

**Changes in Biomechanical Characteristics of Various Snatch Pull Exercises with Various Loads During Five Consecutive Repetitions of One Set,** Keijo Hakkinen and Heikki Kauhanen, Finland. International Olympic Lifter, Volume IX, Number 12, 1988.

The experimenters examined 5-rep sets of the snatch pull exercise, executed from three positions: the platform, a hang below knees (5cm/2in off the platform) position, and from pulling blocks with the bar located just above the patella. Three training loads were measured: 90%, 100%, and 110% of 1RM snatch. They measured activity of the trapezius (TRA), erector spinae (ES), gastrocnemius (G), and Vastus Lateralis (VL) muscles. In all cases, the pulls included maximum extended standing height on toes with flexed elbows. The lifts were performed on a force platform. Pulling from the low hang with 90% produced a significant decrease in ground reaction force, an increase in the time to maximum height, and a decrease in maximum height. Loads of 100% produced significant decreases in knee angular velocities and ground reaction forces. Maximal lifting height decreased by 7.2%. When 110% loads were introduced, again significant changes occurred in the duration of pull, decreases in knee angular velocity, and decreases in ground reaction forces. Maximum lifting height again decreased. Pulling from the platform resulted in small changes in duration, knee angular velocity, maximum force, and lifting height as the loads increased (no surprises). For anyone who has performed snatch pulls with heavy loads, none of this is very alarming. Heavy loaded pulls often do not lead to improved performance. What did prove to be unusual was that when pulling from the blocks lift duration, knee angular velocities, ground reaction forces, and maximum lifting heights remained statistically unaltered throughout the five repetitions. Trapezius activity increased significantly across most conditions, except pulls from the hang. Lifting from the platform and the hang with 100 and 110% loads resulted in significant changes in erector spinae activity, but this was not observed when pulling from the blocks. Bottom line, lifters need to exercise caution in terms of repetition load when pulling from the floor and from a low hang position. It has been known for some time that slow, heavy pulls, while perhaps offering a strength benefit, may detract from power development. I continue to say pulling from the blocks is a great alternative to pulls from the platform or the hang position. This study seems to support that position. However, I very strongly consider pulling from blocks with the bar just above knee level (as in this study and as in most hang repetitions) to be absolutely disastrous to proper lifting technique for most lifters.