

Should All Athletes Use Explosive Lifting?

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ABSTRACT

In this stimulus article, the question is addressed of whether or not the best way to train is explosively, like a weightlifter. Arguments in favour of explosive lifting are increased strength, increased power, hypertrophy, injury prevention, improved flexibility, improved inter- and intramuscular coordination, and sharpened psychological abilities. Arguments against explosive lifting are a complexity of technique, physical capabilities, initial flexibility challenges, initial strength deficiencies, lack of availability of good coaching, and lack of proper facilities, equipment and footwear.

Key words: Clean-and-Jerk, Flexibility, Power, Resistance Training, Snatch, Strength, Weightlifting

INTRODUCTION

Nearly all sports today consider resistance training a crucial ingredient for the acquisition of optimal sporting results. Secondly, such training, commonly referred to as “strength training,” is touted as a reasonable means of preventing injuries and keeping a player on the court or field. But exactly what is the best and/or most effective resistance training remains a debate.

What about an endurance athlete, such as Tour de France cyclist Lance Armstrong? Reportedly Armstrong did little, if any, resistance training throughout his career [1]. The first author was invited (by the USA Cycling coaching staff) to advise Armstrong on the finer points of plyometric training in the early 1990s. Characteristically for an endurance cyclist, Armstrong had exhibited below average vertical jump (a common test for explosiveness, or power) results when tested with the US team in December 1991. The thinking was, perhaps some explosive training would be helpful.

But the US Olympic Committee physiologists at the time thought otherwise, and suggested Armstrong should simply focus on his strong points and not consider attempts to improve his absolute power. With his outstanding cardio-respiratory fitness, suggesting that Armstrong could have performed even better had he engaged in explosive training is at best a stretch.

But, in light of recent research [2] and media coverage of poor skeletal health in male cyclists, perhaps abbreviated explosive training has its place in endurance sports. Research repeatedly shows that ground-based, large muscle group training, such as weightlifting

exercises, squatting, and deadlifting, are beneficial in combating bone mineral density concerns [3, 4].

It is the aim of this target article to explore the oftentimes-heard advice, “The best way to weight train is to train explosively, or like a weightlifter.”

TERMINOLOGY

Explosive lifting customarily refers to the specific competitive lifts, namely the snatch and the clean-and-jerk, performed by weightlifters in the Olympic Games [5]. Obviously, lifts other than Olympic-style movements may be performed explosively. *Explosive strength* is the ability to exert maximal forces in minimal time [6]. *Explosive exercises* are performed at maximum or near maximum rates of force development [7, p. 28]. *Plyometric* training, which is explosive by design, is defined as those activities that enable a muscle to reach maximal force in the shortest possible time [8, p. 414]. Since all plyometric exercise also includes a *stretch-shortening cycle* (SSC), the reader is advised that there are explosive motions that are not considered plyometric.

For example, performing an explosive medicine ball throw from the chest while in a seated position is a measure of explosive strength, or power. The often-studied squat jump involves explosively blasting upward from a squatting (thighs parallel to the ground) position. However, in neither of these static start movements is a stretch-shortening cycle involved, thus the movements cannot be considered plyometric.

Clearly, athletes in power-oriented sports are often encouraged to perform their adjunct resistance training in the same manner in which they execute their sporting skills; i.e., explosively. Among other considerations, the principle of *specificity of training* strongly supports this notion, but this does not require that activities must share identical characteristics [9, p. 171].

However clear this association between sporting performance and proper supplemental training may be, there are those who have expressed serious reservation or blatant opposition to the idea that athletes from sports (explosive or otherwise) should train with weightlifting methods [10, p. 189-191; 11]. Often this hesitation is related to the amount of time necessary to master the technical intricacies of the snatch and clean-and-jerk. This objection may also reflect the challenge of acquiring adequate coaching of the lifts. Yet others write, primarily in non-refereed publications, that weightlifting training leads unnecessarily to increased injury, thus keeping a player away from their chosen sport.

Defenders of explosive lifting reference evidence that suggests such training is, in fact, quite safe, provided adequate coaching and supervision are present [12-14]. The current Youth Resistance Training Position Statement of the National Strength and Conditioning Association (NSCA), which markets itself as the worldwide authority on resistance training, states, “With qualified instruction and a stepwise progression of the training program, researchers have reported significant gains in muscular strength without any report of injury when weightlifting movements (snatch; clean and jerk; and modified cleans, pulls, and presses) were incorporated into a youth resistance training program” [15].

The current use of explosive lifting to train athletes of many sports is probably at an all-time high. One recent survey of high-school strength coach members of the NSCA found that 97% of such coaches incorporate weightlifting movements in the training routines of their scholastic athletes [16].

Since on the one hand coaches and athletes are encouraged to train explosively, yet on the other hand they may encounter opposition to the idea, this article explores the finer points of explosive lifting and sheds light on the question of its appropriateness for all.

