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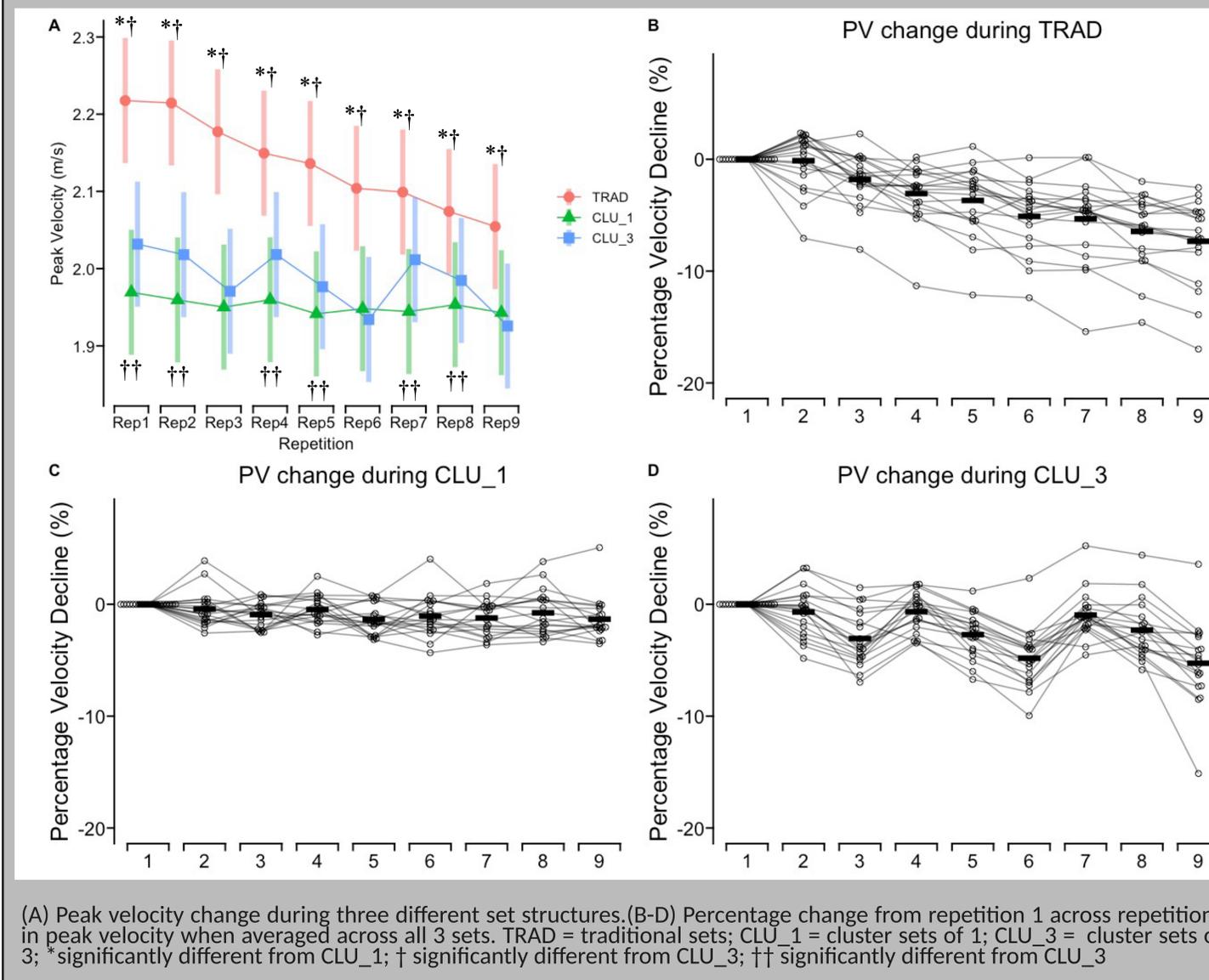
PURPOSE STATEMENT

The purpose of this study was to investigate how cluster sets can allow for increases in external load and the resultant acute velocity and perceptual responses.

