Relationships between strength, jump and kinematic variables during resisted sled sprinting

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BACKGROUND

Resisted sprint training revealed positive and negative effects on sprint performance across multiple loading conditions [1, 2].

This variation to performance may be due to that some of the heavier players may not be as strong as some of the lighter players and vice versa [3].

Further, it is unclear whether heavy loading negatively impacts sprint kinematics for stronger athletes in the same manner as for weaker.

Aims: Examining the relationships between:

- change in kinematics and back squat and hip thrust strength measures,
- strength and sprint performance,
- strength and vertical jump performance,
- sprint performance and vertical jump performance.

METHODS

Sample	Athletes (n = 33)
Measurement	High-Speed, Dartfish Cameras
Analysis	Analyses for relationships performed using Pearson's correlation coefficient

MEASURES

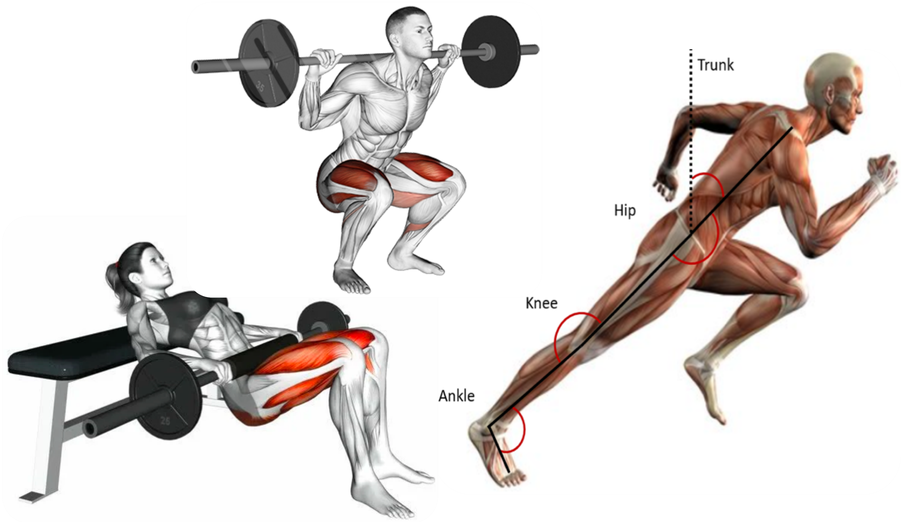

Figure 1: Joint angle definition in the sagittal plane, used to simplify Dartfish analysis (partly amended from FisioSport Pavona [4]. Back squat and hip thrust strength measures [5].

METHODS

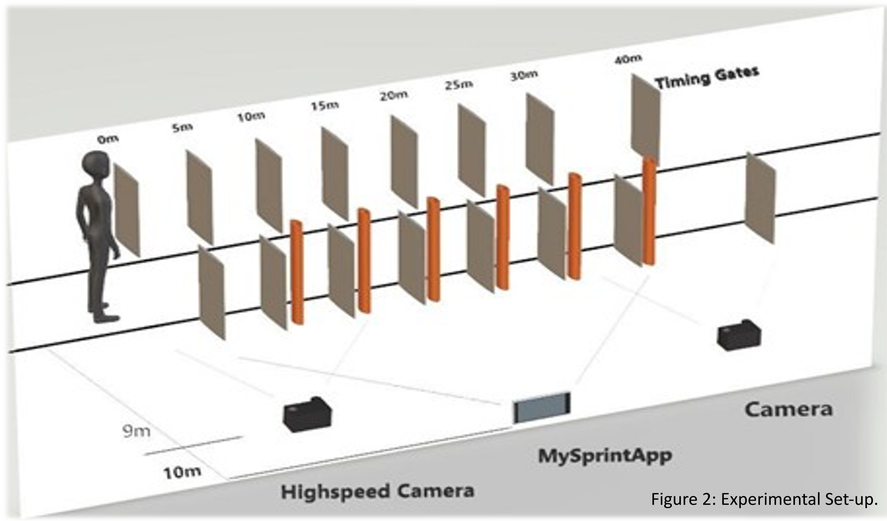

Figure 2: Experimental Set-up.

RESULTS

Significant negative correlations (hip r = .40; r = .44, knee r = .42; r = .56) were found between 1RM measures and percentage change in joint angle (hip, knee and trunk) for each loading condition.

All assessed exercises presented moderate to strong inverse correlations (r= .44 - .61 for back squat; r= .57 - .72 for hip thrust) between 1RMand sprint times.

Significant negative correlations (r = .45 - .73) were found between jump height and sprint time. Controversy, no significant correlations were found between peak power and sprint time.

1RM measures and jump performance measures showed no correlations, except for back squat and peak power of the CMJ (r= .77).

CONCLUSION

Stronger athletes might be able to handle a higher overload without displaying changes in sprint kinematics. This may have important implications in terms of training adaptations.

Maximum strength measures may explain some of the responses of athletes during resisted sled sprints, and coaches should ensure that athletes develop sufficient squat and hip thrust strength.

It requires careful consideration when choosing the correct external load. We encourage practitioners to carefully consider these results when designing training programs using resisted sled sprints.

Tables *References*

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