A BRIEF HISTORY OF RESISTANCE TRAINING

Resistance training is the umbrella term applied to the use of bodyweight and/or external loadings for any number of specific results. The notion that resistance training could create a better athlete has gained in popularity only over the past 50 or so years. Prior to this, lifting weights, like other recreational pursuits, did not attract a large audience.

It is important for the reader to realize that due mostly to differences in training intensity or volume, or the training modality used, various forms of resistance training result in different end results for the user. In other words, not everyone who lifts weights gets stronger, since in the case of light intensity efforts, actual gains in maximum strength (how strength is measured) may not be present.

Characteristic of high-intensity resistance training is the sport of *weightlifting*, which has been part of the Olympic Games since the first modern Olympic Games in 1896. It has evolved over the years into today's two-lift competition, practiced by 167 member nations of the International Weightlifting Federation. Modern competition consists of the snatch and the clean-and-jerk, both commonly known as the "quick lifts." In earlier versions of weightlifting, non-explosive lifts (such as the press) were also contested.

Competitive weightlifting remained the primary means of training for those lifting weights up until about the 1940s. John Fair has written extensively on the impact of World War II and resistance training, when such methods were used to strengthen recruits and rehabilitate wounded servicemen [17]. He references the budding success of York Barbell Company and similar groups as a result of this new-found interest in physical improvement in the post-war years.

Much of this new interest also contributed to the increased popularity of *bodybuilding*, a non-Olympic sport focused on the development of muscular hypertrophy. Later, the expanding interest in lifting weights contributed to the birth of another non-Olympic sport, *powerlifting*. In both cases, these activities have proven to be more popular than weightlifting. And, both of these relatively new forms of training have influenced strength training practices and philosophy.

The more recent and commonly used term *strength training*, in its proper use refers to lifting weights by non-weightlifters for improved performance in their specific sports. This now popular concept was quite revolutionary and controversial when it first appeared toward the end of the 1950s. The idea of strength training for athletes first became widely popular in the United States. Alvin Roy, a trainer who accompanied several US weightlifting teams to international competitions, relied on weightlifting and other movements to increase the physical qualities and performances of American football athletes. The success of his efforts launched the popular use seen today of various forms of resistance training, all too often erroneously called strength training.

Up until the 1960s, resistance training machines were non-existent. Only free weights and exercises performed with bodyweight were available to those wishing to improve strength and/or power. With the increased popularity of lifting weights came the success of product lines such as Universal and Nautilus. Due largely to successful marketing plans to promote and sell these products, resistance training machines became the norm, and lifting free weights, especially as in the sport of weightlifting, faded from popular use.

Largely as a result of the new and increased demand to create stronger, more powerful athletes in literally all sports, the development and manufacture of resistance training machines has burgeoned. Today, anyone interested in resistance training has a full palette of training concepts from which to choose, although the scientific evidence of the most effective methods of training remains unsettled.

And, for the most part, training practices have come full circle. Weightlifting, having faded from popular participation, has returned to a place of prominence, due mostly to non-weightlifters embracing this sport's many benefits. With this returns the debate over the effectiveness of explosive training for all sports.

ARGUMENTS IN FAVOUR OF EXPLOSIVE LIFTING

Weightlifting training has many advantages, which is one reason this form of training persists even as more and more machine options become available.

Both genders, including individuals of any size, can participate in this ground-based, multiple-joint form of training. Weightlifting training produces many benefits, including:

- Increased strength
- Increased power
- Hypertrophy
- Injury prevention
- Improved flexibility
- Improved inter- and intramuscular coordination
- Sharpened psychological abilities

Increased *strength* is an obvious by-product of nearly any form of resistance training, provided the intensity is appropriately high. In powerlifting (a misnomer, as power here is only a fraction of that present in weightlifting) heavier resistances are used and the lifts are performed slowly. As a result *absolute, or maximum, strength* may be greater with this sport, as measured by their competitive lifts. But weightlifters obviously must be quite strong in order to achieve their sporting success, as they move maximum weights with blinding speed.

Greater *power* is truly the most highly sought-after training attribute related to weightlifting training, thus the overwhelming endorsement by most American strength and conditioning staffs, be they scholastic, university, or professional teams focused on this type of training [16]. One can think in terms of speed-strength here, or the old adage, "How fast can you be strong?" Importantly, not all forms of resistance training produce greater power.

The *hypertrophy* benefits of weightlifting training, while more evident in those specializing in the sport of weightlifting, are not nearly as extreme as those obtained via the pursuit of bodybuilding. Few athletes training for improved sports performance seek or need extreme measures of strength or large, muscular bulk, thus the obvious improvements in strength and power, minus muscular growth, are attractive to many.

Injury prevention is a by-product of resistance training, not a goal in and of itself. All forms of resistance training contribute to injury prevention.

Flexibility is a requirement for success in weightlifting. Training for the snatch and the clean-and-jerk requires and develops outstanding flexibility, something often not present in general resistance training, bodybuilding, or machine exercises.

