

WORKOUT DURATION ALTERS RELATIONSHIPS BETWEEN THE PREDICTIVE TRAITS OF PERFORMANCE DURING A HIGH-INTENSITY FUNCTIONAL TRAINING WORKOUT

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INTRODUCTION

Daily high-intensity functional training (HIFT) workouts are highly diverse, and each may differentially challenge a unique combination of strength, skill, and endurance across one or more movement patterns (2, 6, 7). Though it may be expected that a different set of skills and physiological traits will be relevant to completely different workouts (1, 3 – 6), it remains unexplored how altering only a single programming variable might affect relevant characteristics.

PURPOSE

To examine the effect of altering workout duration on relationships between predictive traits and workout performance.

METHODS

Resistance training (RT), gymnastics, and HIFT background history collected from twelve men and women with HIFT experience (≥ 2 years; 29.3 ± 7.1 years-old) during enrollment.

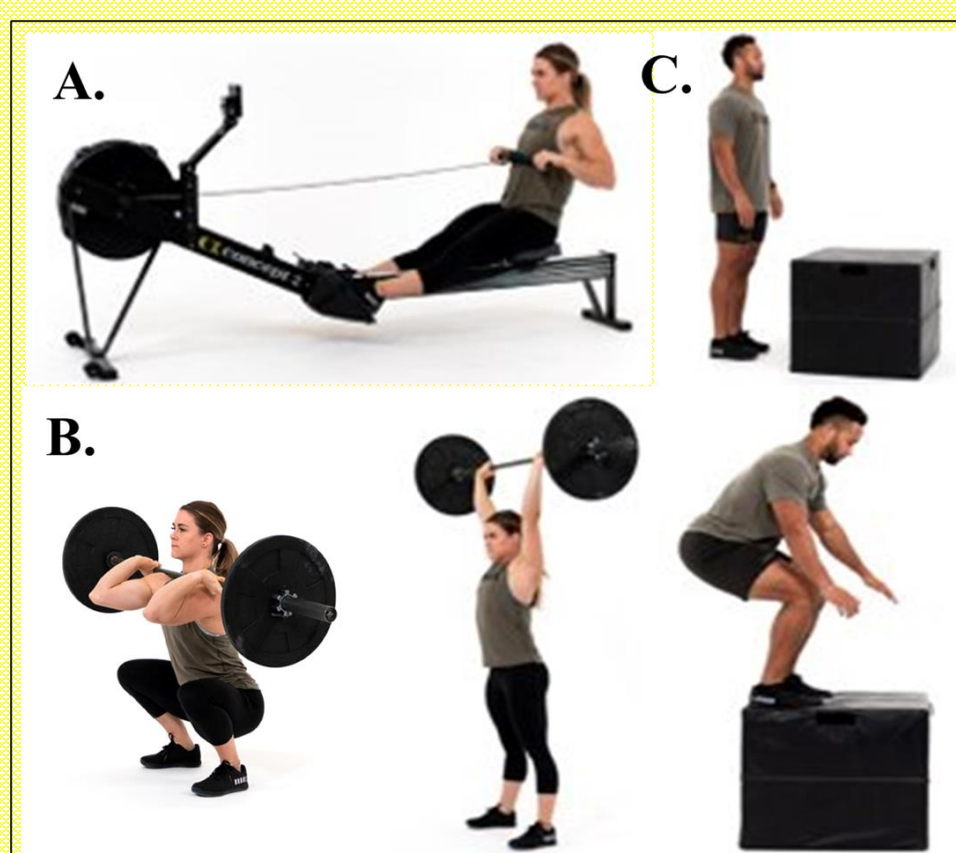
Baseline testing: body composition (BC; via 4-compartment model), vertical jump (VJ) height, 3 – 5 repetitions maximum (RM) thruster, and 2K rowing sprint.

5- or 15-minute circuit (see Figure 1) for ‘as many repetitions as possible’ (AMRAP). Repetitions and workload were recorded for the overall workout and for each exercise.

Pearson correlations between measured and estimated predictive traits and workout performance (overall and individual exercises) → Fisher’s r-to-z transformation compared relationship differences between workout durations.

