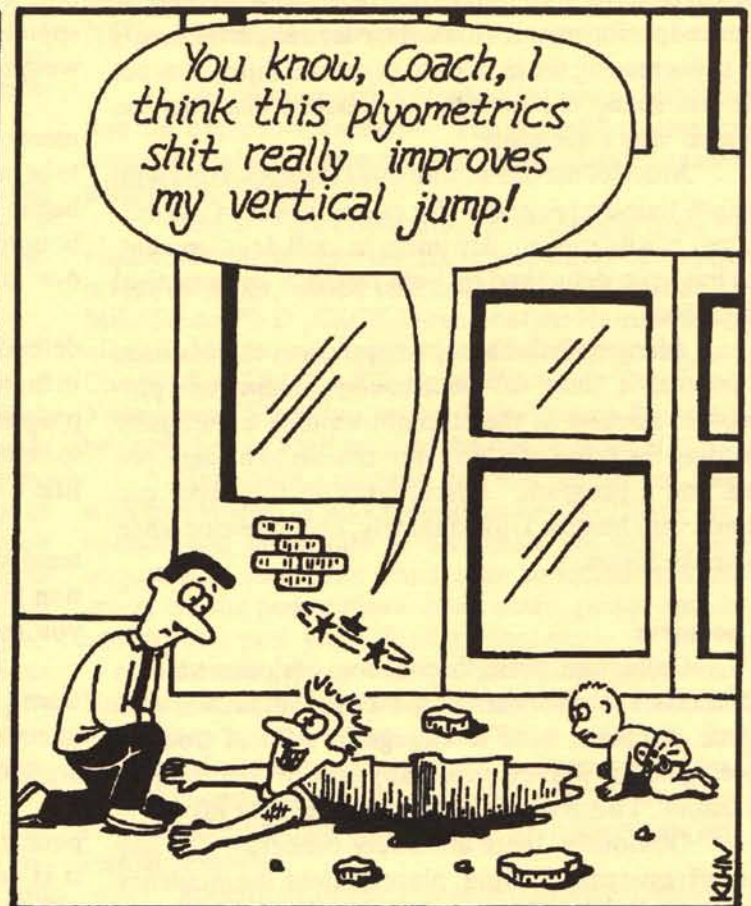
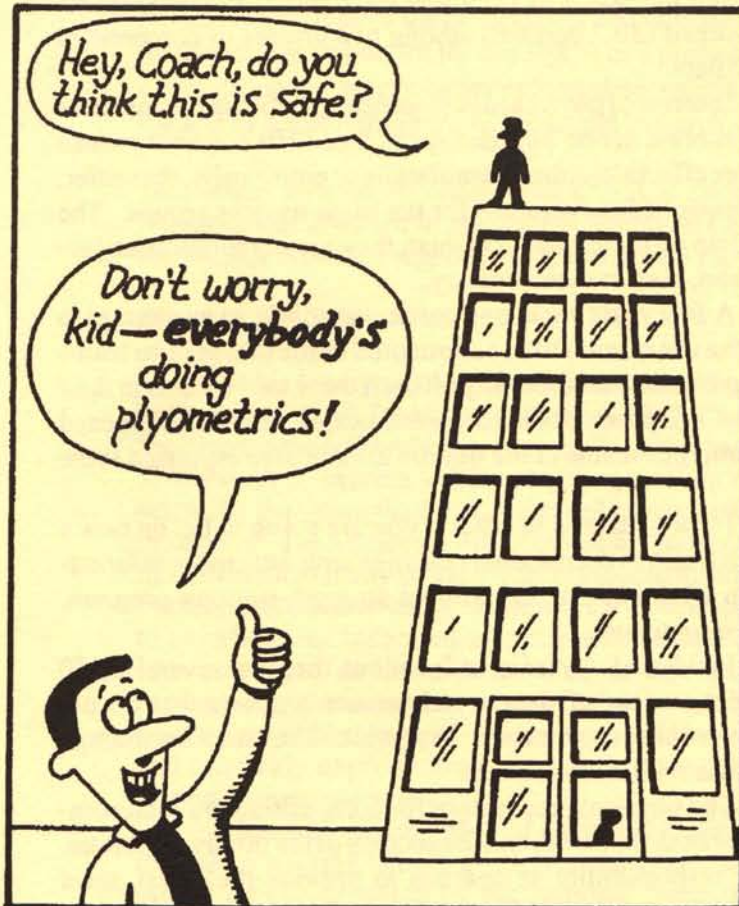


