

COMPARING FORCE-TIME CHARACTERISTICS BETWEEN STRONGER AND WEAKER MEN DURING ACCENTUATED ECCENTRIC DUMBBELL COUNTERMOVEMENT JUMPS USING VARIOUS LOADING SCHEMES

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Introduction

Researchers have shown that eccentric training promotes maximal neuromuscular development compared to traditional resistance training (4). While there are several eccentric training methods, accentuated eccentric loading (AEL) uses heavier loads during the eccentric phase with the goal to enhance the subsequent concentric phase within a stretch-shortening cycle movement (5). Previous research has shown that AEL countermovement jumps (CMJ) can produce favorable performance benefits both acutely (3) and chronically (2). Although AEL jumps may provide an enhanced training response compared to other jump training methods (3), other researchers have indicated that individual responses to AEL may be based on relative strength characteristics (1). To date, no research has examined the differences in force production characteristics between stronger and weaker individuals. Therefore, the purpose of this study was to compare the force-time characteristics of AEL CMJ between stronger and weaker men using different percentages of body weight. It was hypothesized that stronger men would produce greater force outputs over shorter braking and propulsion phase durations compared to weaker men.

Methods

- 14 resistance-trained men participated in two testing sessions.
- The first session required subjects to complete a 1RM back squat and familiarization trials of the AEL CMJ with dumbbells (DB).
- Based on relative 1RM strength, subjects were divided into **Stronger** (n = 8, age = 25.3 ± 6.0 years, body mass = 78.05 ± 9.6 kg, height = 174.1 ± 6.3 cm, relative 1RM back squat = 2.3 ± 0.2 kg/kg) and **Weaker** (n = 6, age = 24.3 ± 2.2 years, body mass = 77.0 ± 13.4 kg, height = 174.2 ± 8.2 cm, relative 1RM back squat = 1.7 ± 0.2 kg/kg) groups.
- 3 single AEL CMJ repetitions with DB equating to 10%, 20%, and 30% of body weight were performed during the second session.
- Jumps were performed on a force platform and force-time data were used to calculate braking net mean force (BMF) and duration (BD) and propulsion net mean force (PMF) and duration (PD).
- A series of 2 (strength) x 3 (load) repeated measures ANOVA were used to compare BMF, BD, PMF, and PD between the stronger and weaker groups. Hedge's g effect sizes were calculated to examine the magnitude of the differences for each variable.

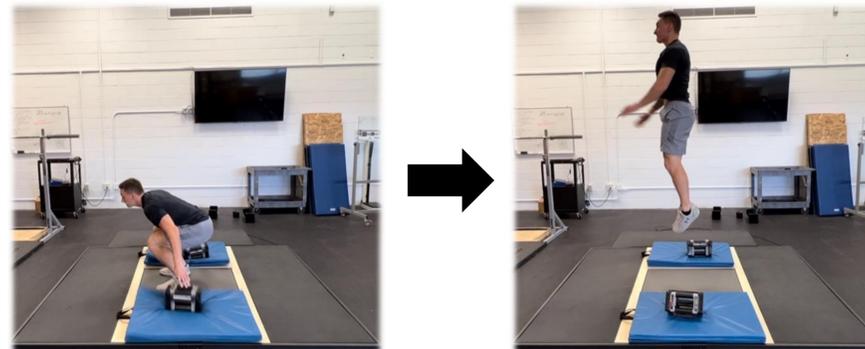
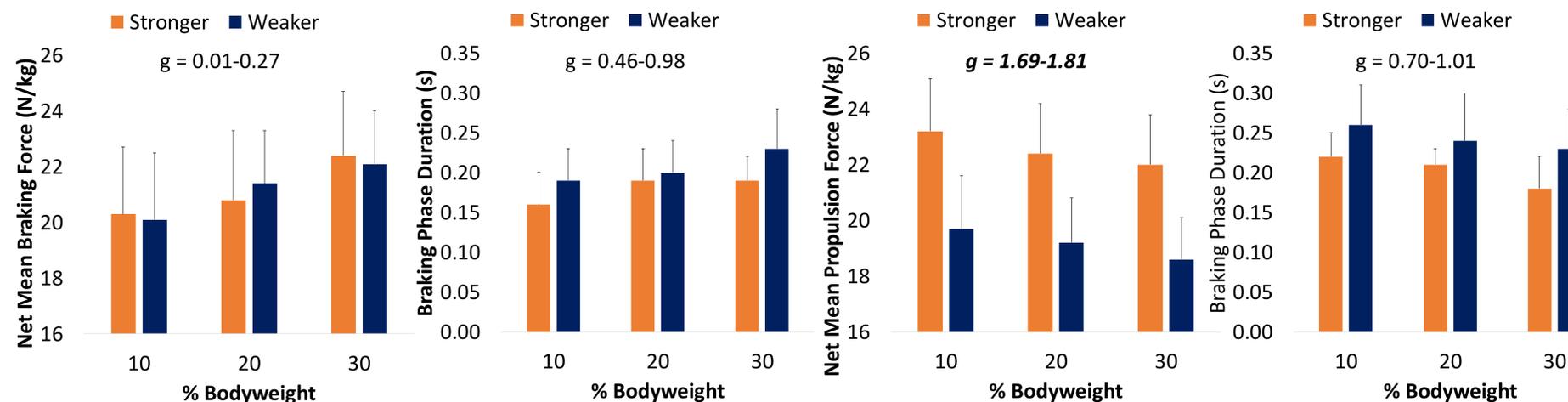


Figure 1. AEL CMJ sequence.

Conclusions

- There were no significant or practically meaningful differences in braking phase characteristics between stronger and weaker men during AEL CMJ.
- There were significant and large differences favoring the stronger group for PMF.
- The stronger group performed the propulsion phase over a shorter duration with moderate-large effects across loads.

Results



Practical Applications

- Stronger men may display greater rapid force production characteristics during the propulsion phase of AEL CMJ. These findings may suggest that stronger individuals may be able to effectively carry over braking forces to the propulsion phase to a greater extent than weaker individuals.
- Strength and conditioning practitioners should note that individuals may respond to loads relative to their body weight in a unique way based on their relative strength during AEL CMJ.



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