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Bench press exercise the greatest functionally and biomechanically drill.

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Abstract:

This article deals with common questions that aspiring, talented athletes commonly ask. With the difference of opinion amongst coaches, trainers and online writers, I hope this article to be a guidepost that will help athletes reach a higher level of understanding for what is required of them to reach sport's highest level. At times, especially for certain athletes, there is merit in avoiding max strength work and progressive overload. Some coaches think that they can build tremendous athletes by targeting qualities other than max strength and/or simply focusing on bar speed with sub-maximal loads. But my take is that max strength lays the foundation for many other qualities and should be the cornerstone of a proper S&C program. Yet debates rage about whether athletes should train like powerlifters or Olympic weightlifters, and if the maximal effort strength training impairs the productivity of the athlete.

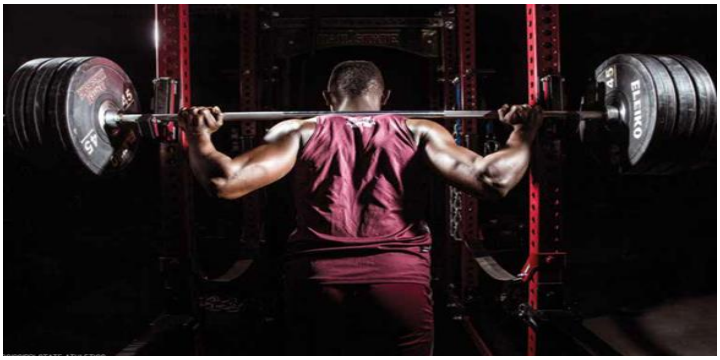
Keywords: Maximal efforts, Resistance training, Neural mechanisms.

Introduction:

Strength training or resistance training is by far the most famous training in the world. It involves using the own bodyweight or tools, like dumbbells or resistance bands, to build muscle mass, increase strength, and build endurance. Maximal strength is the ability to apply peak force over a short duration, while the explosive strength is the ability to apply force extremely quickly, and endurance strength is the ability to apply force over a period time. Maximal effort training is one of the basic pillars to improve the maximal strength of athletes, but it must be complemented with dynamic effort training and repetition. The three methods serve to improve the different manifestations of strength, and it is recommended to use them in greater or lesser volume depending on what our objective is. The contribution of neural mechanisms to increases in muscular strength is highly debated. This is particularly true for the involvement of the motor unit, which is the link between neural (activation) and mechanical (muscle fiber twitch forces) mechanisms [6] [10] [15] [23] [25] [26] [27].

A common definition of strength is: the maximum force that can be exerted by a muscle or group of muscles during a single contraction. In sport we use various types of strength: maximum strength, elastic strength (power), strength endurance, static strength, and dynamic strength. Maximum strength is the maximum force a muscle can exert in a single maximal voluntary contraction. It is used during weightlifting. Men have a larger muscle mass than women owing to higher levels of testosterone, so men can exert greater maximum strength than women. The fast glycolytic fibers are important for maximum strength because they can produce more force than slow twitch fibers. The majority of the Soviet training was centered around 75-85% of a one-rep max for about 50% of all lifts, and 20% are done at 90-100%, while The Bulgarians trained mostly at 90-100% max [3] [6].

Figure (1). Maximum load Training



At times, especially for certain athletes, there is merit in avoiding max strength work and progressive overload. The athlete can build tremendous strength by targeting qualities other than max strength and/or simply focusing on bar speed with sub maximal loads. But no denying that max strength lays the foundation for many other qualities and should be the cornerstone of a proper strength program. America is obsessed with strength, and for our athletes this obsession might be doing more harm than good. After all it's the "strength" and conditioning industry. But thanks to some forward-thinking coaches, the question of "how strong is strong enough?" floats about [3].

Most performance coaches come from a strength background. They love lifting heavy things and questing for strength, so it's only natural we want our athletes to do the same. Yet debates rage about whether athletes should train like powerlifters or Olympic weightlifters. Realistically, the answer is neither. Now, that's not to say that they shouldn't bench or squat, but both powerlifting and Olympic weightlifting are sports in themselves. How silly would it be for an Olympic weightlifter to play football to become explosive? "If Olympic weightlifting made you a better football player, playing football would make you a better Olympic weightlifter." Wouldn't it? [1] [3].

