

Comparison of Landing Variables between Countermovement Jump Landings and Drop Vertical Jump Landings from Equal Heights

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ABSTRACT

The countermovement jump (CMJ) and drop vertical jump (DVJ) are often used as a measurement of physical ability or performance potential, while analysis of landing can provide crucial information regarding injury risk. In theory, similar landing strategies should be employed when CMJ jump height and DVJ drop height are controlled, yet we know of no studies have investigated this possibility.

PURPOSE: to examine and compare landing characteristics between CMJ and DVJ when flight height is controlled.

METHODS: Forty (20 males; 20 females; 22.5 ± 4.3 years, 1.7 ± 0.1 m, 73.2 ± 13.3 kg) recreationally active individuals performed three CMJ and three DVJ trials, each from the same height which was controlled using a Vertec. Vertical ground reaction force (vGRF) data was obtained from a portable force platform. Landing momentum, landing time, and peak vGRF were obtained from the processed vGRF data using a custom analysis program. Variables were compared between jumps (CMJ, DVJ) using paired samples *t*-tests ($\alpha = 0.05$). Cohen's *d* is used to supplement statistical outcomes by demonstrating the magnitude of mean differences.

RESULTS: Landing momentum was 4.8% greater during DVJ than during CMJ and the difference was small (DVJ = -193.6 ± 52.2 , CMJ = -184.4 ± 52.5 ; $P=0.049$, $d = 0.4$), indicating slightly greater landing heights during DVJ. Landing time during DVJ was 52% shorter than the CMJ landing time and the difference was very large (DVJ = 0.4 ± 0.2 , CMJ = 0.7 ± 0.2 ; $P<0.001$, $d = 1.7$), while DVJ peak impact force was 14.7% less than CMJ peak impact force and the difference was moderate (DVJ = 3.5 ± 1.0 ; CMJ = 4.1 ± 0.7 ; $P=0.002$, $d = 0.6$). **CONCLUSION:** While the significant difference in landing momentum was not random, the magnitude of mean difference was small, indicating relatively similar landing momentum between jumps. Thus, the present study shows that, even when controlling jump height between the CMJ and DVJ, the tasks do not have similar landing demands, defined by momentum, time, nor peak impact force. Due to the differences observed, the CMJ and DVJ should not be used interchangeably or as a comparison between one another when examining these specific landing variables. Finally, the DVJ might expose performers to lesser overuse injury risks related to impact forces.