

Training To Failure vs. Volume: Which Has The Greater Influence Over Muscle Gain?

One highly challenged fitness debate deals with the topic of muscle hypertrophy, and whether training to failure is the driving factor, or if another component entirely sits in the driver's seat?

Research on this topic has looked into greater detail on whether overall training volume vs. training to failure has the upper hand in the face of hypertrophy. This article is going to take a look at what the science says to help you to draw your own conclusions about what will work best for you, and your goals.

I've always been a proponent of training volume, and more specifically high volume training.

Volume can be measured in the amount of load over a set, or full workout. But it can also be measured by way of training frequency as well. Within my own practice at RoxStar Fitness, we typically will set up a client's program design factoring in what the client's goals are, and if they are a competitor, what body parts we're looking to bring up (or produce growth for).

With these "weaker parts", we will typically have a client training over various rep ranges (typically anywhere between the 5-15 range), various numbers of sets (3 to 5 on any particular exercise), and often training that body part 2 (and sometimes 3) times per week. The increase in volume is done in a periodized approach over time. After a few weeks, we implement a period of deloading to allow for greater recovery.

Our clients are told to come to what we consider to be "controlled failure", meaning they stop within 1-3 reps short of full concentric failure by the final rep listed for each set.

The results of this kind of set up are always quite remarkable. The client typically sees faster gains than they had before working with us. Moreover, these results are not only seen through compositional changes (namely an increase in lean mass), but changes in strength gain as well. So what exactly is the mechanism at work here? Let's take a closer look.

The Case for Volume Training

There is an excellent 2010 review written by Brad Schoenfeld called *The Mechanisms of Muscle Hypertrophy and Their Application to Resistance Training*. In this review, he took a look at the leading studies at that time that further explored what methods of training had the greatest impact on muscle hypertrophy. Schoenfeld looked at what the research has said in the case of volume and training to failure in relation to hypertrophy. His findings on volume were as follows:

A set can be defined as the number of repetitions performed consecutively without rest, whereas exercise volume can be defined as the product of total repetitions, sets, and load performed in a training session. Higher-volume, multiple-set protocols have consistently proven superior over single set protocols with respect to increased muscle hypertrophy (97,197).

A split body routine where multiple exercises are performed for a specific muscle group in a session may help to maximize the hypertrophic response (86). Compared to full body routines, a split routine allows total weekly training volume to be maintained with fewer sets performed per training session and greater recovery afforded between sessions (85).

This may enable the use of heavier daily training loads and thus generate greater muscular tension. Moreover, split routines can serve to increase muscular metabolic stress by prolonging the training stimulus within a given muscle group, potentially heightening acute anabolic hormonal secretions, cell swelling, and muscle ischemia.

To maximize hypertrophy, evidence exists that volume should be progressively increased over a given periodized cycle, culminating in a brief period of overreaching.

Overreaching can be defined as a planned, short-term increase in volume and/or intensity intended to improve performance. Improvements are thought to be obtained by initiating a "rebound effect" where an initial decrease in anabolic drive causes the body to supercompensate by significantly increasing accretion of body proteins (42,189)

So what he's basically saying, in layman's terms, is that training volume, and split routine type of set-ups (vs. a full body workout set up) have a major effect on muscle hypertrophy. Following this kind of protocol can allow the trainee to lift heavier loads in a given session, and provides greater tension in the muscle.

He's also saying that there is a greater response when it comes to the body's release of anabolic hormones, through supercompensation, under conditions of increased training volume. And although volume plays an important factor, this increase in volume should be done over time, and be a part of a periodized type of set up.

During this periodized set up, a short period of overreaching (or planned short term increase in volume and/or intensity) should be implemented. It is under this period of overreaching that supercompensation is seen. To further explore how supercompensation works, let's break down how the body responds during a training cycle.

During your workout, you're in a constant state of breaking down muscle fibers, depleting stored nutrients, increasing lactic acid, and leading to overall fatigue. Done over time, this can actually decrease the body's ability to recover, and in turn, decrease levels of fitness.

