

COMPARISON OF BARBELL VELOCITY BETWEEN TWO INERTIAL MEASUREMENT UNITS DURING BACK SQUAT AND BENCH PRESS

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INTRODUCTION

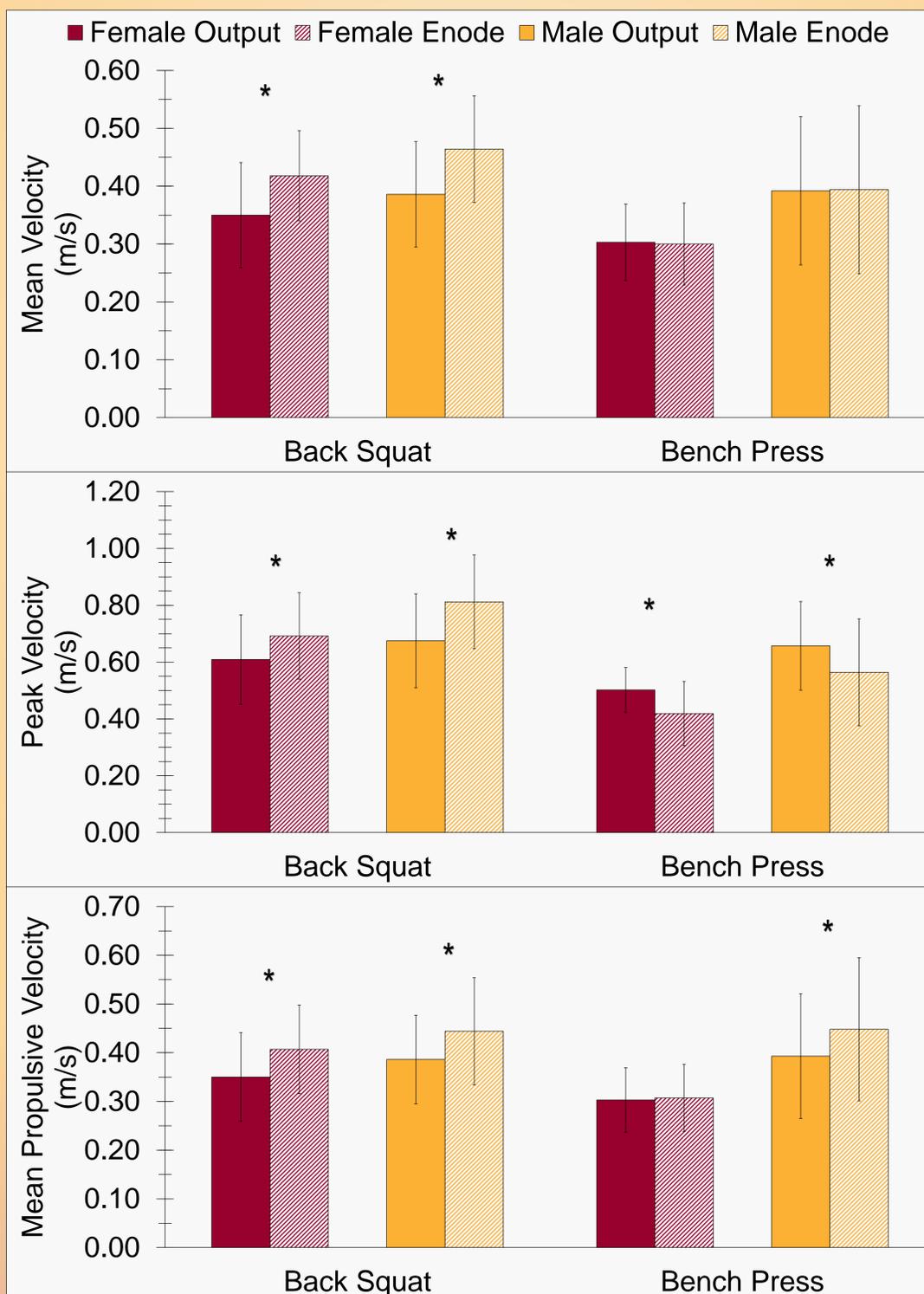
- Many inertial measurement units exist on the market to implement velocity-based training methodologies.
- While some inertial measurement units have established validity and reliability, the agreement between devices has often not been investigated, which may lead to inaccuracies when comparing data to previously published normative values.

PURPOSE

- To compare the mean velocity (MV), peak velocity (PV), and mean propulsive velocity (MPV) from two different inertial measurement units affixed to a barbell during back squat and bench press in men and women.

METHODS

- 13 resistance-trained men and women had their 1-repetition maximum (1RM) predicted via barbell velocity, then completed 4 sets to failure of back squat and bench press at 75%1RM.
- Mean velocity (MV), peak velocity (PV), and mean propulsive velocity (MPV) were assessed during the sets to failure with the Output Sports (OS) and Enode Pro (EP) inertial measurement units on the barbell.
- A total of 770 repetitions were recorded for analysis via 3-way mixed factorial ANOVA to assess differences between devices, exercise, and gender.



RESULTS

- Significant device×exercise interaction for MV ($p < 0.001$) with EP recording significantly greater than OS during squat, but no difference during bench press.
- Significant device×exercise×gender interaction for PV ($p = 0.001$). During squat, EP recorded significantly greater PV than OS in men ($p < 0.001$) and women ($p < 0.001$). However, during bench press EP recorded significantly lower PV than OS in men ($p < 0.001$) and women ($p < 0.001$).
- Significant device×exercise×gender interaction for MPV ($p < 0.001$). EP recorded significantly greater PV than OS during back squat for men ($p < 0.001$), back squat for women ($p < 0.001$), and bench press for men ($p < 0.001$). However, there were no differences between devices during bench press for women ($p = 1.000$).

PRACTICAL APPLICATIONS

- OS and EP inertial measurement units record significantly different barbell MV, PV, and MPV during back squat and bench press at 75% 1RM with greater disagreement during back squat.
- Velocity-based training devices should not be used interchangeably regardless of their published validity and reliability.

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