

VALIDATION OF A NOVEL ISOMETRIC RESISTANCE TRAINING BAND: A COMPARISON OF THE CARDIOVASCULAR RESPONSES BETWEEN EXERCISE MODES

WRIGHT, B.H.¹, BAXTER, B.A.¹, ANTROBUS, M.R.¹, JONES, P.G.W.¹, BAROSS, A.W.¹.

¹Sport and Exercise Science, University of Northampton (UK).

✉ Ben.wright@northampton.ac.uk

🐦 @BHWright_



Introduction

Short- to long-term isometric resistance training (IRT) can produce clinically meaningful reductions in resting blood pressure (BP) (Hansford et al., 2021) however, established methods can be costly or require laboratory access, limiting wider application. The use of an affordable and versatile isometric training band (ITB) could improve accessibility. Yet, there is a need to establish the efficacy, safety, and suitability prior to prescription as an alternative IRT method.

Aims

To establish equivalent isometric training intensities for the ITB to isometric handgrip (IHG) using the category ratio (CR-10) scale and to examine the acute cardiovascular (CV) responses between exercises. To determine if the novel ITB can elicit CV responses (BP, heart rate [HR], and rate-pressure product [RPP]) comparable to established IRT methods.

Methods

30 healthy normotensive adults (25 ± 9 years, systolic [SBP]; 119 ± 5 mmHg, diastolic [DBP]; 70 ± 6 mmHg).

Phase 1 (n = 15)

Replication of IHG exertion (CR-10) for novel ITB exercises (Figure 1).

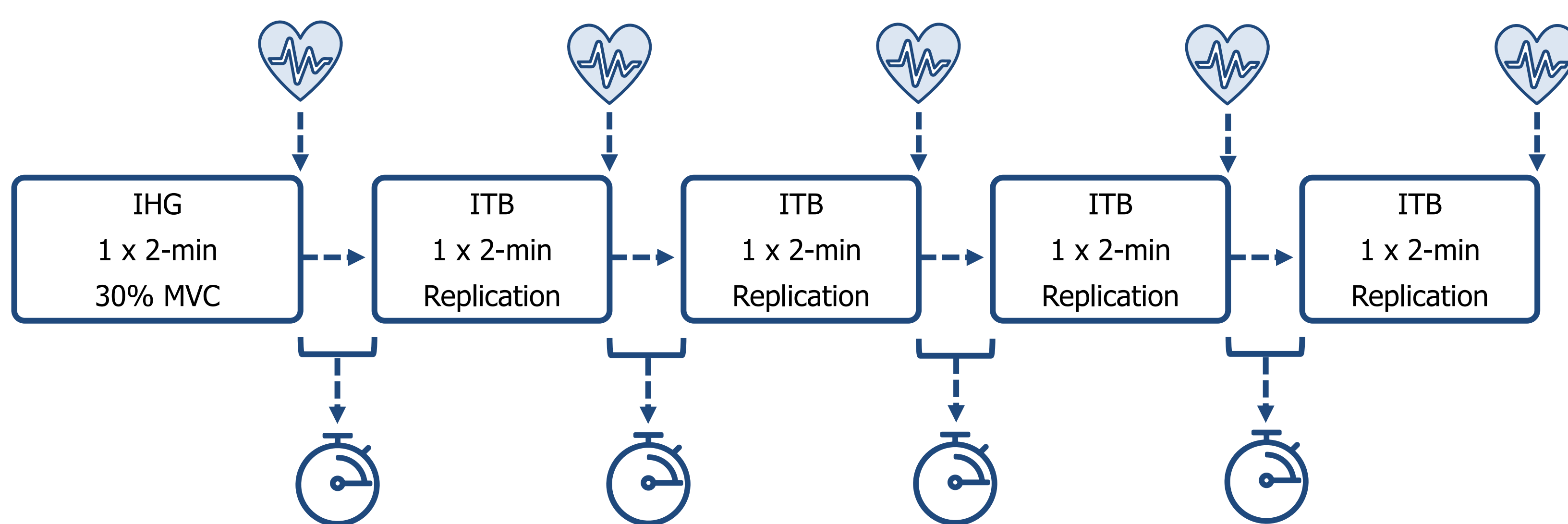


Figure 1. Schematic of study protocol including order of exercise, rest periods, and time points for measurement. IHG, isometric handgrip, ITB, isometric training band, MVC, maximal voluntary contraction.

