

DURATION AFFECTS MULTIPLE PACING STRATEGY COMPONENTS DURING A HIGH-INTENSITY FUNCTIONAL TRAINING WORKOUT

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INTRODUCTION

The ability to sustain a competitive pace over a racing distance is affected by energy availability and movement efficiency (1, 3, 6). Pace is also important in high-intensity functional training (HIFT) workouts but may be autoregulated differentially across each exercise (4, 5). The ability to sustain a faster overall pace would seem to be further complicated by frequent transitions between exercises, changes in modality and body position that commonly occur in HIFT. Each of these prevent the trainee from reaching a steady state, and thus, elevate energy requirements (3, 6).

Previously, a pilot study observed that average repetition completion rate and similar metrics were the best predictors of performance in 4 out of 5 different competition workouts, whereas pacing used for specific exercises (i.e., wall balls) best predicted the fifth workout (4). However, drawing definitive conclusions from that study is difficult because each workout varied in duration and composition. Regardless of composition, it remains unclear how duration might impact pacing strategy and performance.

PURPOSE

To compare pacing strategies employed during the same HIFT workout programmed at different total durations.

METHODS

Men ($n = 7$; 29 ± 7 years, 173 ± 9 cm, 83 ± 17 kg) with ≥ 2 years of HIFT experience completed 4 workout trials (see Figure 1) in cross-over fashion at their normal workout time once per week over 4 consecutive weeks.

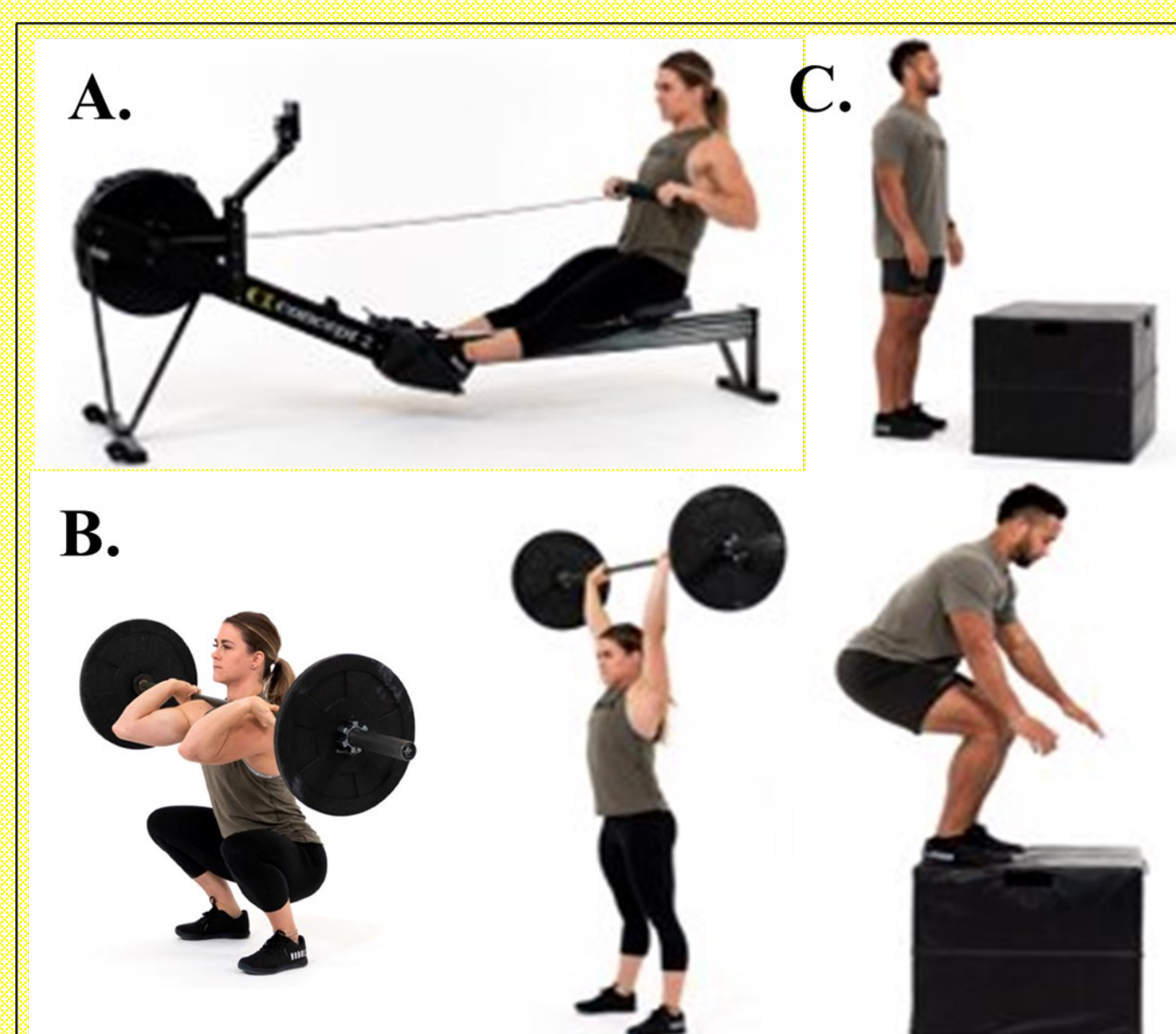
Participants were drawn from a larger study examining the effect of a pre-workout supplement, and thus, 2 trials required participants to consume a supplement prior to exercise. For the present analysis, only trials involving the placebo were considered.