METHODOLOGY

Nineteen strength-power athletes (16 males, 3 females; mean \pm SD; height: 1.75 ± 0.09 m, body mass: 85.2 ± 15.7 kg, age: 28.3 ± 5.5 years), with the ability to power clean ≥ 1.0 times their body mass (relative one repetition maximum [1RM]: 1.21 ± 0.17 kg \cdot kg⁻¹) were recruited for this study. All subjects completed four sessions. In Session 1, subjects completed a one repetition maximum (1RM) power clean test. In sessions 2 through 4, subjects performed TRAD, CLU-1 and CLU-3 protocols in a randomized order. The TRAD protocol consisted of three sets of nine power cleans at 70% of 1RM. The CLU-3 protocol used the same number of sets and repetitions as TRAD but included 30-second intra-set rest after every three repetitions, with a load of 85% of 1RM. The CLU-1 protocol was similar to CLU-3, but used 30-second inter-repetition rest intervals and a load of 90% of 1RM. For CLU-1 and CLU3, the external loads were determined based on the same relative intensity (90% of 1RM and 3RM, respectively) as the TRAD (90% of 9RM) set (1). Three-minutes of rest was allotted between each set during all protocols. Barbell displacement-time data was recorded using 3D motion capture and used to calculate peak velocity (PV) of the barbell. Rating of perceived exertion (RPE) was also recorded after each set during each protocol. A linear mixed-effects model was used to analyse PV, with Session (TRAD, CLU-1, CLU-3), Repetition, and their interactions as fixed effects and random intercepts for Subject to account for repeated measures. Since RPE data are ordinal, a cumulative link mixed model was used to examine the effects of Session and Time on RPE, with Session, Time (SET1, SET2, SET3), and their interactions as fixed effects and random intercepts for Subject. Paired comparisons with Holm's sequential Bonferroni corrections were performed to identify significant differences. The alpha level was set at 0.05.

FIGURE 1



RESULTS

There was a significant Session x Repetition interaction for PV ($p < 0.001$; $F = 25.65$). Based on post-hoc analyses PV in the TRAD protocol was greater than in the CLU-1 ($p < 0.001$) and CLU-3 protocols ($p < 0.001$) across all repetitions (Figure 1A). PV in the CLU-3 was greater than in the CLU-1 across all repetitions ($p < 0.05$) except on every third repetition (i.e., rep 3, 6, 9). While a decline in PV was observed towards the end of both TRAD and CLU-3 sets, PV was maintained throughout the CLU-1 sets (Figure 1B-D). Additionally, there was a significant main effect of Session for RPE, with subjects reporting lower RPEs in both CLU-1 (Estimate = -4.09 , $p < 0.001$) and CLU-3 (Estimate = -1.66 , $p = 0.048$) compared to TRAD. However, there was no Session x Time interaction ($p > 0.05$), suggesting that the pattern of RPE over time was consistent across set protocols.

CONCLUSIONS

The results of this study suggest that set configuration significantly influences both movement velocity and perceived exertion during resistance training. TRAD sets resulted in the highest peak velocities but showed clear signs of fatigue over time. In contrast, cluster sets, particularly CLU-1, helped maintain velocity and reduced perceived exertion, despite showing lower peak velocities overall. Among the cluster protocols, CLU-3 provided a balance between velocity maintenance and lower perceived exertion. Overall, incorporating cluster set structures may be an effective strategy for managing fatigue and maintaining performance during resistance training.

PRACTICAL APPLICATIONS

It is recommended that coaches consider using higher external loads in cluster sets while ensuring adequate intra-set rest intervals to maintain movement velocity and minimize perceptual fatigue.

REFERENCE

- Nagatani, T., Kendall, K. L., Guppy, S. N., & Haff, G. G. (2022). Using cluster set configurations within a resistance training programme. *Professional Strength and Conditioning*(65), 7-17.