

The Effect of Kipping on the Performance of a Pull-up

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ABSTRACT

The kipping pull-up, developed by CrossFit, is an exercise derived from the gymnastic glide kip. While the strict pull-up relies entirely on the strength of the upper body to gain height, the kipping pull-up incorporates a pronounced hip flexion maneuver to facilitate the production of force necessary to raise the body. The purpose was to analyze the effect of adding a kip to a pull-up and to assess whether the use of a kip offers an advantage for participants less able to complete a strict pull-up. Seven novice participants (four men and three women, ages 24-54 with <6 months CrossFit experience) and nine advanced participants (five men and four women, ages 13-47, with >6 months CrossFit experience) completed three trials of each style of pull-up. Trials were filmed from the right side using a digital camcorder operating at 60 Hz. Body landmarks were digitized for use in an 11-point body model to compute the location of the whole body center of mass. From these data velocity and acceleration were computed. Peak vertical velocity (PVV) and Peak vertical acceleration (PVA) of the center of mass was identified and averaged across trials. A 2x2 (group x technique) mixed-model ANOVA was used for statistical analysis. Use of the kipping maneuver into the pull-up produced approximately 50% more PVV and PVA for both skill levels ($F_{(1,14)} = 134.4, p > 0.001$) ($\eta_p^2 = 0.906$) and ($F_{(1,14)} = 60.9, p > 0.001$) ($\eta_p^2 = .0813$), respectively. There was no interaction between advanced and novice groups. Considering Newton's second law, the increase in PVA indicated that vertical force production increased in the kipping pull-up. Several novice participants could not execute a full strict pull-up but could execute a complete kipping pull-up because of the increase in vertical force. Because there were no differences between skill levels, the kipping pull-up could potentially be used as a method for developing upper body pulling strength in individuals unable to perform a strict pull-up.