All workouts were video recorded and subsequently analyzed to quantify repetition completion rate for each exercise, transition and break times, and failed repetitions.

Per minute average, standard deviation (SD), and slope were calculated for each variable, and comparisons were made between workout durations via paired samples *t*-tests.

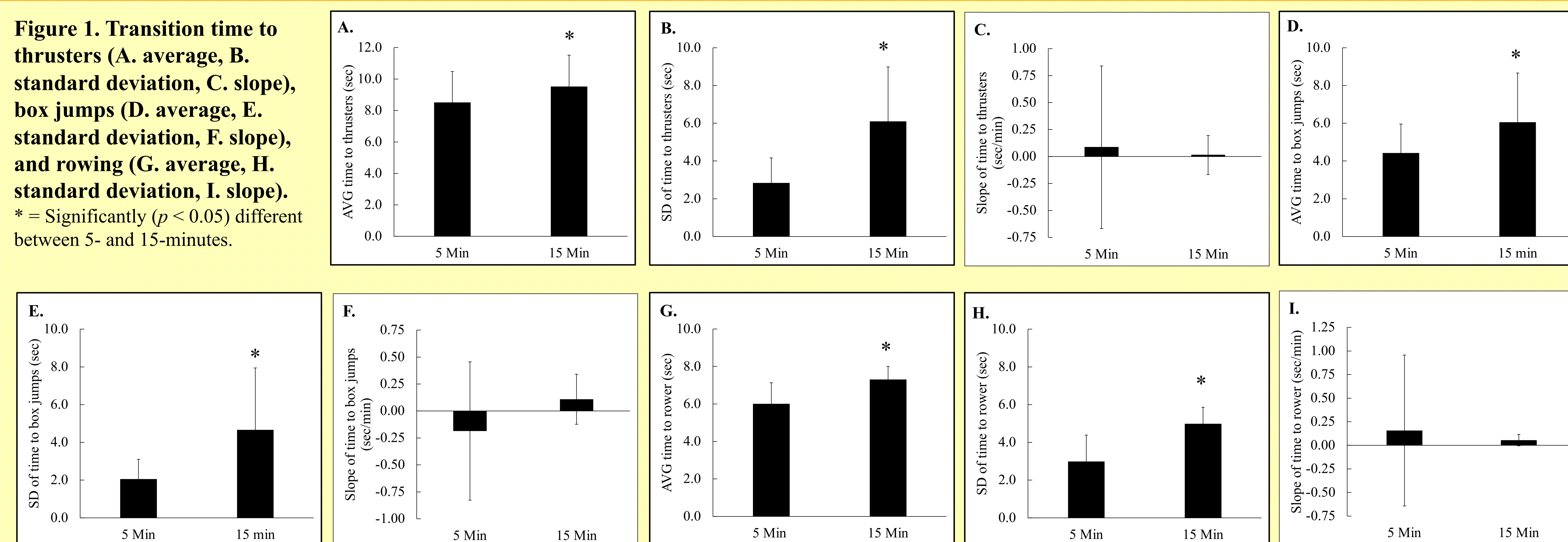
Figure 1. Workout design

Participants completed 'as many repetitions as possible' (AMRAP) in 5 or 15 minutes by repeating a circuit of (A.) nine rowing calories, (B) six barbell thrusters at 95 lbs. (43.1 kg), and (C) three 24-in box jumps with step down. All movement standards (2) were enforced by a certified strength and conditioning specialist.



