

The Influence of Ecologically -Valid High- and Low-Volume Resistance Training on Muscle Strength and Size in Trained Men

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Abstract : Much of the current literature pertaining to resistance training (RT) volume prescription lacks ecological validity, and very few studies investigate true high-volume ranges. Purpose: The present study sought to investigate the effects of ecologically-valid high- vs low-volume RT on muscular size and strength in trained men. Methods: This study systematically randomized trained, college-aged men into two groups: low-volume (LV; n = 4) and high-volume (HV; n = 5). The sample size was affected by COVID-19 limitations. Subjects followed an ecologically-valid 6-week RT program targeting both muscle size and strength. RT occurred 3x/week on non-consecutive days. Over the course of six weeks, LVR and HVR gradually progressed from 15 to 23 sets/week and 30 to 46 sets/week of lower-body RT, respectively. Muscle strength was assessed via 3RM tests in the squat, stiff-leg deadlift (SL DL), and leg press. Muscle hypertrophy was evaluated through a combination of DXA, BodPod, and ultrasound (US) measurements. Results: Two-way repeated-measures ANOVAs indicated that strength in all 3 compound lifts increased significantly among both groups ($p < 0.01$); between-group differences only occurred in the squat ($p = 0.02$) and SL DL ($p = 0.03$), both of which favored HVR. Significant pre-to-post-study increases in indicators of hypertrophy were discovered for lean body mass in the legs via DXA, overall fat-free mass via BodPod, and US measures of muscle thickness (MT) for the rectus femoris, vastus intermedius, vastus medialis, vastus lateralis, long-head of the biceps femoris, and total MT. Between-group differences were only found for MT of the vastus medialis - favoring HVR. Moreover, each additional weekly set of lower-body RT was associated with an average increase in MT of 0.39% in the thigh muscles. Conclusion: We conclude that ecologically-valid RT regimens significantly improve muscular strength and indicators of hypertrophy. When HVR is compared to LVR, HVR provides significantly greater gains in muscular strength but has no greater effect on hypertrophy over the course of 6 weeks in trained, college-aged men.

Keywords : ecological validity, hypertrophy, resistance training, strength

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