# ATHLETIC CONDITIONING

A Publication of ELITE FITNESS INTERNATIONAL

QUARTERLY

## PLYOMETRICS: THE WAVE OF THE FUTURE?



**CAUTION: CONTENTS IN THIS PUBLICATION CAN BE HARMFUL TO THE EGOS OF THOSE INDIVIDUALS WHO CONDONE THE USE OF EXPLOSIVE AND PLYOMETRIC TRAINING.**

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*Matt Brzycki, Strength Coach at Princeton University has been around a little while, and is a respected authors of strength training articles and two critically acclaimed books. When the NSCA tried in its attempt to discredit Mannie, he took to his word processor to help further untangle the dangerous web of propaganda the NSCA has been weaving for years. Here is his response.*

### Explosive Lifting: Unsafe and Ineffective

The associations and individuals that promote explosive lifting would have you believe that their philosophy represents the only approach and that anyone who believes otherwise is misinformed, misguided or just plain stupid. Those with different views are quickly and feverishly attacked for their nonacceptance of the traditional "party line" thinking. In reality, there are rather large numbers of highly qualified and completely competent strength coaches who do not recommend explosive movements or techniques to their athletes.

In his article, "Lift risks are a weighty matter" (NCAA News, 27 January 1993), Coach Ken Mannie sought to inform other coaches and athletes of the potential dangers associated with explosive movements. To ignore, discredit or criticize the opinions of anyone who suggests that there might be a safer and more practical method of training represents a rather narrow-minded, self-centered view that smacks of state-controlled thought. Such condemnation also creates an enormous injustice for the thousands of coaches and athletes who are searching for the appropriate answers to their difficult questions.

The romantic, emotional attachment to certain explosive movements has been force-fed to the coaching community with a religious zeal through various articles, research studies and position papers supported by biased, sketchy protocols and other design flaws that make their results scientifically-unacceptable. So, the conclusions of this "re-

search" might "suggest" something, but they certainly don't indicate anything. Proponents of high speed movements argue that in order to become "explosive" you must train "explosive." Their assumption is that by lifting explosively in the weight room, the fast speed of movement will somehow "carryover" to the athletic arena. Unfortunately, there's been absolutely no definitive, unbiased research to indicate that this is true.

Those who favor explosive training are quick to offer "specificity" as a justification for their methods. For example, power cleans have long been touted as being specific to an incredibly wide variety of skills from the breast stroke to the golf swing to the shot put.

***How is it possible for this one movement to be specific to such a broad range of differing skills?***

***Answer: It can't.***

The Principle of Specificity continues to be frequently misinterpreted and misused. The principle states that your activities must be specific to an intended skill in order for maximal improvement—or "carryover"—to occur. Specific means exact or identical, not similar or just like. So, performing power cleans may be similar to driving off the line of scrimmage and doing lunges may be just like driving toward the basket but the truth is that power cleans will only help you get better at doing power cleans and lunges will only help you get better at doing lunges. Likewise, heaving medicine balls around is great for improving your skill at heaving medicine balls around and nothing else.

In addition, a movement like a power clean is an extremely complex motor skill. Like any other motor skill, it takes a lot of time and patience to master its specific neuromuscular pattern. This valuable time and energy could be used more effectively elsewhere—such as perfecting dribbling or wrestling techniques.

