WORKOUT PACE IS CORRELATED WITH MAXIMAL ENDURANCE IN INDIVIDUAL WORKOUT COMPONENTS IN A LOW- AND HIGH-VOLUME HIGH-INTENSITY FUNCTIONAL TRAINING WORKOUT

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INTRODUCTION

Tracking and adjusting workloads in traditional exercise programs (e.g., weightlifting) is relatively easy because it typically involves minor changes to the exercises listed and/or their prescription (2). Coaches and athletes may do this as part of their progression strategy to encourage adaptations and/or reduce the risks of overtraining.

Traditional methods for describing intensity do not translate well to High-Intensity Functional Training (HIFT). It would be impractical to test all possible movements, and they do not adequately describe their individual contribution to the overall intensity of circuit-style workouts. However, no other methods currently exist to quantify intensity (4).

HIFT-style circuits are often designed to be completed for *"as many reps as possible"* or *"as fast as possible"* (1). An athlete's speed employed during the workout compared to their maximal speed capability in the same movements or an entire round may better reflect the relative intensity of the workout.

PURPOSE

To relate relative pace employed for each exercise and round of low- and high-volume versions of the same HIFT circuit with relative strength and muscle endurance.

METHODS

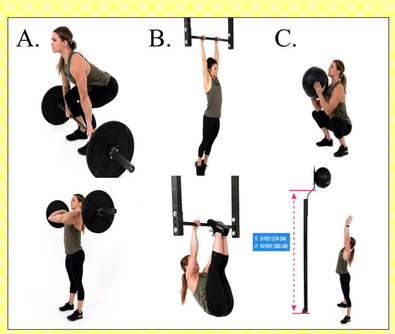
Men and women (26.7 ± 7.6 years; 173 ± 8 cm; 79.3 ± 11.2 kg) with HIFT experience (≥6 months) completed one baseline and two randomized experimental visits, separated by at least 48 hours.

Baseline assessments included one-repetition maximum (1-RM) power clean and RM toes-to-bar (TTB) and wall ball shots (WB).

Experimental visits had participants complete five repetitions of each movement in **Figure 1** as fast as possible, as well as one round of either a Low- (LV) or High-Volume (HV) workout to determine maximal pace in each. Participants then rested five minutes before completing five rounds of LV or HV for time.

Figure 1. Workout Design

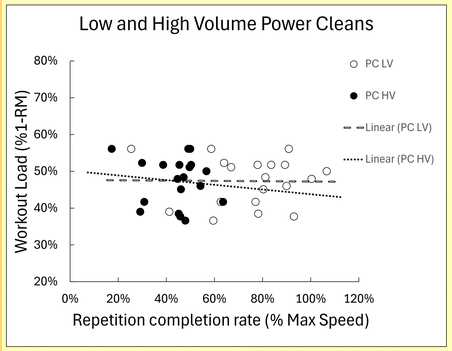
Participants completed 5 repetitions of A. Power Cleans (men = 52.2 kg; women = 34.0 kg), B. Toes-to-Bar, and C. Wall Ball Shots, as well as 1-round of either the Low- (5, 10, 15 repetitions) or High-Volume (10, 15, 20 repetitions) circuit to determine maximal pace. After 5-minutes of rest, participants completed 5 rounds of the LV or HV circuit for time. Movement standards were adopted from (1).

