THE ACUTE EFFECTS OF ACCENTUATED ECCENTRIC LOADING ON SUBSEQUENT REBOUND JUMP PERFORMANCE USING PERCENTAGES OF BODY WEIGHT AND BACK SQUAT

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Introduction

Accentuated eccentric loading (AEL) is a training tactic in which the eccentric load is greater than the concentric load during a movement that requires both eccentric and concentric actions to be performed (2,3). An example would be an AEL countermovement jump (CMJ) where the individual performs a countermovement with dumbbells, drops the dumbbells at the lowest point of the countermovement, and then jumps as high as possible without the weight. Although researchers have shown that jump height and power output can be improved after training with AEL CMJs (1), there is limited research that has examined the effect of AEL CMJs on subsequent jump performances. The purpose of this study was to examine the effects of AEL CMJs on subsequent rebound jump (RJ) performance after using different body weight or back squat one repetition maximum (1RM) percentages. It was hypothesized that heavier loads will lead to greater braking forces produced over longer durations.

Methods

- 11 resistance-trained men (body mass = 78.9 ± 10.5 kg, height = 174.6 ± 7.7 cm, relative 1RM back squat strength = 1.96 ± 0.35 kg/kg) and 8 resistance-trained women (body mass = 69.7 ± 8.6 kg, height = 166.3 ± 6.7 cm, relative 1RM back squat strength = 1.39 ± 0.26 kg/kg) participated in 3 separate training sessions.
  - Session 1: subjects performed a 1RM back squat and AEL with rebound jump familiarization
  - Sessions 2 and 3: subjects performed 3 sets of AEL jumps with dumbbell weight equating to either 10%, 20%, and 30% BW or their 1RM back squat followed by 4 rebound jumps.
- All AEL CMJ and RJ were performed on a force platform and the force-time data were used to calculate mean braking force (MBF), braking duration (BDur), mean propulsive force (MPF), and propulsive duration (PDur).
- The average RJ performance were measured following the AEL CMJ performed with each load was used for statistical comparison
- A series of 2 (condition) x 3 (load) repeated measures ANOVA were used to compare each variable between conditions.
- Hedge's g effect sizes were used to examine the magnitude of the differences.

Results

Table 1. Rebound jump (RJ) braking and propulsion force-time characteristics following accentuated eccentric loaded countermovement jumps using different loading methods (mean ± standard deviation).

	RJ MBF (N/kg)	RJ BDur (s)	RJ MPF (N/kg)	RJ PDur (s)
Load		**% Body Weight**		
10%*	33.7 ± 4.0	0.11 ± 0.02	31.0 ± 4.3	0.13 ± 0.03
20%	33.5 ± 4.0	0.11 ± 0.02	30.9 ± 4.2	0.13 ± 0.03
30%	33.5 ± 4.3	0.11 ± 0.02	31.1 ± 4.3	0.13 ± 0.03
Load		**% 1RM Back Squat[ab]**		
10%*	34.8 ± 4.0	0.11 ± 0.02	32.0 ± 4.0	0.12 ± 0.02
20%	34.6 ± 4.4	0.11 ± 0.02	31.8 ± 4.4	0.13 ± 0.02
30%	34.0 ± 3.6	0.11 ± 0.02	31.2 ± 3.9	0.13 ± 0.02
Hedge's g	0.14-0.26	0.15-0.31	0.04-0.25	0.06-0.36

MBF = mean braking force, MPF = mean propulsive force, BDur = braking duration, PDur = propulsive duration, g = Hedge's g effect size across all loads; a = significantly greater MBF compared to % body weight condition (p=0.046); b = significantly greater MPF compared to % body weight condition (p=0.005); * = significantly greater MBF compared to 30% load (p=0.046)

