



Validity of Repetition Prediction Equations to Estimate Upper-Body Strength in Trained and Untrained Men

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Introduction

Numerous equations are available to estimate one-repetition maximum (1RM) bench press performance from submaximal repetitions to fatigue (RTF). The consensus is that RTF ≤10 produces more accurate predictions of 1RM. However, there are limited cross-validation evaluations of many of these equations on trained and untrained participants.

PURPOSE: The purpose of this study was to cross-validate selected prediction equations to estimate 1RM bench press in trained and untrained men

Methods

Participants

- College men
 - 100 Trained (TR) (>12 weeks of resistance training) (20.1 ± 1.6 yrs, 178.9 ± 6.1 cm, and 73.7 ± 12.3 kg).
 - TR performed progressive resistance training 3X/week for 12 weeks.
 - 108 Untrained (UT) (19.8 ± 1.4 yrs, 178.5 ± 7.2 cm, and 69.7 ± 9.0 kg)

Test Conducted

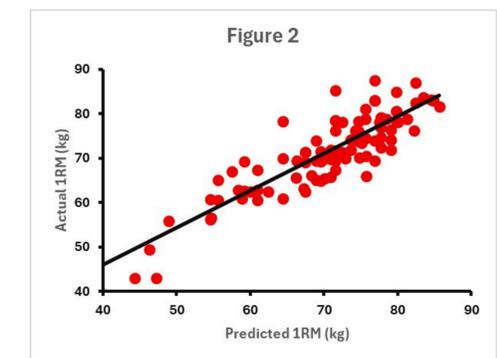
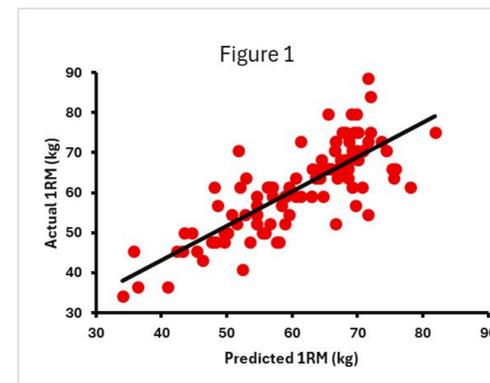
- 1RM Bench Press
- Repetitions to Failure (RTF) using a self-selected weight that allowed between 3 and 10 repetitions.
- 9 prediction equations were evaluated [Berger, Brzycki, Desgorces, Lander, Macht, O'Conner, Wathen, Welday].

Statistics

- Paired t-tests were used to evaluate the difference between predicted and actual 1RM values .
- Pearson correlations were used to assess the strength of the relationship between predicted and actual 1RM values.

Results

- TR had a significantly greater 1RM (72.0 ± 9.7 kg) and RepWt (59.3 ± 9.0 kg) than UT (60.9 ± 10.7 and 49.1 ± 9.7 kg).
- There was no significant difference between TR & UT in %1RM (82.4 ± 5.4 vs 81.2 ± 11.2).
- UT completed significantly more RTF (7.7 ± 4.4) than TR (5.5 ± 1.9).
- In the UT group, the Brzycki, Lander, Macht, Wathen, and Welday equations equation had high correlation (r> 0.79). The smallest difference was produced by the Brzycki equation (-0.2±6.5 kg)(Figure 1).
- In the TR group, all equations had a high correlation (r> 0.87) but significant differences between predicted and actual 1RM. The smallest difference was produced by the Wathen equation (-1.8±5.0 kg).



Conclusion

CONCLUSIONS: In this sample of TR and Ut young men, it appears that several equations may provided excellent predictions of 1RM using RepWt and RTF regardless of training background.

PRACTICAL APPLICATION: Of the array of current 1RM prediction equations, the Wathen and Welday equations may offer the best choices for estimating 1RM bench press in both TR & UT men until further evaluation on more diverse populations can be done.