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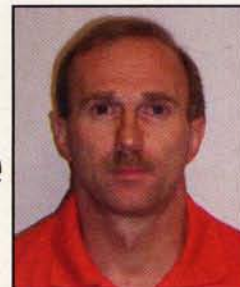
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Success Through Failure

By Matt Brzycki

In the first week of January 1996, I was one of six panelists who had been invited to participate in a roundtable discussion during the National Strength and Conditioning Association's 1996 Strength and

Conditioning Conference for Football that was held in New Orleans, Louisiana. Several topics were debated including the notion of whether or not athletes should train to the point of muscular fatigue or "failure." Another of the panelists was Dr.

Michael Stone who was, at the time, a researcher at Appalachian State University. During the roundtable discussion, Dr. Stone made this comment (or words to the effect): "Training your athletes to muscular failure is teaching them to fail." Does his assertion have any factual basis?



THE OVERLOAD PRINCIPLE

The most important factor that determines your results from strength training is your genetic (or inherited) characteristics (which include the insertion points of your tendons, your predominant muscle-fiber type and so on). Unfortunately, you cannot control the genetic cards that you were dealt. The most important factor that you can control is your level of intensity. (In the weight room, "intensity" - or a percentage of it - should not be confused with "a percentage of a maximum weight." Rather, "intensity" is another word for "effort.")

If you fail to achieve a desirable level of intensity - or muscular fatigue - your increases in strength (and size) will be less than optimal. Evidence for this notion is found in the Overload Principle. Coined by Dr. Arthur Steinhaus in 1933, this principle is one of the most widely referenced in exercise physiology.

According to Dr. Roger Anoka - a renowned biomechanist and author of the excellent college text *Neuromechanical Basis of Kinesiology* - the Overload Principle states, "To increase their size or functional ability, muscle fibers must be taxed toward their present capacity to respond." He adds: "This principle implies that there is a threshold point that must be exceeded before an adaptive response will occur."

Stated otherwise, a minimum level of muscular fatigue must be produced in order to provide a stimulus for adaptation. Your effort must be great enough to sur-

Washington - Clinton Teeple (red) from Newport parlayed a high leg lift into a remarkable comeback victory over Jeff Fischbach from Monetsano, during a 140 lb. match at the Washington State High School Championships. Teeple won the match 17-14. Photo by Bill France.

pass this threshold so that a sufficient amount of muscular fatigue is created to trigger an adaptation. Given proper nourishment and an adequate amount of recovery between workouts, your muscles will adapt to these demands by increasing in strength (and size). The extent to which this "compensatory adaptation" occurs then becomes a function of your inherited characteristics.

Clearly, failure to reach a certain level of fatigue will result in submaximal improvements in muscular strength (and size). This concept is similar to aerobic conditioning where your effort must be great enough in order to achieve an improvement in cardiovascular fitness. With aerobic conditioning, your level of effort is a function of your exercising heart rate. With strength training, the level of intensity is directly related to the amount of muscular fatigue that is produced. But the level of intensity - and the degree of muscular fatigue - is much more difficult to quantify during strength training than during aerobic conditioning.

THE INTENSITY CONTINUUM

No one knows precisely the minimum level of intensity that is necessary to surpass the "threshold" of fatigue and stimulate muscular growth. For the moment, however, suppose that a 90% level of intensity is the threshold for achieving maximal results. If so, how is it possible to pinpoint 90% intensity? Answer: You cannot. (Again, a percentage of intensity should not be confused with a percentage of maximum weight.)

There are exactly two levels of intensity that can be determined easily and accurately. One level is 0% intensity or complete inactivity. Obviously, no intensity creates no stimulus and, therefore, produces no effect. The only other identifiable level is at the opposite end of the intensity continuum. That level is 100% intensity. It is literally impossible to determine any other levels of intensity. Therefore, the only level of effort that is both productive and measurable is 100% intensity.

In the weight room, this level of intensity is characterized by an all out effort for a prescribed number of repetitions or amount of time. More precisely, it is when you have exhausted your muscles such that you cannot raise the weight for any additional repetitions. Do you have to go to the point of muscular fatigue to maximize your training? Maybe not. But how else can you know whether or not you surpassed the "threshold" that is needed to stimulate an adaptation by your muscles?

