

# Developing Explosive Strength and Power for Athletic Performance

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Over the last few months I've received a boat load of questions regarding explosive strength and power, how it pertains to athletic performance, and subsequently how to develop it based on an individual's needs and goals.

Seeing as I'm tired of answering the same questions over and over again a delightfully charming young fellow, I've decided to write an article detailing the *what's*, *why's*, *when's*, *who's*, and *how's* of explosive strength and power which will hopefully answer many common questions and concerns.

While this piece will not focus on many of the advanced topics related to power development, it will cover the basics of:

- *What* explosive power is
- *Why* explosive power training is important
- *Who* will benefit from explosive based strength training
- *When* should explosive strength/power be trained, and
- *How* explosive strength/power is developed

Through writing this article I hope to provide athletes, coaches, and fitness enthusiasts with an adequate amount of scientifically based information which will allow them to incorporate explosive based strength training in a safe, efficient, and effective manner.

## What Is Explosive Strength and Power?

Now I don't want to geek out too hard but there will be a little bit of nerd speak here so please bare with me. I promise to make it brief. Simply put, explosive strength refers to an individual's ability to exert a maximal amount of force in the shortest possible time interval.

For conceptual purposes, think of a sprinter forcefully driving into the starting blocks, a high-jumper propelling himself off of the ground, a football player exploding off the line, or a weight lifter squatting a near maximal load. While each of these movements are markedly different from one another, both in form and speed of movement, they all require explosive strength.

Power (which results from explosive strength) can be represented as:

$$\text{Power (P)} = \text{Force (F)} \times \text{Velocity (V)}$$

As the equation shows, in order to display a high level of *P* one must be capable of exerting a high amount of *F* and *V*.

So how do we achieve greater *F* and *V*?

Simple:

- 1 Get Stronger, and/or
- 2 Get Faster

For a majority of individuals (notably beginner and intermediate trainees), initially improving one's maximal strength will be far more important than speed.

However, as an individual progresses and exhibits sufficient maximal strength, targeted training to improve speed becomes an essential component to improving explosive strength and power as well. In summary, explosive strength refers to the ability to exert a maximal amount of force in

the shortest possible time interval. As I'll explain later on, developing this skill set is of the utmost importance especially in regard to most athletic populations.

### Who Needs Explosive Strength?

In some way, shape, or form I'd be willing to argue every athlete needs explosive strength. That being said, based on a variety of factors including, but not limited to, individual strengths and weaknesses, the specific athletic event, and phase of the training cycle, the degree of emphasis which should be placed on explosive strength development will vary among athletes. Generally speaking, athletes who need to display large amounts of force in relatively short periods of time would do well to incorporate explosive based strength training within their regimen. Well...obviously. But what movements require large amounts of force in short periods of time? Below is a short list of various explosive movements in sport. If playing your sport entails one or more of the following actions, appropriately incorporating explosive based strength training into your routine would likely be in your best interest. Clearly this includes most common sports such as baseball, soccer, basketball, football, lacrosse, hockey, tennis, boxing, wrestling, golf, track & field, and weightlifting. In summary, what I'm trying to say is to some degree every athlete will need to develop explosive strength. As Louie Simmons has rightfully pointed out on numerous occasions, "*Even a marathon runner needs to sprint to the finish line.*" Yup, they've both gotta sprint at some point!

### Why Is Explosive Strength and Power Important?

While I don't want this article to become overly technical, I do want to briefly cover the basics of why explosive strength and power development is a crucial determinant of athletic success. Therefore, I'm about to get my geek on hardcore so if you aren't interested in the physiological mechanisms or overall *why's* of explosive power, right meow would be a good time to scroll to the next section.

The benefits of improving explosive power are vast and apply to a variety of populations. However, notably in regard to athletic performance, McBride and colleagues have clearly shown an athletes ability to display a high level of explosive power is believed to be one of the most important factors in determining athletic success. Now, there are various mechanisms behind these factors, each of which contribute to an athletes explosive strength and power capabilities. However, perhaps the most important ones are related to the neural adaptations which result from explosive strength training. Specifically, motor unit recruitment and rate coding are the two which I will focus on today.

### Greater Recruitment of Fast Twitch Muscle Fibers

For the purposes of this article the human body has two types of muscle fibers; slow twitch (Type I) and fast twitch (Type II). Slow twitch muscle fibers are built for endurance/long lasting activities, are predominantly active in smaller motor units, and are the first and easiest for the body to use. Fast twitch muscle fibers are built for explosive/high force activities, are predominantly active in larger motor units, and require a much greater stimulus for the body to use effectively. As one might assume, an athlete involved in an event requiring high levels of explosive power would likely benefit from teaching her/his body to efficiently recruit these fast twitch muscle fibers. And considering **fast twitch muscle fibers are only recruited during high force/power outputs**, athletes must incorporate appropriate explosive power based training to effectively train these high force/power developing fibers.

## Improved Rate Coding

Similar to how recruiting more fast twitch muscle fibers is important for improved explosive strength and power development, increasing the frequency of neural impulses sent to these motor units may be beneficial as well. Simply, rate coding is the frequency at which neural impulses are sent to motor units which have already been activated. Through improving this process and increasing the rate at which these impulses are sent to the motor neuron, an individual can effectively increase the amount of force created without activating more motor units.