Figure (2). Olympic Snatch Lift

Maximal Effort Might Be Maximal Failure:

Health is the primary concern for an athlete, in both the short and long term. Often associate maximum muscular contraction with strength. Westside popularized the three ways to get the former with the dynamic effort method (DE); lifting a lighter weight fast—the repeated effort method (RE); lifting a lighter (ER) weight to failure; and the maximal effort method (ME)—lifting a maximal weight [3] [28].

However, achieving maximum muscular contraction is different than getting stronger. For most athletes, a maximum muscular contraction akin to a 1RM never happens during their sport because that kind of effort isn't repeatable. Football players can't gas themselves on one play. Extreme or unaccustomed eccentric exercise can cause exercise-induced muscle damage, characterized by structural changes involving sarcomere, cytoskeletal, and membrane damage, with increased permeability of sarcolemma for proteins. From a functional point of view, disrupted force transmission, altered calcium homeostasis, disruption of excitation-contraction coupling, as well as metabolic changes bring about loss of strength [22].

Importantly, the trauma also invokes an inflammatory response and clinically presents itself with swelling, decreased range of motion, increased passive tension, soreness, and a transient decrease in insulin sensitivity. While being damaging and influencing heavily the ability to perform repeated bouts of exercise, changes produced by exercise-induced muscle damage seem to play a crucial role in myofibrillar adaptation [22]. Prescribing repetitions relative to task failure is an emerging approach to resistance training. Under this approach, participants terminate the set based on their prediction of the remaining repetitions left to task failure [5]. Exercise-induced muscle damage (EIMD) occurs primarily from the performance of unaccustomed exercise [5], and its severity is modulated by the type, intensity, and duration of training. Although concentric and isometric actions contribute to EIMD, the greatest damage to muscle tissue is seen with eccentric exercise, where muscles are forcibly lengthened [20].

For athletes, the maximal effort method has been glorified for the wrong reasons. The majority of the Soviet training was centered around 75-85% of one-rep max for about 50% of all lifts, and 20% were done at 90-100% [8]. The Bulgarians trained mostly at 90-100% max. Circa-max weights are 90-97%. The Bulgarian system produced the highest results in weightlifting [12]. They handled the highest average weights most often. It's that simple. Yes, they had used a very select group of lifters, but that system was the best. It's quite convincing that the Bulgarian system was superior. So we should go maximal or go home, right? But here's what gets lost: we can still get strong training primarily in the 75-85% range [3] [5] [12] [22].

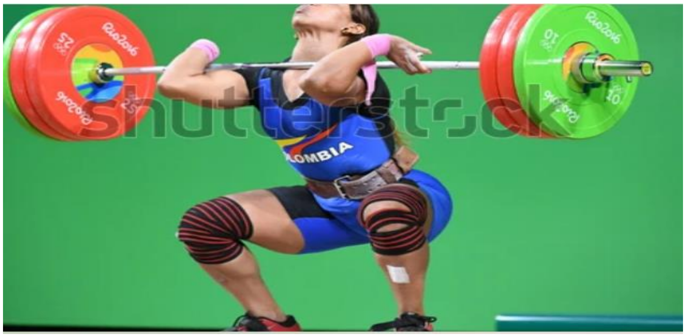
Additionally, maximal effort strength training "About 70% of strength work should be in the 70-85% range, which actually allows to develop greater strength than when you lift only in the 90-100% zone."And considering most Soviets were only a few pounds behind the Bulgarians in the Olympics, you can get pretty darn strong. Zatsiorsky, in Science and Practice of Strength Training, deems this as the sub-maximal effort method, which he describes as lifting a load lighter than a maximum for sub-maximal number of repetitions. Most athlete's need to be strong, we get it. Do they need to be Powerlifting strong? No. The more physical sports positions will need *more* strength comparatively, but athletes won’t be challenging world records [3] [8] [28].

For athletes, the Soviet’s method is better because you can get strong without being exposed to higher intensity stressors, which does three things. First, it lessens the chance for injury. Second, it allows more energy and nervous system reserves for sport-specific training. Third, it allows speed, power, and reactivity to be better trained. [8] [10] [27].

Figure (3). Maximal effort might lead to injury

Maximal effort strength training impairs the development of speed to an extent [7] [9]. The athlete will never be as strong and as fast as he can be at the same time, which is why athletes taper strength work speed closer to competition. The Soviets decoupled volume and intensity. One week might be high volume and high intensity and the next week would be low intensity and medium volume [3] [4]. Waving the volume and intensity allows for more natural recovery and greater strength gains [8]. From another point, the Bulgarian Method just mentioned is apt to get a rise out of people. Some people argue that it’s the best training system ever devised (how else could a country as small as Bulgaria become a world powerhouse in weightlifting, they argue). Others say it’s a surefire way to bring about overtraining, injury, and death [10] [12].

