

# The Brookbush Institute Publishes a New Continuing Education Course: 'Acute Variables: Performing Sets to Failure'

*Sets-to-failure are recommended for hypertrophy, strength endurance, and max strength goals. However, reps-in-reserve is recommended for power and athletes.*

NEW YORK, NY, UNITED STATES,  
January 16, 2025 /EINPresswire.com/ --

- Excerpt from the course: [Acute Variables: Performing Sets to Failure](#)

- Related to the article: [Should You Perform Sets to Failure?](#)

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Acute Variables: Performing Sets to Failure - <https://brookbushinstitute.com/courses/acute-variables-performing-sets-to-failure>

## EVIDENCE-BASED SUMMARY STATEMENT ON SETS TO FAILURE

Based on a systematic review of all available peer-reviewed and published research, the Brookbush Institute recommends performing repetitions to failure per set (reps-to-failure/set) for optimal improvements in hypertrophy, strength endurance, and maximal strength. However, repetitions in reserve per set (reps-in-reserve/set) are recommended for enhancing power outcomes and for athletes engaging in high-frequency training with the intent of improving sports performance, hypertrophy, strength, or power. Performing 1–2 reps-in-reserve/set, along with 1 additional set per exercise, maintains exercise volume (an influential acute variable), sustains rep velocity and force across multiple sets, and reduces post-exercise performance decreases and long recovery periods associated with reps-to-failure/set.

It is also important to note that for most training goals, reps-to-failure/set is not the most influential variable. For example, performing 1 set to failure is less effective than performing 3 sets with reps-in-reserve for improving hypertrophy, strength, or power, as total training volume has a larger influence on outcomes. Similarly, training load is a more influential variable for improving strength, and contraction velocity is more influential for power development.

Reps-to-failure/set recommended for



It may be beneficial to use an athlete's perception of intensity to perform reps-in-reserve/set to maintain or improve bar velocity/power throughout a high-frequency training program."

*Dr. Brent Brookbush, CEO of Brookbush Institute*

- Hypertrophy
  - Strength Endurance
  - Max Strength
- 1-2 Reps-in-reserve/set and an additional set/exercise is recommended for:
- Power
  - Athletes performing high-frequency training (with hypertrophy, strength, or power goals).
- Acute variables that are likely more influential than sets to failure:
- Volume: 1 set-to-failure is less effective than 3 sets-not-to-failure.
- Load: Load is more influential than reps-to-failure/set for

strength goals.

- Velocity/force (repetition tempo): Concentric velocity and force production are likely to have a larger influence on strength and power (and potentially - hypertrophy) than reps-to-failure.

#### COURSE SUMMARY

Based on the research available and carefully developed conclusions, this course answers many of the questions regarding performing sets to failure for improving strength, hypertrophy (muscle growth), muscle endurance, and power. Additionally, training experience, age, and athletic performance are also addressed. Additional topics include the effects of set-to-failure on blood chemistry, hormones, markers of muscle growth, body composition (body fat), electromyography, and post-exercise force production.

This course reviews all of the available research comparing "sets to failure" and "sets not to failure" (e.g., reps-in-reserve). Although the definition of failure most often included mechanical failure and the inability to perform another repetition (reps), some studies included volitional failure in which a participant chose to stop. Sets not performed to failure included a range from 1-rep-in-reserve to an estimated half-of-the-reps that could be performed for a load. Unfortunately, most of the research on this topic is plagued by methodological issues, including studies that altered multiple variables, making determining the most influential variable challenging, and studies that compared protocols on each limb of an individual despite known cross-over effects. Despite these challenges, the conclusions in the statement above are well supported and are likely to be congruent with any additional research published.

Some findings from the included systematic research review resulted in counterintuitive, or at least unconventional, recommendations. For example, it may be beneficial to use an athlete's perception of intensity (similar to a BORG scale) to perform reps-in-reserve/set to maintain or improve bar velocity/power throughout a high-frequency training program, to optimize improvements for power, as well as strength and hypertrophy.

Movement professionals, including personal trainers, fitness instructors, strength coaches, physical therapists, athletic trainers, massage therapists, chiropractors, and occupational therapists, should consider acute variables essential knowledge for optimal exercise programming. Sets to failure is one of these critical acute variables. This course is part of our ongoing effort to optimize acute variable recommendations.

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