## So Why Is All This Important?

In sports requiring explosive movements such as sprinting, quick changes of direction, jumping, throwing, etc, it is essential for an athlete to be capable of generating a large amount of force in a very short period of time. As such, specific and targeted training to improve muscle fiber recruitment and rate coding is likely necessary and may dramatically improve athletic performance. Interestingly, not only has explosive power based training been shown to improve athletic performance in sports requiring a high output but it has also improved physical performance in endurance athletes such as cross country skiers and distance runners

## When Should Explosive Strength and Power be Trained?

There are numerous factors to take into consideration regarding when explosive strength and power training should be emphasized. With brevity in mind, I won't go into each factor within this one article. As such, suffice to say the preparedness, needs, and goals of the athlete in question are the most important factors in not only determining *when*, but also *what* types of explosive power training should be used. To that end, it is necessary to evaluate each athlete on an individual basis in order to decide what will be the safest, most efficient, and most effective programming strategies.

Having said that, I want to outline when explosive strength and power exercises tend to be most effective within a single training bout.

## Explosive Strength and Power Development Within a Single Training Bout

Generally speaking, athletes looking to improve explosive strength/power would do best to incorporate these high intensity movements near the beginning of a training session. In doing so, the athlete in question can perform these (sometimes highly technical) movements when they are most "fresh" and capable of maintaining proper form. Additionally, as one of the primary goals of these movements is to produce as much force as possible, the athlete would likely perform better in a non-fatigued state; if he/she is fatigued they may not apply maximal force and subsequently won't achieve the desired training effect. Needless to say, this may not only result in less performance gains but could also potentially increase the risk of injury. Taking the above into consideration, I generally recommend incorporating most explosive strength/power based training during and/or immediately following the warm-up. I'll give specific examples in the subsequent section, but variations of med ball throws, explosive push-ups, jumps, squats, and plyometric/shock drills are all equally valid.

Finally, I'd like to add that explosive strength/power drills are not *only* meant to be utilized at the beginning of a training session. In fact, there are numerous reasons and justifications for using them when the athlete is in a pre-fatigued state (such as with MMA and other combat athletes). However, for the majority of individuals I think performing these high intensity drills at the

beginning of training bout is generally a good rule of thumb when the desired result is improved explosive strength/power (and not solely conditioning or other things of the sort).

### How is Explosive Strength and Power Developed?

Explosive strength and power is developed through teaching the body to produce maximal force in minimal time. To do so efficiently, one must train both maximal strength and speed strength in a manner which allows for optimal rest, recovery, and adaptation processes to occur.

### The Maximal Effort Method

The Maximal Effort Method is the superior method for improving maximal strength. Handling near maximal loads will teach an individual to apply as much force as possible throughout the entirety of a given movement. Learning to strain and fight through the lift is of the utmost importance for the improvement of maximal strength. On Maximal Effort training days athlete's should work up to a 1-3 repetition maximum in a given lift. Generally speaking, when working up to the 1-3 RM individuals should limit themselves to roughly 3-4 total lifts at loads equal to or greater than 90% 1RM within a single training bout.

### The Dynamic Effort Method

Zatsiorsky defines the Dynamic Effort Method as "*lifting (throwing) a non-maximal load with the highest attainable speed.*" Since developing speed-based qualities such as rate of force development (RFD) and reactive ability are very much a skill, using the Dynamic Effort Method is essential in the process of teaching an individual to become as fast and explosive as possible. On Dynamic Effort training days athletes should perform their explosive/power based movements with light to moderate loads (anywhere from 0-60% 1RM). *When performing these movements it is essential to actively try to perform the movement as quickly and explosively as possible!* Additionally, it's important to keep in mind that these movements, despite being relatively low intensity (in terms of weight being lifted) can be extremely taxing on the tendons, joints, ligaments, and central nervous system (CNS). Taking this into account, coupled with the fact that each repetition must be performed explosively and with great technique, I recommend performing a minimum of 12 and maximum of 40 individual explosive repetitions per training bout. As a general rule of thumb, the less weight being used (i.e. body weight movements) the more total repetitions you can safely perform.\* Likewise, the greater the weight being used in relation to your 1RM (i.e. 60% 1RM for DE Box Squats) the fewer total repetitions can be safely performed.

### Wrapping Up

Developing high levels of explosive strength and power are essential for a variety of athletes across numerous sports and disciplines.

I hope this article gave you better insight into the development of explosive strength and power, and subsequently feel more comfortable and knowledgeable in regard to programming them within your training routine. As a final note, I want to make one last comment: There is not one single movement or exercise that inherently builds explosive strength/power. Whether you're doing cleans, snatches, deadlifts, squats, med ball throws, etc...none of these movements build explosive power unless they are being performed *correctly*. To build explosive power you must perform the movement in an explosive manner!

As Louie says, “*There aren’t explosive movements, just explosive people.*” Keep that in mind as you perform these exercises because if you aren’t executing them with as much speed and force as you can muster you will see sub-optimal results.