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Towards Maximizing Jump Performance with Apparel

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Abstract

Previous studies have shown that specially designed apparel can have a beneficial impact on vertical jump performance; however the reason for this improvement is unknown. In order to maximize jump performance using apparel, information on certain aspects of the jumping mechanism must be gathered.

Purpose: The aim of this study was to examine the influence of hip joint flexion angle on jump height and to determine if athletes naturally attain the optimal hip joint angle.

Methods: Ten subjects performed counter-movement jumps in three conditions. The first set of trials was performed at the subjects' self-selected hip flexion angle. Motion capture was used to determine the hip flexion angle after each jump and peak height was measured with the Vertec jump tester. The next two conditions were performed at (approx.) 10 degrees of hip flexion less than and greater than the control condition. Inverse dynamics was used to analyze the joint moments and analog force plate data was used to analyze ground reaction force and impulse.

Results: Differences in jump height were observed for each condition. The highest average jump height was achieved during the control condition, with the "above" condition (shallower squat during countermovement) a close second and the "below" condition had the lowest average jump height. The mean ground reaction force for the "above" condition followed the same pattern as the control condition results but showed a higher magnitude, while the "below" ground reaction force was substantially lower than the control results. The peak hip extension moment was consistently the greatest in magnitude for the "below" condition and smallest for the "above" condition.