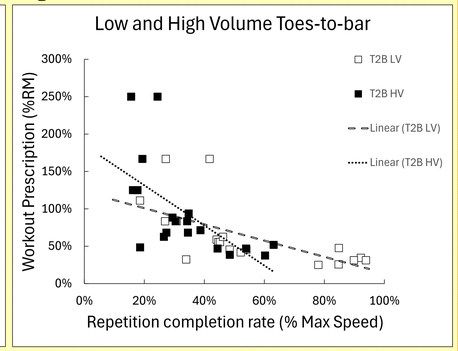


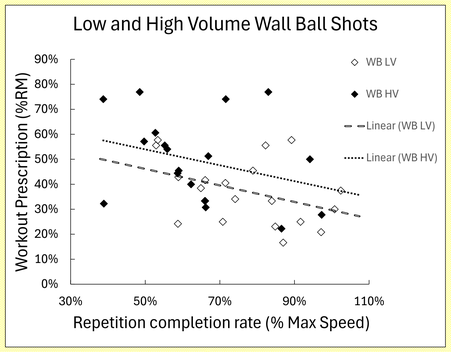
RESULTS

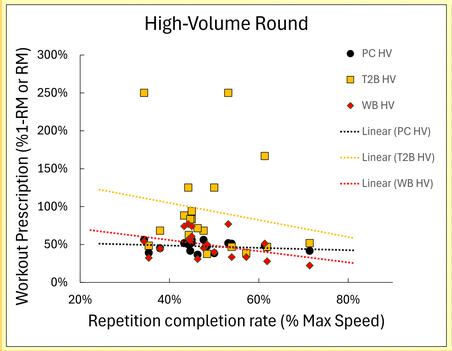
- **TTB (% Max Speed) related to TTB (% RM; ρ = -0.78 and -0.73, *p* = <0.001) in both workouts (LV/HV) and WB (% RM; ρ = -0.56, *p* = 0.013) only for LV.**
- **RD (% Max Speed) related to TTB (%RM; ρ = -0.63, *p* = 0.004) and WB (%RM; ρ = -0.51, *p* = 0.027) during LV only.**

Figure 2. Correlations between %1-RM or RM and Repetition Completion Rate for each movement and round of the Low- and High-Volume Circuit









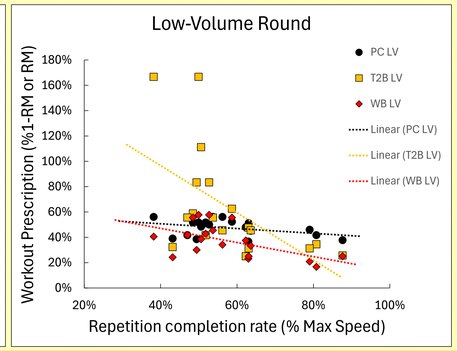


Table 2. Spearman's Rho Correlations (rho, p-value)

	Power Clean (% of 1-RM)	Toes-to-Bar (% of Max reps)	Wall Ball Shots (% of Max reps)
Repetition Completion Rate			
Power Cleans			
High Volume	0.00 (0.986)	-0.26 (0.277)	-0.22 (0.372)
Low Volume	-0.04 (0.883)	-0.21 (0.398)	0.24 (0.332)
Toes-to-Bar			
High Volume	-0.18 (0.473)	-0.73 (0.001)*	-0.45 (0.053)
Low Volume	-0.21 (0.399)	-0.78 (0.001)*	-0.56 (0.013)*
Wall Ball Shots			
High Volume	-0.27 (0.273)	-0.29 (0.234)	-0.38 (0.113)
Low Volume	-0.40 (0.087)	-0.35 (0.146)	-0.41 (0.080)
Round			
High Volume	-0.26 (0.274)	-0.28 (0.245)	-0.43 (0.09)
Low Volume	-0.27 (0.257)	-0.63 (0.004)*	-0.51 (0.027)*

Table 1. Workout performance

	Low-Volume	High-Volume
Muscle strength and endurance		
Power Clean		
Prescribed load (kg)	34.0 / 52.2	34.0 / 52.2
1-RM (kg)	93.2 ± 21.9	93.2 ± 21.9
% 1-RM of prescribed load (kg)	0.47 ± 0.07	0.47 ± 0.07
Toes-to-Bar		
Prescribed repetitions	10	15
Repetition-maximum	21.4 ± 10.3	21.4 ± 10.3
% RM of prescribed repetitions	0.47 ± 0.97	0.70 ± 1.46
Wall Balls		
Prescribed repetitions	15	20
Repetition-maximum	46 ± 17.83	46 ± 17.83
% RM of prescribed repetitions	0.33 ± 0.84	0.43 ± 1.12
% Max Rate (repetitions/sec)		
Power Clean	0.75 ± 0.2	0.44 ± 0.11
Toes-to-Bar	0.55 ± 0.25	0.34 ± 0.15
Wall Balls	0.77 ± 0.16	0.64 ± 0.17
Round	0.58 ± 0.13	0.49 ± 0.09

CONCLUSIONS & PRACTICAL APPLICATIONS

- **Power clean (%1-RM) was not related to any pacing variable.** This could potentially be due to the overall emphasis of the workout challenging endurance more than strength.
- **Toes-to-bar repetition completion rate was inversely related to the relative intensity of prescribed repetitions for toes-to-bar for both low-volume and high-volume. Toes-to-bar repetition completion rate was also inversely related to the relative intensity of wall ball shot prescribed reps in low-volume only.**
- **Toes-to-bar and wall ball shot endurance was related to round pace in LV only.** The additional volume in the high-volume workout may change an athlete's strategic approach to completing the workout.
- **Athletes and coaches might consider focusing on developing endurance in toes-to-bar and wall balls, as they are two of the most common exercises that appear in HIFT programming.**

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