

Barbell Velocity During the Snatch Differs across Weight Categories of Female Weightlifters

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SUMMARY

The barbell velocity profile for female athletes competing in the 49kg weight category differs from female athletes competing in the middle and heavy-weight categories.

INTRODUCTION

The snatch is one of two lifts performed in the sport of weightlifting and consists of athletes lifting a barbell from the ground to an overhead position in one continuous motion. The snatch includes five phases; first pull, transition, second pull, turnover, and catch. The velocity of the barbell during the second pull is an important biomechanical and technical factor that plays a critical role in successfully completing the snatch [1]. There is limited research, however, on the barbell velocity profiles across all phases or between different weightlifters from different weight classes. The purpose of the current study is to compare the velocity profiles of the snatch across the females from different weight classes.

METHODS

A digital camera was used to record sagittal plane videos (120 Hz) of the snatch lifts from 77 female weightlifters in the 49kg (n = 16), 59kg (n = 9), 71kg (n = 15), 81kg (n = 20), and 87+kg (n = 17) weight categories at a national competition. The pixel size in each video was converted to meters based on calibration to the diameter (0.45 m) of the largest visible outside plate loaded on the barbell. The trajectory of the barbell throughout the lift was tracked with an automated tracking algorithm. The trajectories were trimmed from barbell lift off to end of the catch phase. The trimmed trajectory time series data were time normalized and used as input to statistical parametric mapping. An SPM ANOVA was used to compare velocity time series data between all weight classes. SPM t-tests were used to compare differences between specific weight categories.

RESULTS AND DISCUSSION

The SPM ANOVA indicated global differences in barbell velocities across different weight categories at three instances of the snatch (Figure 1). The SPM post hoc tests showed consistent differences between the 49kg weight class and three out of four of the other weight classes (all except for 71 kg).

The 49kg weight category is the lightest category that competes in weightlifting at the Olympics. The results show that barbell velocities during the first pull of the snatch were significantly smaller in the 49 kg weight class.

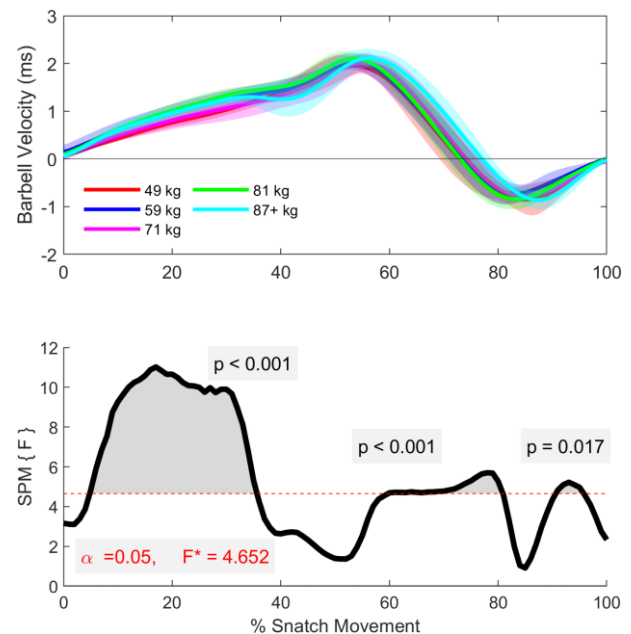


Figure 1: Barbell velocity profiles for the snatch for the 49kg, 59kg, 71kg, 81kg, and 87+kg female weight categories.

Given that female weightlifters in the 49kg weight category are likely shorter than some of their counterparts in heavier weight classes they may not need to pull the bar as high to make a successful lift. Previous research showed that when weightlifters are grouped by weight class, anthropometric variables correlated with barbell trajectory [2]. It is interesting, however, that peak velocities did not differ across weight categories. One could therefore speculate that the difference in barbell velocities arise from differences in neuromuscular factors (e.g., maximal strength or speed-strength) rather than technical factors

CONCLUSIONS

Female weightlifters who compete in the 49 kg weight class exhibit different barbell velocity profiles than female weightlifters in some of the other weight classes. These results suggest that females in the 49 kg weight class may require different programming and accessory work to find success in the snatch lift compared to those who compete in heavier weight classes.

REFERENCES

- [1] Bartonietz (1996). *Strength Cond*, **18(3)**: 24-31.
- [2] Musser et. al (2014). *J Strength Cond*, **28(6)**: 1636-1648