Perceptual, metabolic, and neuromuscular responses to 10, 20, and 30% velocity loss thresholds during the barbell back-squat.

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1 – Introduction

Velocity based training (VBT) is a contemporary method of resistance training that can enhance physical adaptations and exercise prescription. This study compared the effects of 10, 20, and 30% velocity loss (VL) thresholds on differential ratings of perceived exertion (dRPE), lactate, and countermovement jump height (CMJ) during, immediately post-, and 24 hours post-five sets of the barbell back-squat.

2 – Method

- In a randomised-crossover design, 15 resistance-trained males completed five sets of the squat with an initial mean concentric velocity of 0.70±0.01 $m \cdot s^{-1}$ and a set termination threshold of either 10% (0.63$m \cdot s^{-1}$), 20% (0.56$m \cdot s^{-1}$), or 30% (0.49$m \cdot s^{-1}$) VL. Three minutes rest was provided between sets, while barbell velocity was assessed during exercise to guide set termination.
- External load was manipulated throughout each session to ensure the first repetition of sets 2-5 was 0.70±0.06 $m \cdot s^{-1}$.
- If the first repetition of these subsequent sets was not within this range an additional 30 seconds recovery was provided. If the following repetition again did not meet this criteria, external load was manipulated by ±4% of estimated 1RM.
- Participants provided fingertip lactate at the completion of each set, while CMJ height was collected pre-, after each set, and 24 hours post-exercise. dRPE for the legs and lungs was provided at the completion of each set and 15 minutes following exercise to provide an overall value of leg and lung exertion.