Figure 1. AMRAP workout design (men / women)

Both circuits repeated (A.) rowing calories (9 / 7 calories), (B.) six barbell thrusters (THR; 95 lbs. [43.1 kg] / 65 lbs. [29.5 kg]), and (C.) three box jumps (BJ; 24 in [0.61 m] / in [0.51 m]) using adopted movement standards (1).



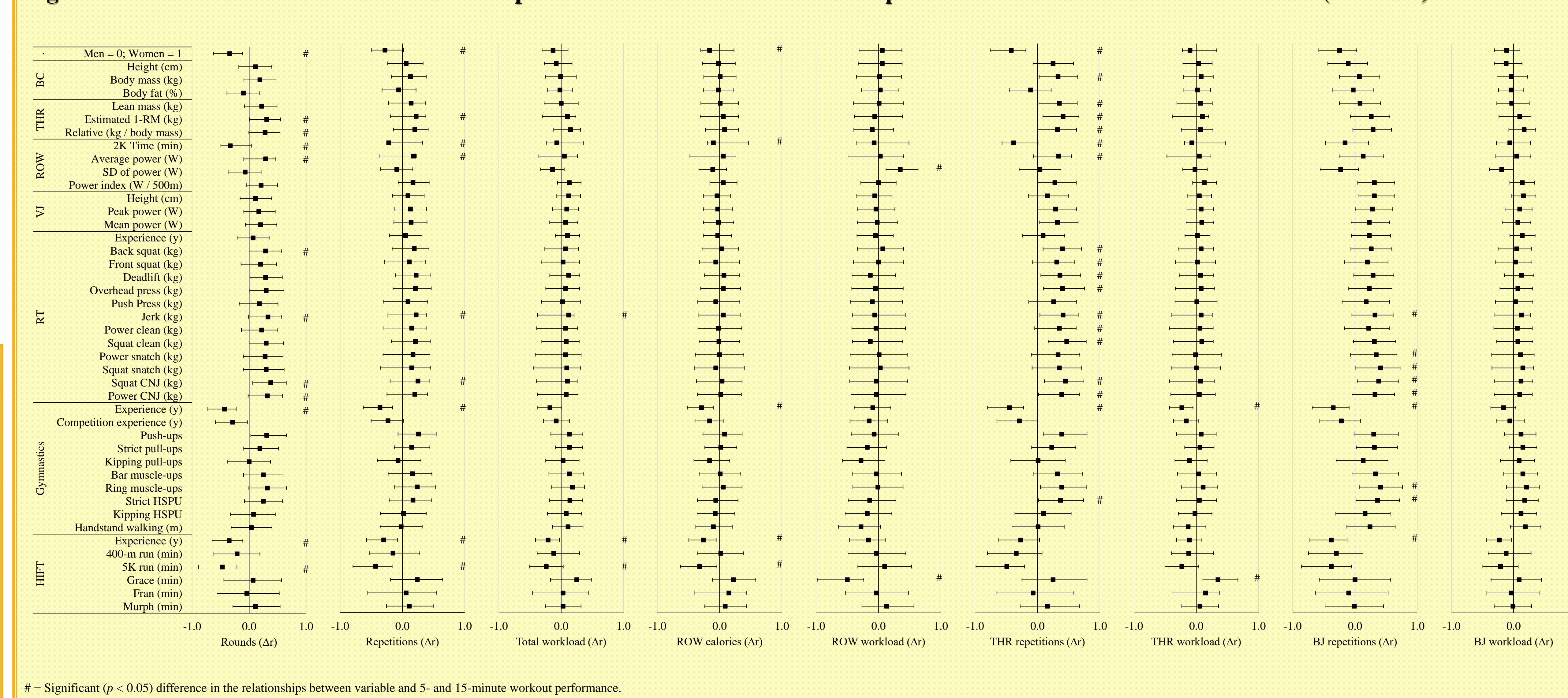
RESULTS

Table 1. Measured and reported predictive characteristics and their relationships to 5- and 15-minute AMRAP performance.