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 you pushed a 100 pound cart a distance of 50 yards at a steady, deliberate pace. In this instance, you maintained a constant tension on your muscle for 50 yards. Now, suppose that you were to push the same cart another 50 yards. This time, however, you accelerated your pace to the point where you were running as fast as possible. If you were to stop pushing the cart after 35 yards, the cart would continue to move by itself because you gave it momentum. So your muscles had tension 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 the last part. In effect, the requirement for muscular force is lessened and the potential strength gains are reduced accordingly.

Secondly, explosive lifting can also be 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. No one knows what the exact tensile strength of ligaments and tendons are at any given moment. The only way to ascertain tensile strength is when the structural limits are surpassed. Then, of course, it's too late. Therefore, we must be concerned with an exercise's speed of movement because we simply don't know the structural limitations of the human body's various connective tissues. As the speed of movement increases, so does its potential force. This isn't merely an opinion or observation—it's a fundamental law of physics. Something new? Nope. In fact, it was first proposed about 300 years ago by a fellow named Isaac Newton and is referred to as his Second Law of Motion. So, if slower speeds of movement are safer, doesn't it follow that faster speeds of movement are more dangerous?

Proponents of explosive training sometimes counter these facts by saying, "So what? Sports are dangerous—just look at football and wrestling. Maybe we should stop playing sports." Arguments like this miss the point entirely. It is true that sports are inherently dangerous. However, using potentially dangerous techniques in the weight room to prepare for potentially dangerous activities is like banging your head against the wall to prepare for a concussion.

When someone is described as being "explosive" on an athletic field, essentially what we are saying is that the athlete performs, moves or reacts quickly and forcefully. This is primarily due to the fact the athlete's movement patterns for a particular skill are so firmly ingrained in his or her "motor memory" that there is little or no wasted effort. In other words, it's because the athlete is highly efficient at performing the intended sports skill—not because the athlete practiced explosive movements with barbells, medicine balls or other stage props in search of a nebulous concept like "speed-strength."

## Plyometrics: Dangers and Incorrect Philosophies

By Michael Johnson, Nautilus Director  
Westfield (NJ) YMCA

As a reader of ACQ, you already know we are not in favor of the use of plyometrics. Most articles concerning plyometrics correctly detail the dangers and incorrect philosophies concerning training specificity. What this article attempts to accomplish is to further investigate plyometrics and draw conclusions to details which are rarely discussed in other articles. Safe and proper alternatives will also be described and recommended. This will hopefully help you gain more insight concerning plyometrics and therefore allow you to correctly decide whether or not to use them.

A quick review of what plyometrics are needs to be done before any discussion. Plyometrics are used in an attempt to improve the ability to generate athletic power. This involves various jumping movements where upon landing on the ground you attempt to spring up/forward as quickly as possible. The landing forces the muscles to eccentrically prestretch and thus elicit the stretch reflex. This reflex is a safety mechanism and, once called upon, contracts the muscle to avoid further stretching and possible damage. This, along with the stored energy developed during the fall toward the floor, allows you to explosively contract the muscles for forward propulsion.

The prestretch and subsequent contraction is made possible by the muscle spindles located deep within the muscles. The responsibility of the spindles is to sense a change in the length of a muscle. A rapid, ballistic stretch activates the spindles which then initiates a muscular contraction for protection. The faster a muscle is forced to stretch and lengthen, the greater the contraction.

While I agree it is important to develop athletic power and quickness, I disagree with the concept of plyometrics. I, as well as everyone at ACQ, feel there are safer, simpler, more logical, and less confusing alternatives. For example, in his book "Bounding to the Top", Frank Costello writes this concerning plyometric training: "We will, therefore be concerned with training the white or fast twitch fibers in the eccentric phase of the muscle contraction." This statement makes it seem like you can randomly choose which muscle fibers will and will not be trained. While the fast twitch are stronger and larger, how can you force the remaining fibers to not work? You simply cannot turn off parts of a muscle and leave the rest intact.

When it comes to muscular fiber utilization,