3 – Results

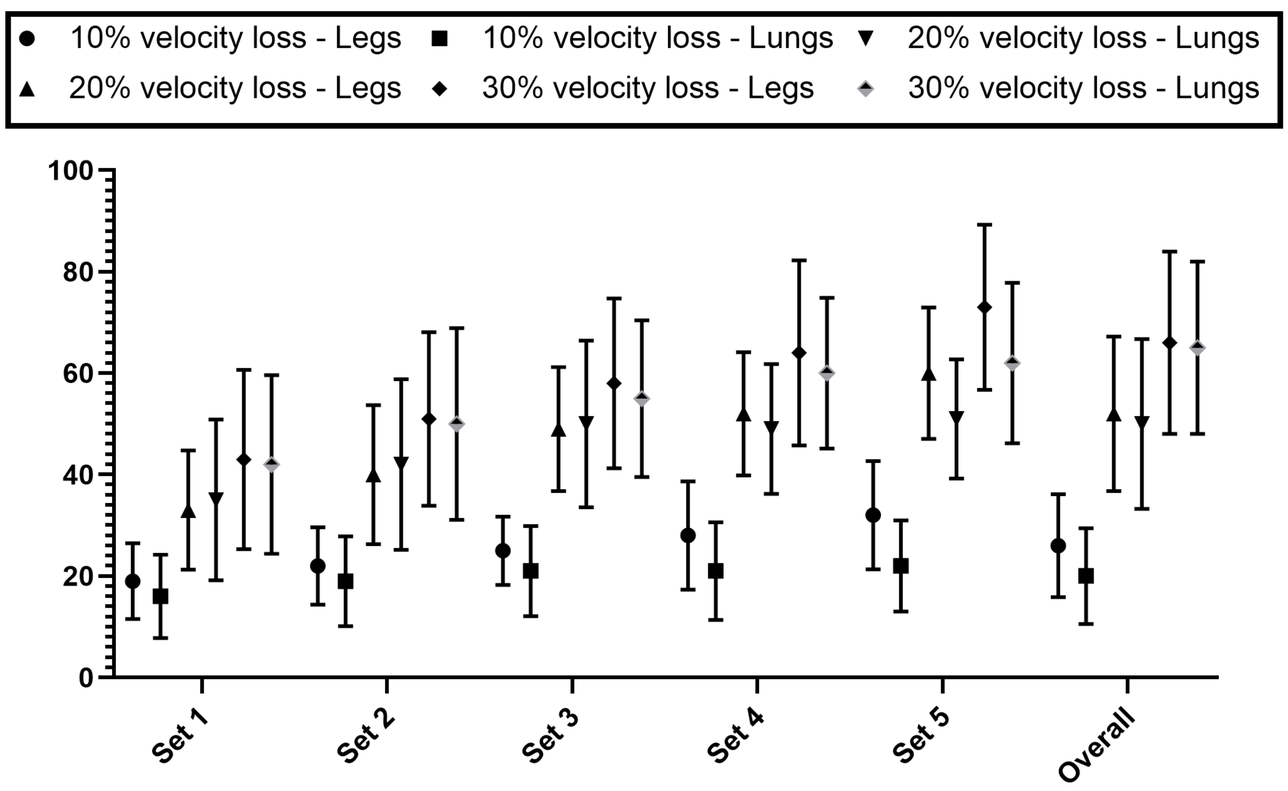

Figure 1 Changes in dRPE across five sets of the back-squat with either 10, 20, or 30% VL thresholds applied.