Weightlifting requires outstanding muscular *coordination* in order to execute the complex snatch and clean-and-jerk motions. Aside from the muscular benefits of this type of training one must also consider the neural, or nervous system, benefits of executing such lifts in the blink of an eye. Training the nervous system can have a positive carryover to other sports with similar neural characteristics.

Finally, the *psychological* requirements of weightlifting are challenging. Harnessing one's total concentration to perform an explosive lift that requires less than one second to execute calls on many psychological traits present in other sports, such as golf.

ARGUMENTS AGAINST EXPLOSIVE LIFTING

The use of weightlifting training for improved athletic performance is not a concept embraced by all. In fact, there are many detractors that suggest much simpler training (bodyweight resistance, machines, or other “toys” currently popular in the fitness profession) is sufficient to obtain the necessary benefits without the risk of more complex efforts.

Many coaches correctly note that the technique requirements of weightlifting training demand much individual attention to detail. It may be impractical in some settings (a university weightroom, for example) to properly instruct a medium or large number of novice participants in the intricacies of weightlifting technique.

Some opponents of weightlifting training argue that the mere performance of these types of lifts, especially when done explosively, may increase the odds of a weightroom injury.

Is explosive lifting the panacea for all athletes’ strength training? Here are some real challenges that are present for someone wanting to engage in weightlifting training.

- A complex, technique-driven activity
- Physical capabilities
- Initial flexibility challenges
- Initial strength deficiencies
- Lack of availability of good coaching
- Lack of proper facilities, equipment, footwear

To be proficient at this form of training, one must master basic techniques of the key lifts. Proficient technique is *not* necessary to successfully elevate a barbell overhead, as this can be done in poor form, as well. But performing these lifts in anything other than proper form both shortchanges the participant in terms of benefits, and it greatly increases the chances of injury.

Most able-bodied athletes may consider performing snatch, clean-and-jerk, or derivative exercises without hesitation, provided proper technique is learned. However, physically challenged athletes need to improvise and modify existing techniques in order to still train explosively.

Just as the specific lifts generally require outstanding flexibility, there are many novices that present with less than adequate flexibility on their first day in the gym. An inability to fully extend one’s arms overhead or to fail to sit comfortably in a full squat receiving position (with a neutral spine posture) are sure indicators that additional preparatory work must be done before introducing the full snatch and clean-and-jerk exercises.

In some cases actual flexibility may not be the limiting factor. In teaching a squatting action, the second author has found that many novices exhibit an action with posterior tilting of the pelvis and large knee moment with the heels off the ground. It doesn’t take long to coach them into correct pelvic tilting to achieve a neutral pelvis and spine with a larger hip moment and feet flat on the floor.

Similarly, it is possible that one is simply too weak to hold correct posture in the lifts or to exhibit adequate strength as measured by a standard fitness evaluation. Such an individual is ill advised to perform explosive training without proper remedial preparation. Young lifters are sometimes seen lifting weights in excess of what they can perform in good form, suggesting further basic strengthening is necessary. In this case, more general resistance training protocols are needed in order to properly strengthen the individual prior to engaging in advanced training.

The growth in the number of “certified” weightlifting coaches in recent years, at least in

the United States, can only be described as phenomenal. As a principal in the initial stages of weightlifting coaching training in America, the first author confirms that it was initially thought that more coaches schooled in the subtleties of explosive lifting would identify budding athletic talent, and in the long run, return the nation to a position of competitiveness on the international platform.

Recent figures from USA Weightlifting (USAW) reflect more than 5,400 coaches among USAW's more than 8,700 members [Personal Communication by First Author with USAW]. Those claiming coach status appear across several strata of competency. Despite the myriad people throughout the country claiming to be weightlifting coaches and experts, the team's current international standings are worse than ever before. The success of certification programs appears to neutralize the challenge of finding a qualified coach to teach weightlifting, yet many of these individuals are hardly more than rank novices themselves when it comes to actually performing lifts.

Weightlifting, at least in the United States, exists in small pockets around the country. Although not absolutely necessary in order to practice weightlifting, the sport does encourage the use of specialty equipment. This includes revolving barbells, rubber "bumper" discs, platforms, racks, and, like most other sports, specialty footwear. Far too many individuals fail to utilize properly designed weightlifting shoes, which actually do contribute to one's ability to properly lift heavier weights more safely.

One cannot simply go into the average fitness center and expect to find the equipment or layout necessary for weightlifting training. In fact, many fitness centers in America actively discourage or forbid some of the sights or sounds that accompany serious, high-intensity weightroom efforts such as dropping weights on a weightlifting platform.

CONCLUSION

Explosive lifting provides a great number of benefits in terms of developing outstanding strength and power in most individuals. At first glance it may appear that weightlifting training is perfect for all athletes. Certainly there are some, especially those dyed-in-wool weightlifting disciples, who would argue that this is the case.

But it must again be stated that weightlifting is perhaps the most advanced form of resistance training, and as a result, one that must be approached carefully and with proper preparation and coaching.

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