

# INTER-SESSION ACCURACY OF REPETITIONS-IN-RESERVE DURING THE BENCH PRESS AND BACK SQUAT IN FIREFIGHTER CADETS

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## BACKGROUND

### What is it?

- Repetitions-in-reserve (RIR) is an emerging tool to prescribe effort during a set, helping to select and regulate load during resistance training<sup>1</sup>
- RIR is an individual's attempt to estimate how many repetitions they had until momentary failure, after completing a set of submaximal exercise

### How does it work?

1. Individual is prescribed sets, reps, and effort (e.g., 3x10 @ 2-RIR)
2. Individual selects an approximate starting load for exercise
3. After completing the first working set, the individual estimates RIR (e.g., 6-RIR)
4. Comparing to prescribed effort (i.e., 6-RIR vs 2-RIR), the individual adjusts load

### Why is this relevant?

- May eliminate the need for pre-program 1-repetition max (1RM) testing.
- Allows for autoregulation of day-to-day load based on perceived readiness
- RIR has potential applications in the fire service, where the workload of a shift necessitates flexible load in exercise programming

### Current literature gaps

- Studies have investigated the accuracy of RIR for load-selection<sup>2</sup> and during sets of fixed repetitions<sup>3</sup>, the repeatability of RIR between sessions under high load conditions in upper and lower extremity exercises remains unknown

## PURPOSE

- To examine inter-session differences in RIR accuracy during the bench press and back squat exercises under high load conditions in FF cadets

## REFERENCES

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## METHODS

### Participants

- 13 FF cadets (12 male, 1 female; 18.98 ± 0.54 yrs, 1.80 ± 0.11 m, 85.07 ± 21.69 kg) with mixed resistance training experience were enrolled from the same Midwestern fire training academy

### Statistical analysis

- An accuracy score (RIR<sub>diff</sub>) was calculated for testing session 1 and 2 (Figure 1) using the following equation:

$$RIR_{diff} = Reps_{fail} - (Reps_{callout} + RIR_{target})$$

Where:

- Reps<sub>fail</sub>: total repetitions completed upon momentary failure
- Reps<sub>callout</sub>: total repetitions completed when participant called "2 RIR"
- RIR<sub>target</sub>: prescribed RIR value (i.e., 2)

- A repeated measures ANOVA determined significant differences in RIR<sub>diff</sub> between the bench press and back squat
- An alpha of 0.05 determined statistical significance

