

The influence of back squat and loaded countermovement jump exercises with and without elastic band resistance on subsequent jump performance

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Introduction

Performing maximal or near maximal voluntary contractions using elastic bands (EB) in combination with free-weight resistance (FWR) can increase subsequent force production and performance. However, such improvements are often reported after limited or no warm-up (1) and the impact of different conditioning contractions at different loads requires further investigation. Therefore, the aim this study was to examine the acute effects of conditioning EB exercises (back squat and loaded countermovement jump) following a comprehensive warm-up on subsequent countermovement jump (CMJ) height performance.

Methods

Fifteen active men (age = 21.7 ± 1.1 y, height = 1.8 ± 0.1 m, mass = 77.6 ± 2.6 kg) volunteered for the study and completed four conditions (EB50%, EB85%, FWR50%, FWR85%) in a randomised order each separated by 48 h. During each trial (Table 1), participants performed a comprehensive warm-up of 5 min cycling, 10 continuous unloaded squats, and 5 continuous CMJs at ~70% of perceived maximum, followed by maximal jumps performed every 30 s until 3 jumps were within 3% of maximum jump height. Participants then performed 5 repetitions of either EB- or FWR-loaded CMJs at 50% 1-RM or 3 repetitions of either EB- or FWR-loaded back squat at 85% of 1-RM (35% of load generated from elastic resistance during EB). CMJs were then performed 30 s, 4 min, 8 min, and 12 min later.

Methods cont.

Table 1. Study design timeline

Task	Time (min)
5 min cycle	0-5.0
5 unloaded squats (1 s/ 1 s)	5.0-6.0
5 unloaded squats (2 s/ 2 s)	6.0-7.0
5 CMJs (70%)	7.5-8.5
Single CMJs every 30 s (100%)	9.0-11.0
CMJ Test 1	13.0-13.5
5 EB- or FWR loaded CMJ (50%) or	14.5-15.0
3 EB- or FWR loaded BS (85%) Tests	
CMJ Tests (2-5)	15.5, 19.5, 23.5, 27.5

CMJ, countermovement jump; FWR, free-weight resistance; EB, elastic bands

Results

No change in any variable was found after either FWR warm-up condition ($p > 0.05$). Significant increases ($p < 0.05$) in CMJ height (4.6-8.0%) and peak power (3.1-5.1%) were observed in EB50% at 30 s and 4 min; no changes were found at 8 min and 12 min. CMJ height (5.6-6.5%) and peak power (4.4-6.0%) were also significantly increased in EB85% at 30 s, 4 min and 8 min; no changes were found at 12 min (Figure 1).

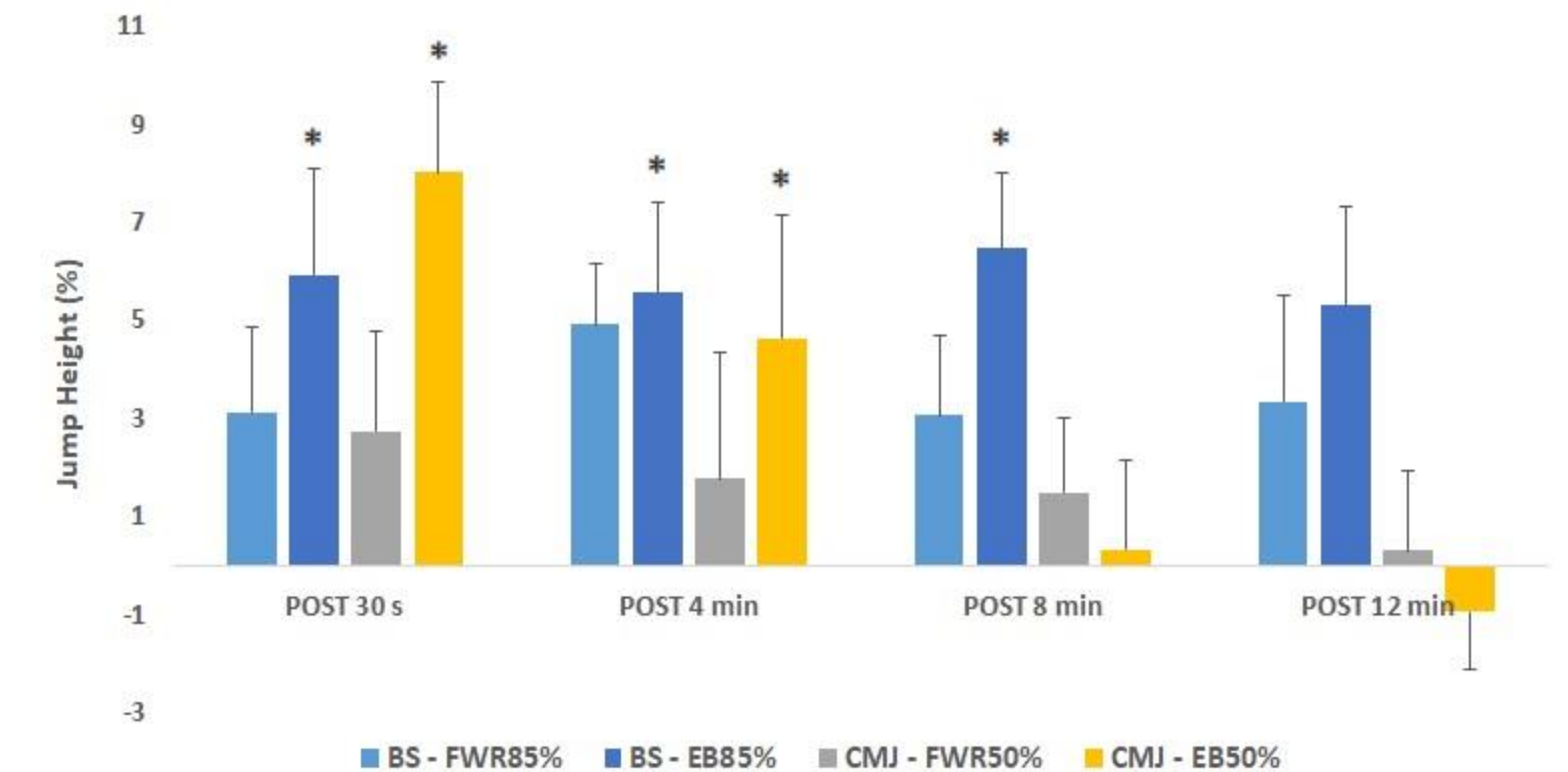


Figure 1. Change in CMJ height (%) following FWR or EB loaded CMJs at 50% or BS at 85% 1-RM. * Significant increases ($p < 0.05$) in CMJ height. BS, back squat; CMJ, Countermovement jump; FWR, free-weight resistance; EB, elastic bands

Discussion & Conclusion

The lack change in any variable after the free-weight conditioning contractions suggests the comprehensive task-specific warm-up mitigated further performance augmentation commonly reported after high-load conditioning activities (1). However, the improved CMJ performance following the use of EB at both intensities is indicative that specific alterations in force-time characteristics of warm-up exercises may further improve performance. However, the heavier EB loading (85%) resulted in a more prolonged improvement in performance, indicative of an intensity-dependent temporal effect.

References

1. Blazevich & Babault (2019). *Front Physiol.* 1;10:1359.