	mean \pm SD	Rounds		Repetitions		Total workload (kg)		ROW calories		ROW workload		THR repetitions		THR workload		BJ repetitions		BJ workload	
		5-min	15-min	5-min	15-min	5-min	15-min	5-min	15-min	5-min	15-min	5-min	15-min	5-min	15-min	5-min	15-min	5-min	15-min
Sex (men = 0, women = 1)		-0.28	0.06	-0.60*	-0.32	-0.55*	-0.42*	-0.78*	-0.62*	-0.60*	-0.66*	-0.34	0.08	-0.85*	-0.75*	-0.21	0.04	-0.37	-0.26
BC measures																			
Height (cm)	171 \pm 7	0.37	0.26	0.51*	0.45*	0.53*	0.61*	0.58*	0.60*	0.69*	0.63*	0.46*	0.21	0.62*	0.58*	0.13	0.24	0.45*	0.57*
Body mass (kg)	80.5 \pm 15.6	0.40	0.21	0.55*	0.42	0.66*	0.67*	0.57*	0.56*	0.69*	0.67*	0.51*	0.18	0.67*	0.59*	0.28	0.21	0.60*	0.64*
Body fat (%)	18.1 \pm 6.5	-0.33	-0.23	-0.43*	-0.37	-0.32	-0.30	-0.48*	-0.46*	-0.34	-0.37	-0.32	-0.21	-0.46*	-0.48*	-0.25	-0.22	-0.24	-0.20
Lean mass (kg)	65.9 \pm 13.5	0.51*	0.29	0.69*	0.55*	0.75*	0.75*	0.73*	0.72*	0.78*	0.77*	0.61*	0.26	0.82*	0.75*	0.37	0.29	0.66*	0.69*
THR strength																			
Estimated 1-RM (kg)	75.1 \pm 21.9	0.59*	0.28	0.77*	0.55*	0.83*	0.73*	0.78*	0.72*	0.73*	0.79*	0.67*	0.26	0.88*	0.78*	0.56*	0.30	0.74*	0.64*
Relative (kg / body mass)	2.04 \pm 0.37	0.51*	0.23	0.66*	0.46*	0.63*	0.48*	0.66*	0.58*	0.48*	0.58*	0.43*	0.23	0.73*	0.66*	0.56*	0.27	0.54*	0.37
ROW performance																			
2K Time (min)	7.95 \pm 0.71	-0.74*	-0.41	-0.89*	-0.67*	-0.86*	-0.79*	-0.91*	-0.81*	-0.89*	-0.82*	-0.77*	-0.39	-0.92*	-0.85*	-0.60*	-0.44*	-0.76*	-0.70*
Average power (W)	216 \pm 56	0.74*	0.45*	0.89*	0.71*	0.86*	0.81*	0.91*	0.85*	0.89*	0.86*	0.76*	0.42	0.92*	0.87*	0.61*	0.48*	0.77*	0.72*
SD of power (W)	29.9 \pm 17.4	0.16	0.23	0.19	0.28	0.14	0.28	0.19	0.30	0.34	-0.01	0.23	0.19	0.22	0.24	0.00	0.23	0.09	0.28
Power index (W / 500m)	-0.01 \pm 0.03	0.15	-0.06	0.16	-0.01	0.26	0.13	0.07	0.01	0.06	0.06	0.22	-0.06	0.19	0.06	0.30	-0.01	0.28	0.14
VJ performance																			
Height (cm)	49.4 \pm 15.3	0.05	-0.06	0.14	0.05	0.27	0.15	0.10	0.14	0.05	0.11	0.10	-0.06	0.23	0.18	0.24	-0.07	0.28	0.12
Peak power (W)	7781 \pm 1207	0.22	0.05	0.36	0.23	0.52*	0.43*	0.35	0.38	0.36	0.40	0.32	0.03	0.50*	0.42	0.32	0.04	0.50*	0.40
Mean power (W)	1507 \pm 536	0.30	0.10	0.45*	0.31	0.61*	0.54*	0.45*	0.47*	0.49*	0.51*	0.40	0.08	0.59*	0.50*	0.33	0.10	0.57*	0.50*