RESULTS

Figure 1. Transition time to thrusters (A. average, B. standard deviation, C. slope), box jumps (D. average, E. standard deviation, F. slope), and rowing (G. average, H. standard deviation, I. slope).
* = Significantly ($p < 0.05$) different between 5- and 15-minutes.



- More repetitions were completed during the 15-minute workout (182 ± 27) compared to the 5-minute workout (80 ± 8), leading to faster pace during the 15-minute workout (3.8 ± 1.5 reps/min).
- A faster pace was seen for rowing calories ($+0.09 \pm 0.04$ calories/sec) and box jumps ($+0.04 \pm 0.02$ jumps/sec) during the 5-minute workout, though a steeper decline in calories per stroke (slope = 0.03 ± 0.02 calories/stroke/min) was noted.
- While no breaks were taken or failed repetitions observed, longer and more variable transitions were observed with all three movements during the 15-minute workout.

Table 2. Differences in overall and individual exercise repetition completion rate characteristics

	5-minute	15-minute	<i>p</i> value
Repetitions	79.7 ± 8.1	182.3 ± 27	< 0.001
Rate (reps/min)	15.9 ± 1.6	12.2 ± 1.8	< 0.001
Calories			
Average	0.367 ± 0.067	0.281 ± 0.038	0.001
Standard deviation	0.057 ± 0.045	0.049 ± 0.026	0.591
Slope	-0.031 ± 0.029	-0.004 ± 0.006	0.066
Calories per stroke			
Average	0.687 ± 0.129	0.658 ± 0.089	0.477
Standard deviation	0.071 ± 0.031	0.076 ± 0.062	0.838
Slope	-0.035 ± 0.029	-0.01 ± 0.012	0.021
Thrusters			
Average	0.439 ± 0.03	0.432 ± 0.056	0.712
Standard deviation	0.048 ± 0.013	0.044 ± 0.019	0.647
Slope	-0.004 ± 0.014	-0.003 ± 0.004	0.878
Box Jumps			
Average	0.433 ± 0.07	0.395 ± 0.073	0.002
Standard deviation	0.047 ± 0.023	0.084 ± 0.064	0.272
Slope	-0.016 ± 0.024	-0.002 ± 0.006	0.169
Rounds			
Average	0.266 ± 0.027	0.203 ± 0.03	< 0.001
Standard deviation	0.031 ± 0.008	0.033 ± 0.01	0.594
Slope	-0.012 ± 0.009	-0.003 ± 0.002	0.022

CONCLUSIONS

More repetitions were completed during the longer workout but at a slower overall pace. This is consistent with the effect of race distance on pacing in more traditional aerobic activities (1, 3, 6), but contrasts previous reports of similar pacing amongst exercises programmed within a series of competitive HIFT workouts (4). However, each of those five workouts differed in both duration and composition. The present study adds to those findings by demonstrating the effect of duration when workout composition is the same.

Longer and more variable transitions were seen between all exercises during the 15-minute workout, whereas a steeper decline in rowing stroke strength (i.e., calories per stroke) was noted during the 5-minute bout. Previous work only noted the value of consistent transitions (4) but could not distinguish the effects from workout composition and duration. The present data suggests that when HIFT workout composition is the same, longer duration workouts will necessarily involve more transitions and opportunities for variation. Meanwhile, the steep decline in calories per stroke during the 5-minute bout is consistent with the fatiguing effect of an overaggressive initial pace in moderate-to-longer duration races (1, 3, 6).

PRACTICAL APPLICATIONS

Given the same circuit prescription, a longer HIFT AMRAP will impact overall and individual exercise pacing and transition time, as well as the variability in transitions between exercises. Coaches and athletes should be mindful of the impact of each exercise's pace on transition time (i.e., the athlete's opportunity to "rest"). In longer duration workouts, there are more opportunities for transitions to vary, and too much variability may negatively impact total repetitions completed. In shorter duration, "sprint"-style HIFT workouts, an overaggressive, initial pace may also negatively impact the ability to sustain effort and limit repetitions completed.

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