Figure (4). Olympic Clean and Jerk lift



Some coaches have qualms with athlete's bench pressing and squatting, citing shoulder and knee issues that can arise. But are the movements causing the problems? Or are the methods? It’s much easier to keep form during a sub-maximal set, after all.

And here’s an observational anecdote taken from baseball. (Keep in mind this is nothing but a thought.) At the highest level, pitchers are first in line for shoulder and elbow problems, even though catchers throw the ball just as much (if not more [3].

Pitchers, throughout their career, are concerned with lighting up the radar gun. So there is a chance that it’s *less* about the movement and *more* about the intensity. Now, I’m sure curveballs and sliders don’t help the situation. But, regardless, recovery is paramount. And it’s easier to recover from lower intensity training. Of course, the sub-maximal effort method isn’t likely to proliferate anytime soon because working until exhaustion is ever appealing. It is interesting to find the maximum weight you can lift in one repetition (or one rep max). For beginners, it is always better to start strength training slowly and get the movements right before you try to increase your reps [7] [8] [23]. Regular practice of strength training is associated to increases in maximal strength, changes in neuromuscular function, and in muscle morphology. Neural adaptations to strength training occur earlier than muscle adaptations and the initial gains in strength are not accompanied by an increase in muscle size [6] [19].

It is recommended to stick to a program for at least six weeks before attempt "a heavy lift." This is because, even if you are satisfied with your current form, you will improve it by learning how to make corrections and tweaks. You are in the process of learning everything when you start, so your "true" one rep max won't be the one-rep maximum. Velocity loss is a flawed method for monitoring and prescribing resistance training volume with a free-weight back squat exercise. The shape of the force-velocity (F-V) relationship has important implications for different aspects of muscle physiology, such as muscle efficiency and fatigue [2] [18] [29].

The recent investigations indicate that training with light-load jump squats results in increased movement velocity capabilities and that velocity-specific changes in muscle activity may play a key role in this adaptation [9] [13]. Besides clarified that strength-trained individuals, high-volume lower-velocity-loss thresholds were as effective as higher thresholds for improvements in (1RM) strength; but local hypertrophy was seemingly elicited faster with higher velocity-loss thresholds. The force–velocity (*P*–*V*) relation suggests that muscle can regulate its energy output depending on the load imposed on it [11] [24] [29] [30].

In this randomized trial, a resistance exercise intervention that involved performing the back squat, bench press, and deadlift exercises to near muscular failure was no more effective than terminating sets substantially short of muscular failure for increasing muscle mass and strength in resistance-trained participants [10]. The effects of resistance training near muscular failure (low repetition in reserve or low-RIR training) compared to stopping sets substantially short of muscular failure (high-RIR training) on muscle hypertrophy, strength, and motor unit characteristics. The outcomes assessed were vastus lateralis muscle cross-sectional area (a measure of muscle size, assessed via ultrasonography at 3 different sites), maximal voluntary isometric contraction of the knee extensors, vastus lateralis motor unit firing rates during an 80% maximal voluntary isometric contraction [16] [17], and barbell squat, bench press, and deadlift 1-repetition maximums , the training loads used are some of the most important factors that determine the training stimuli and the consequent training adaptations [7] [10] [16] [17] [20] [25

Conclusion:

According to the results of this meta-analysis studies, there were no differences between moderate and high training volume responses for the quadriceps ($p = 0.19$) and the biceps brachii ($p = 0.59$). However, it appears that a high training volume is better to induce muscle mass gains in the triceps brachia ($p = 0.01$). The variable proximity to failure does not have a consistent quantification method, despite being defined as the number of repetitions in reserve (RIR) upon completion of a resistance training. Resistance training variables such as volume, load, and frequency are well defined. However, the variable proximity to failure does not have a consistent quantification method, despite being defined as the number of repetitions in reserve (RIR) upon completion of a resistance training set. Further, there is between-study variability in the definition of failure itself. So, there is no one program that always works for any one person or for all conditions. The complexity of strength training programs is how to provide straightforward approaches to take under specific circumstances. Those approaches are applied to new physiological concepts and training practices, which provide readers with the most current information in the science and practice of strength training. [1] [14].

Finally, it is hoped this article may permit greater clarity in reporting, interpretation, and application of resisting training interventions for researchers and practitioners.

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