



Mid Atlantic Regional Chapter of the American College of Sports Medicine

Annual Scientific Meeting, November 5th - 6th, 2021
Conference Proceedings
International Journal of Exercise Science, Issue 9, Volume 10



Does Performing Resistance Exercise *to* Failure Homogenize the Stimulus?

Scott J. Dankel, Ryan J. Exner, Mana H. Patel, Dominic V. Whitener. Rowan University, Glassboro, NJ.

Resistance exercise commonly involves performing a set number of repetitions at a given relative load which accounts for individual differences in strength but not local muscle endurance. As such, it has been suggested that performing resistance exercise to volitional task failure may create a more homogeneous training stimulus by accounting for differences in local muscle endurance, but this hypothesis has not been experimentally tested. **PURPOSE:** To test if performing resistance exercise to volitional failure creates a more homogenous stimulus across individuals. **METHODS:** Individuals completed 2 testing sessions to compare repetitions, ratings of perceived exertion (RPE), muscle swelling assessed via ultrasound, and muscle fatigue assessed via decrements in isometric strength, between arbitrary repetition and failure protocols. The first testing session compared 3 sets of 8 repetitions (60%-SET) and 3 sets to failure (60%-FAIL) with a 60% load, while the second testing session compared 3 sets of 20 repetitions (30%-SET) with 3 sets to failure (30%-FAIL) with a 30% load. Differences in correlated variances between protocols were examined. **RESULTS:** Forty-six individuals (25 females and 21 males) completed the study. There was more variability in the number of repetitions completed during the failure protocols when compared to the arbitrary repetition protocols for both the 60% (average variance: 60%-SET=0.01, 60%-FAIL=16; $p < 0.001$) and 30% (average variance: 30%-SET=0.36, 30%-FAIL=139; $p < 0.001$) trials. Performing the 60% 1RM trial to failure appeared to reduce the variability in muscle swelling (average variance: 60%-SET=.034, 60%-FAIL=.023; $p = 0.017$) and RPE (average variance: 60%-SET=4.0, 60%-FAIL=2.5; $p = 0.002$), but did not alter the variability in muscle fatigue. No differences in variability were present between the SET-30% and FAIL-30% protocols for any of the dependent variables. **CONCLUSION:** Performing resistance exercise to failure may result in a more homogenous stimulus across individuals, particularly when using moderate to high exercise loads. From a practical standpoint this can ensure health professionals are prescribing an adequate training stimulus for all clients, while researchers may benefit by reducing the magnitude of error and increasing statistical power.