This is where overreaching is seen (a step right before overtraining). During your periods of recovery, the body will increase muscle protein synthesis in efforts to rebuild tissue with the idea to get you back to your baseline levels of fitness.

Allowed to recover long enough, you'll actually see an increase in overall fitness (including muscle hypertrophy) in levels well above baseline. This is supercompensation in action.

So how do you set this up in your own programming, you might ask?

It's pretty simple actually. When setting things up, you want to consider mesocycles and microcycles. These are two terms used in a periodized approach to training. A mesocycle basically represents a block of training that focuses on a specific goal.

So in this case, your mesocycle would be focusing on increasing strength and overall hypertrophy (or hypertrophy for a specific muscle group). This mesocycle may then be made of up a 4 to 6 week training block designed specifically for those goals.

The microcycles would be the smaller blocks within the mesocycle, so that can be anywhere between 1 and 2 weeks at a time. Within the mesocycle for hypertrophy (4-6 weeks total), each microcycle (or week) should focus on increasing volume. By increasing training volume, you are gently coaxing your body to have to work more, and adapt to the demands you're placing on it.

At some point during this cycle, your body will get to a point where you cannot push anymore, and you may even start to feel fatigue setting in. This is where overreaching starts to occur, and may be felt somewhere around the middle or towards the end of the mesocycle.

Once you're at this level, this is where your deload cycle will occur - and hence where your body will reach supercompensation. To accomplish this, you simply would decrease your training volume by about half. You can even decrease it slightly more at about 60-70% of what you're used to, all while slightly increasing intensity (so you keep lifting heavy during this period).

Metabolically, by increasing intensity (the amount of weight) in the face of decreasing volume, you're still allowing the body to have some form of progress - even while it's recovering. I like to refer to this as an active recovery so to speak. And because the volume and frequency of training is taken down dramatically, the ability for the body to recover - and build - is greatly increased.

The Case for Training to Failure

In his research review, Brad Schoenfeld does indeed touch upon the research he's found on the efficacy of failure training. Muscle failure is defined by the point at which a muscle is pushed during a set to where it can no longer concentrically contract a given load. Many proponents of training to failure cite the hypothesis that a greater amount of motor units are employed during the motion, and this has a direct effect on hypertrophy.

In his research, Schoenfeld specifically says:

For one, training to failure is hypothesized to activate a greater number of MUs (196). When a lifter becomes fatigued, a progressively greater number of MUs are recruited to continue activity, providing an additional stimulus for hypertrophy (145).

In this way, failure may provide increased stimulation to the highest threshold MUs when moderate repetition ranges are employed. Training to failure also may enhance exercise-induced metabolic stress, thereby potentiating a hypertrophic response.

So this is to say that the science does in fact support training to failure. However, this isn't without a cost. Consistently employing failure training techniques to every set can indeed lead to overtraining, and hamper the body's ability to recover – putting a damper on progress. And because of this, Schoenfeld has said that the research suggests:

Thus, although it seems prudent to include sets performed to failure in a hypertrophy-oriented program, its use should be periodized and/or limited to avoid an overtrained state.

So at the end of the day, it all comes down to practical and intelligent application of the science. The current research shows that both techniques (volume and failure training) can have a positive impact on the body, and produce a good amount of hypertrophy. At the same time, overusing either principle can lead to more harm in the long run than good.

Wrapping Things Up

A good approach for those looking to put on size would be to set up a periodized type of program that focuses on increasing volume and frequency over time. In addition to this, including some sets where you really push to failure, perhaps say the final set of each exercise (or few exercises), adds another layer to the complexity of the best techniques for muscle hypertrophy. Most importantly, learn to listen to your body, push your limits, but know when to take a deload. A smarter approach, is a successful approach. Done in the proper way, your progress in the gym will surely skyrocket.

Sources Schoenfeld BJ. The mechanisms of muscle hypertrophy and their application to resistance training. *J Strength Cond Res.* 2010 Oct;24(10):2857-72. doi: 10.1519/JSC.0b013e3181e840f3. Review. PubMed PMID: 20847704.