Training to muscular fatigue is also an important consideration if you want to engage as many fast-twitch (FT) muscle fibers as possible. Fibers are recruited based upon the demands of the exercise. During the initial repetitions of a set when the demands are low, slow-twitch (ST) muscle fibers are used. As you do more repetitions and the set becomes more demanding, intermediate fibers are called upon. Only when the demands are sufficient do you recruit FT fibers. Needless to say, a muscle fiber will not get stronger if it is not recruited.

TIME AND INTENSITY

It is important to understand that you cannot train with a high level of intensity for a long period of time. If you increase the number of sets or exercises in your workout, then you increase the duration of your workout. The end result is actually a decreased level of intensity. If you grasp the logic of this principle, the following point should now be obvious: In order to train with a high level of intensity, you must train for a relatively short period of time. There are individual differences but, for the most part, the duration of an intense workout in the weight room should be no

more than about one hour.

APPROPRIATE INTENSITY

Make no mistake about it: In order for you to achieve optimal improvements in muscular strength (and size) you must produce an adequate level of muscular fatigue. If your workouts produce too little muscular fatigue, then you may not have stimulated any compensatory adaptation. But if your workouts produce too much muscular fatigue, then you may not have permitted any compensatory adaptation; it may even cause a loss in strength (and size). The General Adaptation Syndrome (GAS) is a three-stage process that was proposed by Dr. Hans Selye to explain the physical effects of stress. The GAS may be applied to the stress that is placed upon the muscles during strength training. In the first stage, the physiological stress or demands that are placed upon the muscles cause damage (or microtrauma). This is followed by the second stage during which the body defends itself against the stress-induced damage by compensatory adaptation (that is, by increasing in muscular strength and size). But stress that is too severe induces a third stage in which the demands that are encountered by the muscles exceed their

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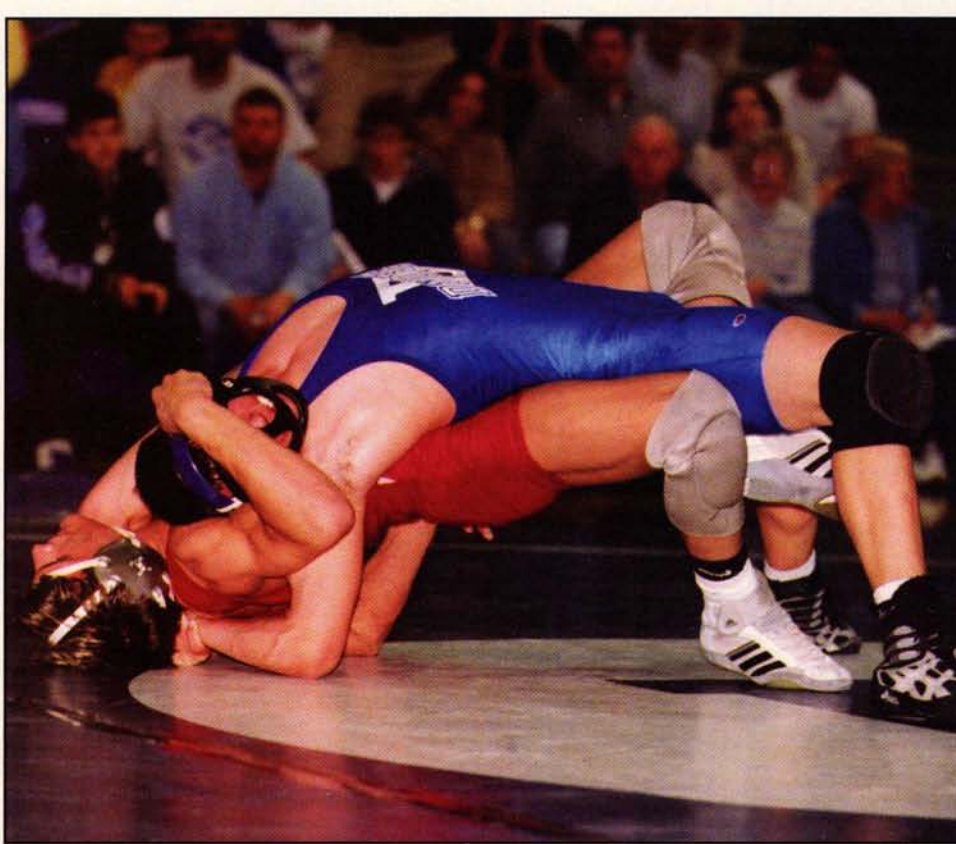


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Michigan - Jacob Costello (Dundee) momentarily has Kevin Zink (Bedford) in trouble. Zink would go on to win 13-3 at the Wittibslager Challenge Dual Tournament at 171 lbs. Photo by David Schankin.

ability to recover and adapt.