RT history																			
Experience (y)	11.1 \pm 5.8	0.05	-0.02	0.12	0.07	0.20	0.10	0.09	0.12	0.04	0.09	0.11	0.02	0.21	0.19	0.17	-0.06	0.19	0.05
Back squat (kg)	142 \pm 51	0.50*	0.21	0.66*	0.47*	0.75*	0.68*	0.67*	0.64*	0.70*	0.63*	0.60*	0.20	0.79*	0.71*	0.48*	0.22	0.68*	0.63*
Front squat (kg)	113 \pm 39	0.58*	0.38	0.73*	0.62*	0.81*	0.78*	0.71*	0.77*	0.73*	0.73*	0.68*	0.37	0.82*	0.80*	0.56*	0.36	0.75*	0.72*
Deadlift (kg)	161 \pm 50	0.43	0.14	0.62*	0.40	0.68*	0.56*	0.65*	0.68*	0.56*	0.69*	0.52*	0.16	0.76*	0.69*	0.45*	0.16	0.60*	0.47*
Overhead press (kg)	61.8 \pm 24.5	0.44	0.14	0.65*	0.44	0.70*	0.63*	0.72*	0.66*	0.69*	0.74*	0.53*	0.13	0.82*	0.74*	0.39	0.16	0.60*	0.53*
Push Press (kg)	81.2 \pm 27.8	0.53*	0.35	0.68*	0.59*	0.76*	0.74*	0.68*	0.74*	0.67*	0.77*	0.61*	0.35	0.79*	0.78*	0.52*	0.34	0.69*	0.66*
Jerk (kg)	95.0 \pm 28.8	0.66*	0.33	0.80*	0.58*	0.88*	0.76*	0.78*	0.72*	0.75*	0.81*	0.74*	0.33	0.87*	0.79*	0.66*	0.34	0.82*	0.69*
Power clean (kg)	92.5 \pm 30.4	0.61*	0.39	0.78*	0.63*	0.87*	0.80*	0.77*	0.79*	0.76*	0.80*	0.72*	0.37	0.89*	0.83*	0.61*	0.39	0.79*	0.73*
Clean (kg)	95.4 \pm 31.8	0.50*	0.20	0.70*	0.49*	0.80*	0.72*	0.69*	0.70*	0.69*	0.82*	0.64*	0.17	0.85*	0.76*	0.53*	0.22	0.72*	0.65*
Power snatch (kg)	67.8 \pm 22.3	0.64*	0.36	0.78*	0.61*	0.86*	0.79*	0.76*	0.76*	0.72*	0.71*	0.71*	0.38	0.83*	0.84*	0.70*	0.36	0.82*	0.71*
Snatch (kg)	75.8 \pm 19.9	0.68*	0.38	0.79*	0.64*	0.88*	0.79*	0.73*	0.79*	0.74*	0.71*	0.73*	0.38	0.81*	0.81*	0.74*	0.33	0.84*	0.69*
Clean-and-jerk (CNJ; kg)	93.5 \pm 27.0	0.63*	0.25	0.79*	0.54*	0.87*	0.77*	0.79*	0.75*	0.78*	0.81*	0.70*	0.25	0.88*	0.81*	0.63*	0.25	0.80*	0.68*
Power CNJ (kg)	89.5 \pm 26.8	0.63*	0.31	0.78*	0.58*	0.86*	0.78*	0.77*	0.75*	0.76*	0.79*	0.71*	0.32	0.87*	0.82*	0.64*	0.32	0.80*	0.70*
Gymnastics history																			
Experience (y)	1.6 \pm 2.5	-0.12	0.31	-0.16	0.20	-0.20	-0.02	-0.20	0.09	-0.23	-0.14	-0.11	0.34	-0.18	0.05	-0.07	0.28	-0.20	-0.04
Competition experience (y)	0.6 \pm 1.3	-0.33	-0.04	-0.26	-0.03	-0.35	-0.27	-0.19	-0.03	-0.34	-0.19	-0.30	-0.01	-0.16	0.00	-0.30	-0.08	-0.42	-0.36
Push-ups	44.8 \pm 26.4	0.31	0.00	0.57*	0.31	0.60*	0.47	0.64*	0.56*	0.47	0.54*	0.40	0.01	0.78*	0.70*	0.32	0.02	0.46	0.34