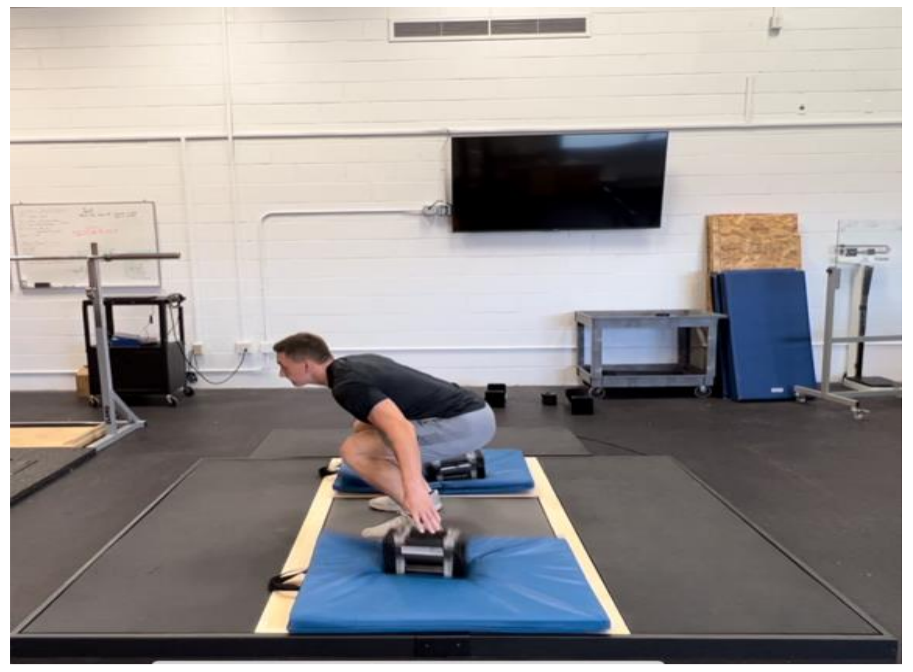

Figure 1. Bottom position of descent of AEL jump.

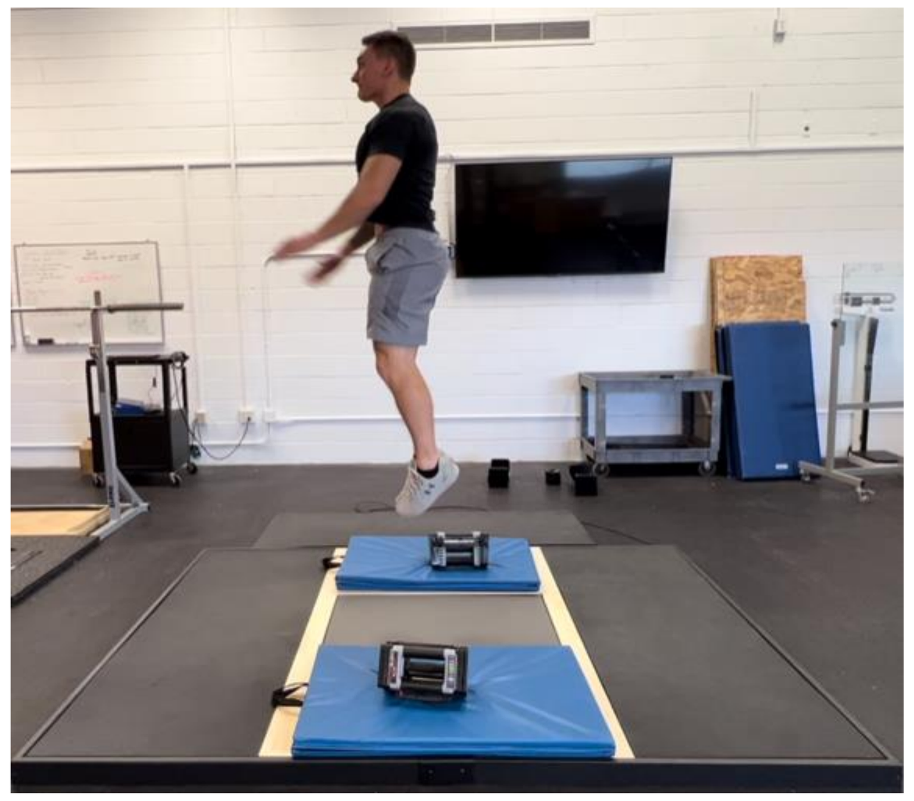

Figure 2. Propulsion and flight of initial AEL jump and rebound jumps.

Conclusions

- AEL CMJ performed with back squat percentages may increase mean braking force and mean propulsive force during subsequent RJ compared to body weight percentages.
- In contrast, braking duration and propulsive duration may not be impacted by the AEL CMJ loading condition.
- Heavier loads may increase braking forces but not braking duration during subsequent RJ.

Practical Applications

- While the loading condition may impact mean braking forces or mean propulsive forces to a small extent, RJ performance does not appear to be altered significantly.
- Practitioners may consider implementing AEL CMJ and RJ as individual exercises rather than pairing them together within a training program.

References

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