Therefore, your level of intensity should be high . . . but it should also be appropriate. To better appreciate the concept of using an appropriate level of intensity (and volume of training), consider this analogy: If you used a shovel on a regular basis for a short period of time, you would form calluses on your palms. Basically, the calluses are a compensatory (and protective) adaptation to frictional heat. If you shoveled for a long enough period of time, however, you would develop blisters instead. Here, the excessive demands have surpassed the adaptive ability of the epithelial tissue because the stress was too much (and/or too frequent). The same is true when the intensity is too much (such as from doing too many post-fatigue repetitions at the end of sets too often) and/or the workouts were too frequent. In this case, the excessive demands have surpassed the adaptive ability of the muscle tissue because the stress was too much (and/or too frequent). To summarize: You should train with a high level of intensity without overdoing it. And this is a difficult concept for many wrestlers to grasp since they are, by nature, so aggressive.

How do you know if the demands on your muscles are too little or too much? You should monitor your performance in the weight room in terms of the resistance that you use and the repetitions that you do. If you continue to make progress in your performance, then the demands are appropriate.

The main reason why most athletes - and, for that matter, most people - fail to realize their potential for muscular strength (and size) is simply because they do not train with a high enough level of intensity. Simply, a sub-maximal effort will yield sub-maximal results. Keep in mind, too, that you compete like you practice." If you perform your strength training with a low level of effort, will you be able to ratchet up your intensity when you need to do so in a wrestling match?

That being said, you must also use your judgment in deciding what level of intensity is suitable for you. "Intensity" is a relative term that depends upon several factors including your experience, age and current level of fitness. Exercise of low intensity for a veteran 17-year-old wrestler who is in good condition may be of high intensity for a novice 14-year-old wrestler who is in poor condition. So you should adjust your effort accordingly if you are inexperienced, young or not in the best of shape. Remember you can control your level of intensity when you train: Your efforts can be as easy or as difficult as you desire.

THE LAST REP

In any set, each repetition that you do creates a little more muscular fatigue than the previous repetition. So, the last rep is actually the most productive rep.

There is no question that a high level

of intensity is an absolute requirement for maximizing your physical potential. You cannot expect to produce optimal improvements in your muscular strength (and size) by picking up any old weight, lifting it 10 times without much effort, putting it down, scratching your butt and yawning. Your effort in the weight room must be aggressive. It must be purposeful. It must be demanding. It must be intense.

You are allowed to sweat in the weight room. You are allowed to breathe hard. This does not mean that you are out of shape. It simply means that you are training with a great deal of effort.

The fact that your response from strength training is directly related to your level of effort should not come as much of a surprise. It is like anything else in life: How hard you work at your academics, your wrestling technique, your conditioning and even your relationships largely determines your success at those endeavors.

Are athletes who train to muscular failure being taught to fail? Hardly. This is not to say that athletes who train to muscular failure are more successful than athletes who do not. However, it is ridiculous to state that "training your athletes to muscular failure is teaching them to fail." That would be like saying, "Training your athletes with dumbbells is teaching them to be dumbbells." Better yet, if training your athletes to muscular failure is teaching them to fail then perhaps stopping your athletes short of muscular fatigue is teaching them to quit. The bottom line: You can achieve success through failure. 🐾

Editor Note: Matt Brzycki has authored, co-authored or edited 11 books on strength and fitness including: [Wrestling Strength: The Competitive Edge](#), [Wrestling Strength: Prepare to Win](#) and [Wrestling Strength: Dare to Excel](#). The three wrestling books are available at all major bookstores or through Cardinal Publishers Group (800-296-0481).