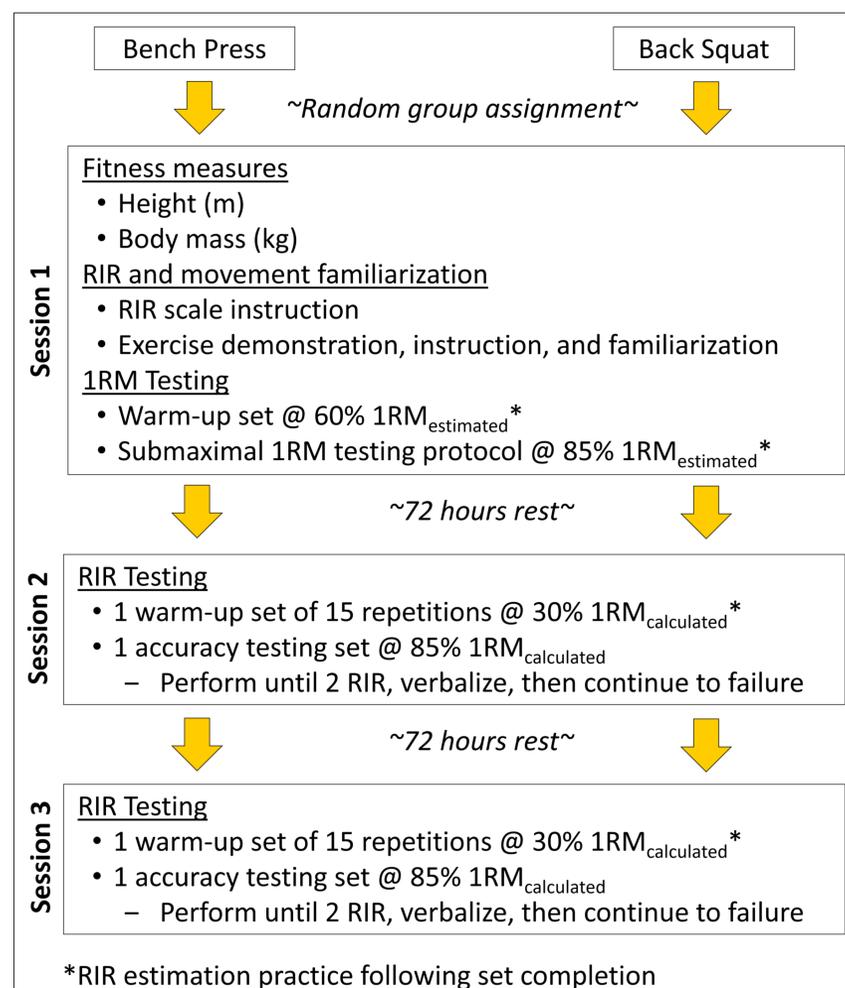


Figure 1. Illustration of data collection procedures across 3 testing sessions

## RESULTS

- There were no differences in RIR<sub>diff</sub> within subjects across testing sessions ( $F = 0.28, p = 0.605$ ) or between exercise groups ( $F = 0.66, p = 0.433$ )
- Further, 85% and 77% of participants scored within 2 repetitions of 2-RIR during testing session 1 and 2, respectively (Figure 2)

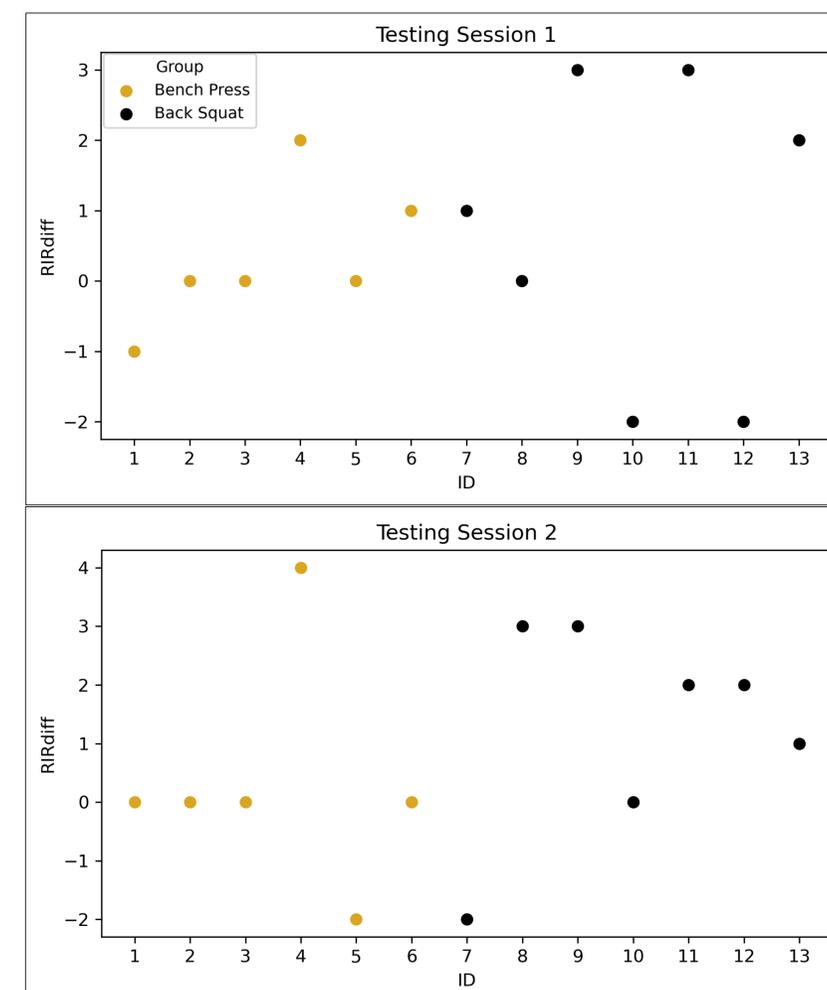


Figure 2. Individual RIR<sub>diff</sub> from Testing Session 1 and Testing Session 2 separated by bench press and back squat

## CONCLUSIONS

- Under high load conditions, the FF cadets are consistent in their ability to predict 2-RIR, regardless of upper or lower body exercise
- A single familiarization session may have carryover into future sessions

## PRACTICAL APPLICATIONS

- Implementing RIR into programming for FF cadets may be effective in regulating overall training load, though the familiarization process may benefit from including a set of exercise to failure
- Future research should investigate accuracy when using various RIR targets under both high and low loads