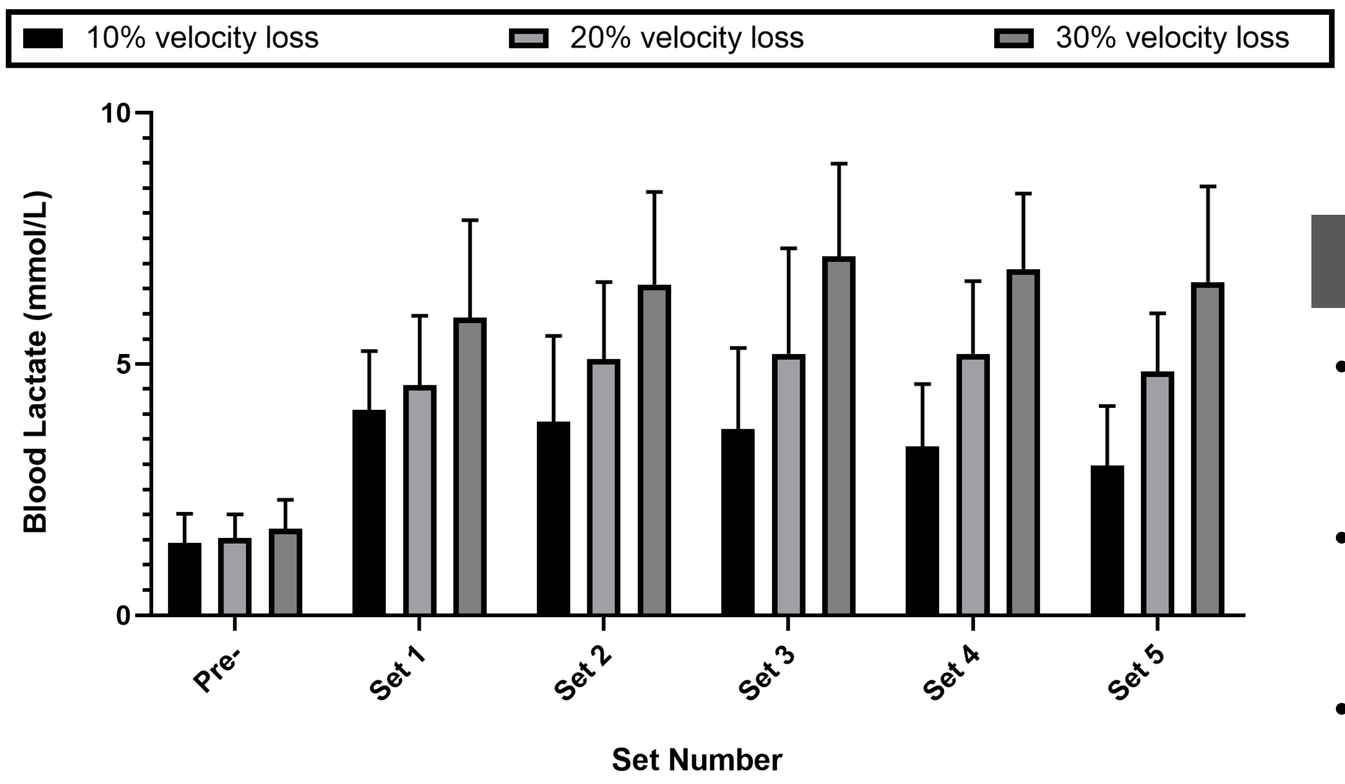

Figure 2 Changes in lactate across five sets of the back-squat with either 10, 20, or 30% VL thresholds applied.

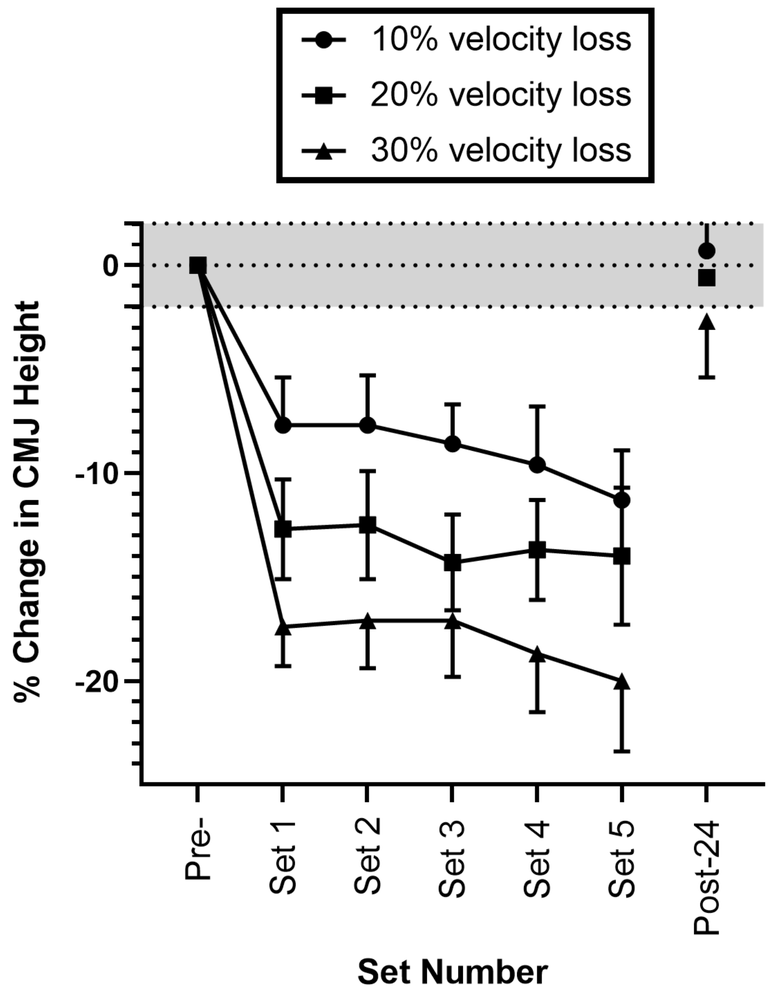

Figure 3 Changes in CMJ height (%) across five sets of the back-squat with either 10, 20, or 30% VL thresholds applied.

4 – Conclusions

- Different VL thresholds during the back-squat cause varying perceptual, metabolic, and neuromuscular responses.
- The use of 30% VL thresholds can cause substantially greater metabolic responses and potentially attenuate neuromuscular function at 24 hours post-training.
- Alternatively, a 10% VL can mitigate perceived exertion and changes in metabolic responses.
- These findings should be considered during the planning of velocity-based resistance training programmes, with smaller velocity loss thresholds programmed closer to occasions that require lower training loads and reduced fatigue.

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