

SAME RESULTS, TWICE THE WORK? THE CARDIO-METABOLIC DIFFERENCES BETWEEN CIRCUIT TRAINING AND TREADMILL-BASED INTERVALS



INTRODUCTION

- When seeking improvements in cardiovascular health, individuals often choose between circuit training or treadmill intervals.
- While various methods of improving cardiovascular health exist, the workload to elicit similar aerobic adaptations may differ.

Purpose: To observe the cardio-metabolic differences between a bodyweight circuit and interval-based treadmill running.

METHODS

- 14 males (n=7) and females (n=7) completed a bodyweight circuit and treadmill intervals.
 - M (25±6 yr; 176.7±5.8 cm; 90.9±20.4 kg)
 - F (23±6 yr; 163.5±9.4 cm; 65.0±9.3 kg)
- Day 1: Bodyweight circuit with 10 alternating rounds of burpees and jump squats with a 1:1 work-to-rest ratio (30 s on:30 s off).
- Day 2: Treadmill intervals set at a speed to match the average aerobic capacity (VO₂) obtained during the circuit.
- Differences in heart rate (HR), lactate, glucose, and energy expenditure (kcal) were assessed using Friedman's ANOVA & Cohen's *d*_{rm}.

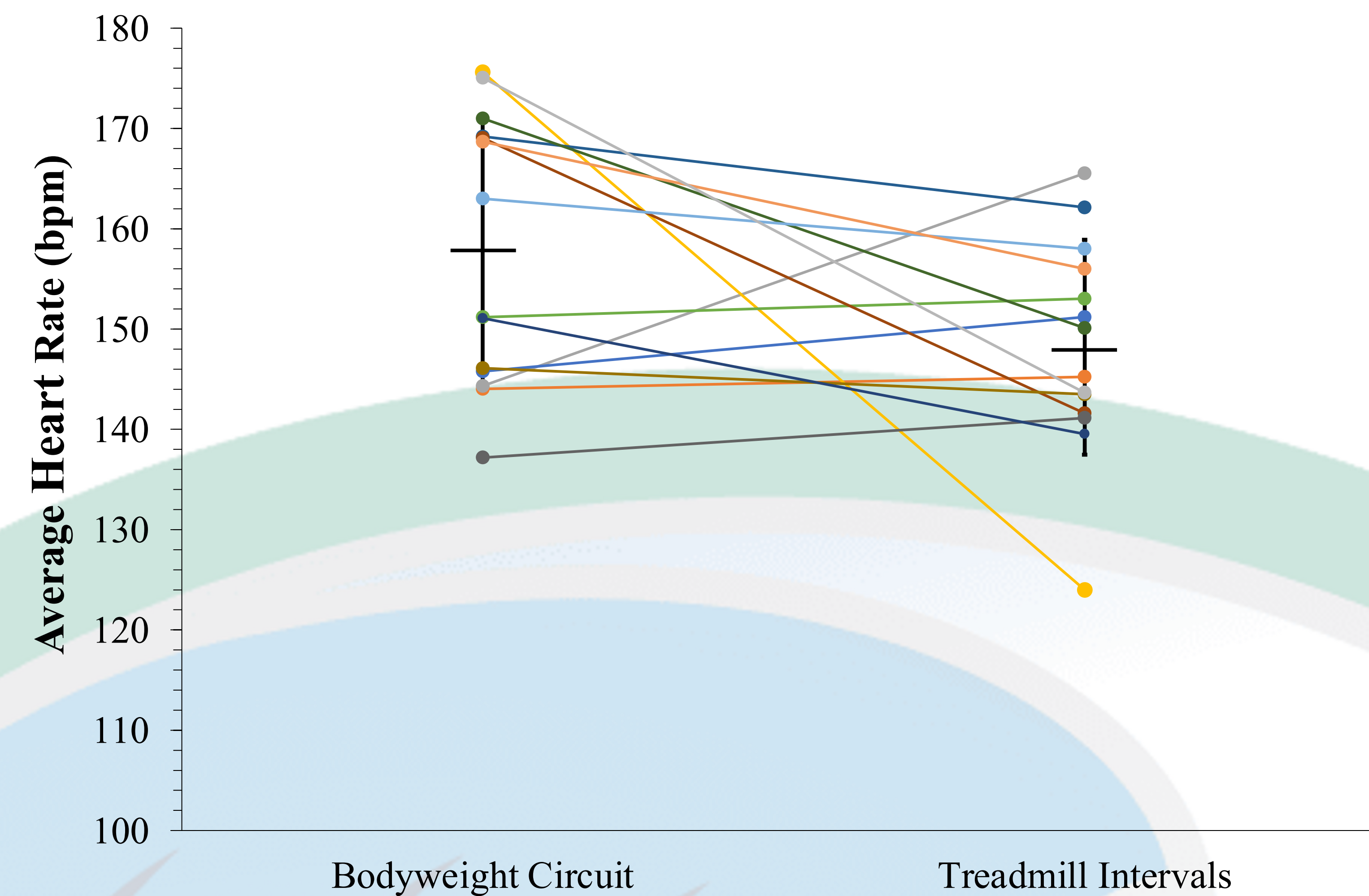


Figure 3. Individual differences in average heart rate (bpm) between a bodyweight circuit and treadmill intervals matched for aerobic demand (n=14).

RESULTS

- Despite a matched VO_{2avg} between sessions, circuits produced a moderate practical difference in HR_{avg} compared to the treadmill intervals (*d*_{rm}=0.53).
- Circuits also exhibited a very large practical change in anaerobic energy contribution via lactate production versus treadmill intervals (*d*_{rm}=2.78).
- Anaerobic contributions are further demonstrated within the very large practical difference in average RER between circuits and intervals (*d*_{rm}=1.87).

