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OUTPUT

SEX DIFFERENCES IN THE FORCE-VELOCITY CURVE & 1RM PREDICTION DURING THE BACK SQUAT:



New angular velocity research:

Swipe to discover some new research on A-VBT and RM prediction at #NSCACon23 from Kyle Beyer and colleagues!

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Introduction:

Velocity-based training (VBT) involves measuring barbell velocity during resistance exercises, allowing for load adjustment, fatigue monitoring, progress tracking, and 1-repetition maximum (1RM) prediction.

It is important to consider **sex differences** in the force-velocity curve when applying VBT, and while most VBT methods focus on linear velocity, the measurement of angular velocity might be more appropriate.



The **force-velocity curve** depicts the relationship between the force a muscle can produce and the speed of muscle contractions. It demonstrates that **as movement velocity increases, the force capability of the muscle decreases, and vice versa.**

The study **aimed to...**



Examine sex differences in the force-velocity curve during the back squat.



Compare differences in angular velocity between men and women during back squat exercises of varying intensities.



Evaluate the accuracy of 1RM prediction using force-velocity profiling in both men and women.

Methods:

12 recreationally trained men and women participated in the study, performing 1RM testing and submaximal testing (30-90% 1RM) for the back squat.

Linear velocity was measured using a linear position transducer.

Angular velocity was measured using the Output system placed on the thigh.

1RM was predicted by constructing an individual load-velocity curve and calculating the load corresponding to the measured 1RM velocity.



Results:

- ! Men had significantly higher relative 1RM compared to women ($p=0.017$, $d=1.66$).
- ! There was a significant difference in angular velocity at 1RM between men and women ($p=0.01$, $d=2.19$).
- ! During submaximal sets, men exhibited significantly faster linear velocity at 30% ($p=0.01$, $d=1.84$), 40% ($p=0.01$, $d=1.77$), and 50% 1RM ($p=0.04$, $d=1.13$).
- ! Linear velocity resulted in a significant over-prediction of 1RM for men ($p=0.05$) and a trend for women ($p=0.08$).

Practical applications:



Gender differences in linear velocity are **apparent** at loads up to 50% of 1RM, potentially influencing the implementation of VBT.



Variances in angular velocity at 1RM may indicate **differences in technique strategies** employed to complete maximal lifts.



Predicting 1RM using **angular velocity** may **yield more accurate results** compared to using linear velocity.

To learn more about angular velocity-based training...

Check out our blog on the topic!