Strict pull-ups	13.7 \pm 11.9	0.14	-0.05	0.30	0.15	0.34	0.21	0.33	0.31	0.16	0.34	0.20	-0.03	0.46	0.40	0.26	-0.05	0.27	0.12
Kipping pull-ups	24.9 \pm 11.1	0.50*	0.50*	0.51*	0.58*	0.57*	0.54*	0.43	0.59*	0.38	0.66*	0.51*	0.50*	0.45	0.56*	0.59*	0.46	0.58*	0.49
Bar muscle-ups	9.0 \pm 8.1	0.51	0.26	0.63*	0.47	0.65*	0.52*	0.62*	0.61*	0.50	0.53*	0.57*	0.25	0.70*	0.66*	0.61*	0.28	0.58*	0.43
Ring muscle-ups	4.5 \pm 6.3	0.52*	0.20	0.63*	0.39	0.68*	0.50	0.60*	0.54*	0.55*	0.57*	0.18	0.69*	0.58*	0.63*	0.22	0.64*	0.43	0.43
Strict HSPU	9.6 \pm 9.3	0.49	0.24	0.64*	0.47	0.67*	0.53*	0.67*	0.51*	0.65*	0.59*	0.22	0.76*	0.71*	0.58*	0.22	0.59*	0.41	0.41
Kipping HSPU	17.5 \pm 12.4	0.57*	0.49	0.56*	0.54*	0.59*	0.51	0.44	0.51	0.40	0.58*	0.58*	0.48	0.46	0.48	0.66*	0.50	0.60*	0.48
Handstand walking (m)	9.9 \pm 10.2	0.29	0.25	0.37	0.39	0.36	0.25	0.37	0.47	0.10	0.38	0.28	0.27	0.40	0.53*	0.45	0.21	0.32	0.13
HIFT history																			
Experience (y)	5.9 \pm 2.8	-0.02	0.33	-0.15	0.15	-0.02	0.19	-0.26	0.00	-0.09	0.07	0.05	0.32	-0.22	-0.11	-0.06	0.32	0.07	0.30
400-m run (min)	1.38 \pm 0.38	-0.51	-0.30	-0.62*	-0.47	-0.74*	-0.62*	-0.55	-0.57	-0.59*	-0.56	-0.61*	-0.27	-0.71*	-0.59*	-0.61*	-0.31	-0.70*	-0.58*
5K run (min)	24.4 \pm 3.2	-0.36	0.11	-0.44	-0.01	-0.45	-0.21	-0.43	-0.11	-0.39	-0.49	-0.37	0.12	-0.41	-0.18	-0.31	0.07	-0.41	-0.20
Grace (min)	2.64 \pm 1.13	-0.53	-0.60	-0.37	-0.61	-0.49	-0.74*	-0.17	-0.39	-0.20	0.30	-0.36	-0.61	0.10	-0.25	-0.60	-0.60	-0.63*	-0.72*
Fran (min)	4.32 \pm 2.37	-0.76*	-0.72*	-0.79*	-0.85*	-0.80*	-0.83*	-0.69*	-0.84*	-0.64*	-0.61*	-0.81*	-0.74*	-0.70*	-0.85*	-0.80*	-0.70*	-0.78*	-0.74*
Murph (min)	45.1 \pm 17.6	0.06	-0.05	0.16	0.05	0.10	0.07	0.26	0.17	0.15	0.02	0.07	-0.09	0.23	0.17	-0.01	0.00	0.02	0.03

* = Significant ($p < 0.05$) relationship; HSPU = handstand push-ups

Figure 2. Differences between measured and reported variables in their relationships to the 5- and 15-minute AMRAP bouts ($\Delta r \pm SE$)



= Significant ($p < 0.05$) difference in the relationships between variable and 5- and 15-minute workout performance.

Table 2. Participant workout performances.

Performance Variable	5-minutes	15-minutes
Rounds	4.5 \pm 0.6	10.8 \pm 1.6
Repetitions	77.6 \pm 12.5	185 \pm 29.4
Total workload load (kg)	6885 \pm 1860	6905 \pm 1776
Rowing calories		