Table 1. Metabolic and cardiovascular differences between a bodyweight circuit and treadmill interval matched for aerobic demand.

Variable	Circuit	Range	Interval	Range
VO _{2avg} (ml/kg/min)	26.7 ± 4.4	20.8, 35.6	26.9 ± 4.7	20.9, 35.7
HR _{avg} (bpm)	158 ± 13	137, 176	148 ± 11	124, 166
Δ Lactate (mmol/L)	9.9 ± 2.7	5.4, 14	1.9 ± 2.0	-1, 7.2
Δ Glucose (mg/dL)	3.9 ± 26.3	-62, 40	-6.9 ± 34.4	-67, 87.5
kcal	95.1 ± 31.8	58.8, 157.5	89.6 ± 31.7	56.3, 147.1
RER	1.14 ± 0.12	1.03, 1.56	0.97 ± 0.05	0.89, 1.10
Treadmill speed (mph)	---	---	7.0 ± 1.40	5.0, 9.7

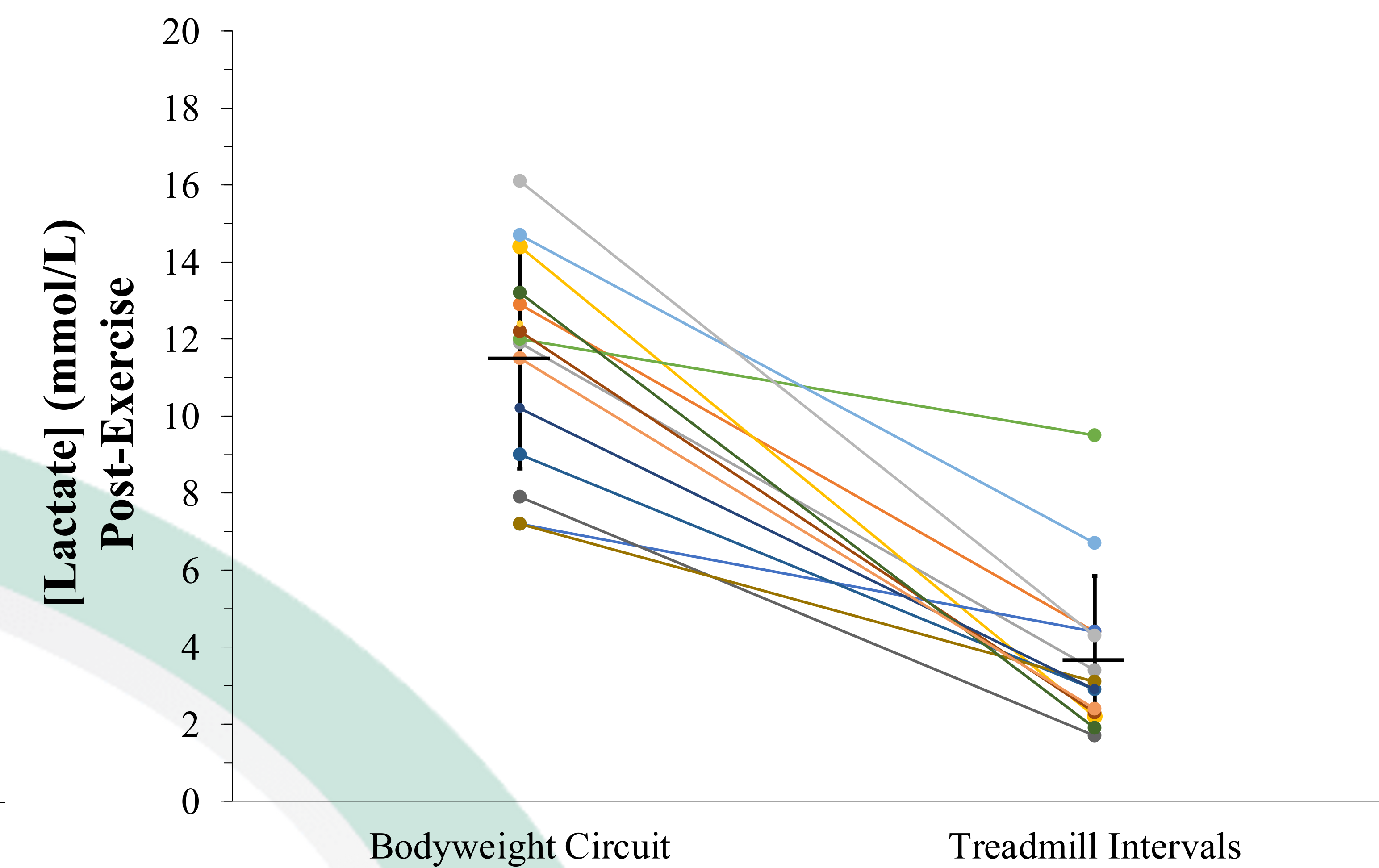


Figure 4. Individual differences in [lactate] (mmol/L) immediately post-exercise between a bodyweight circuit and treadmill intervals matched for aerobic demand (n=14).

DISCUSSION

- While matched for VO_{2avg}, bodyweight circuits required a greater muscular demand to complete the movements; thus, increasing overall energy expenditure and HR_{avg}.

PRACTICAL APPLICATIONS

- Although aerobic performance can be improved minimally through bodyweight circuits, treadmill intervals can elicit the same aerobic demand with less overall workload.



Figure 1: Bodyweight Circuit



Figure 2: Treadmill Intervals