifting 150 to 450 pounds (68 to 204 kilograms) than an athlete weighing 250 pounds (113 kilograms) has with 250 to 750 pounds (113 to 340 kilograms). This is a simple matter of geometric progression.

Of course, other factors being equal, a larger athlete normally performs better in terms of absolute strength. This is why weightlifting has different body weight categories for lifters ranging from around 100 pounds to well over 300 pounds (45 to 136 kilograms).

Smaller individuals, on the other hand, generally display more relative strength. It is impossible to predict exactly the optimal strength-to-weight ratio of every athlete in every sport. As a result, some experimentation is