Phase 2 (n = 15)

Comparison of CV (BP, HR, & RPP) responses to an ITB and IHG bout (Figure 2).

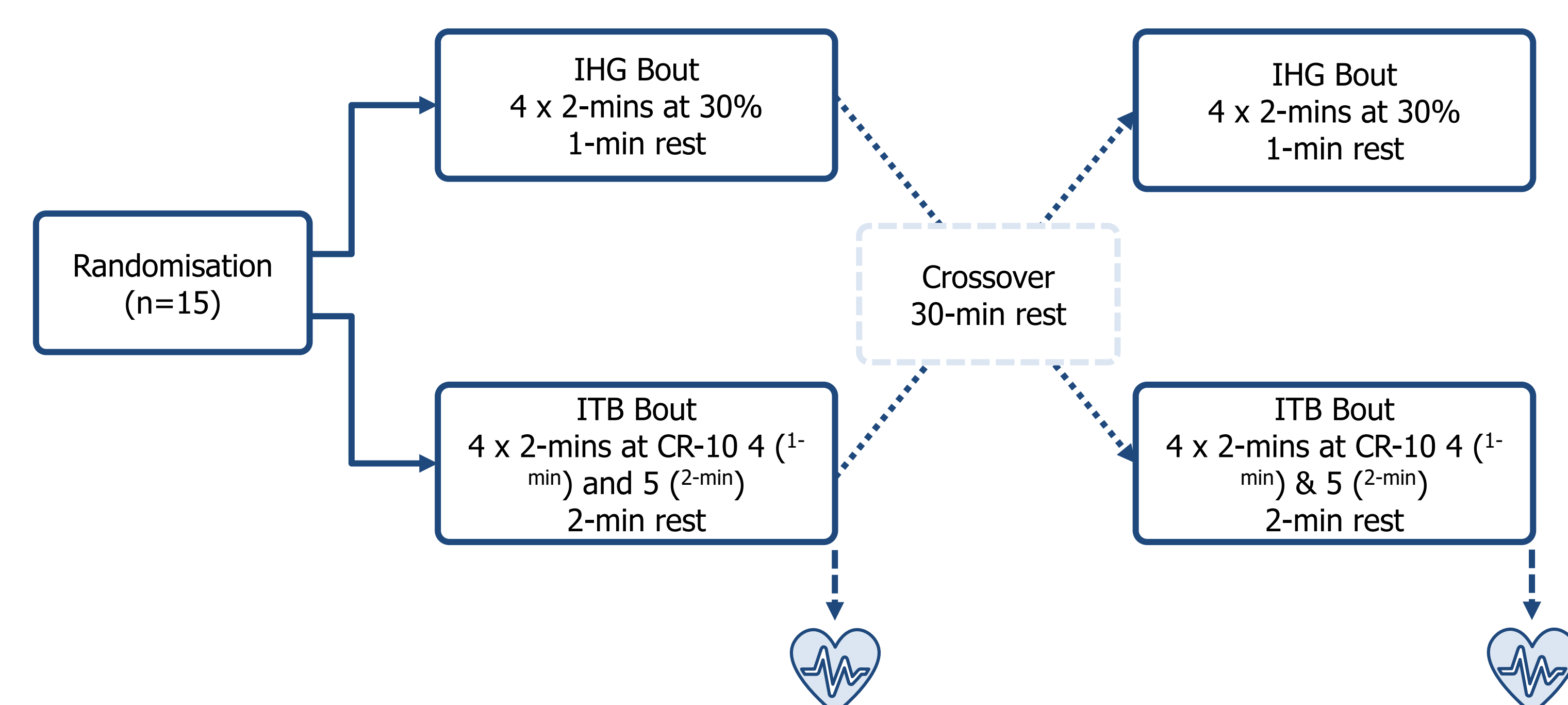


Figure 2. Schematic diagram of study protocol including training group allocation, randomisation, and time points for measurement. IHG, isometric handgrip, ITB, isometric training band, CR-10, category-ratio scale.

Results

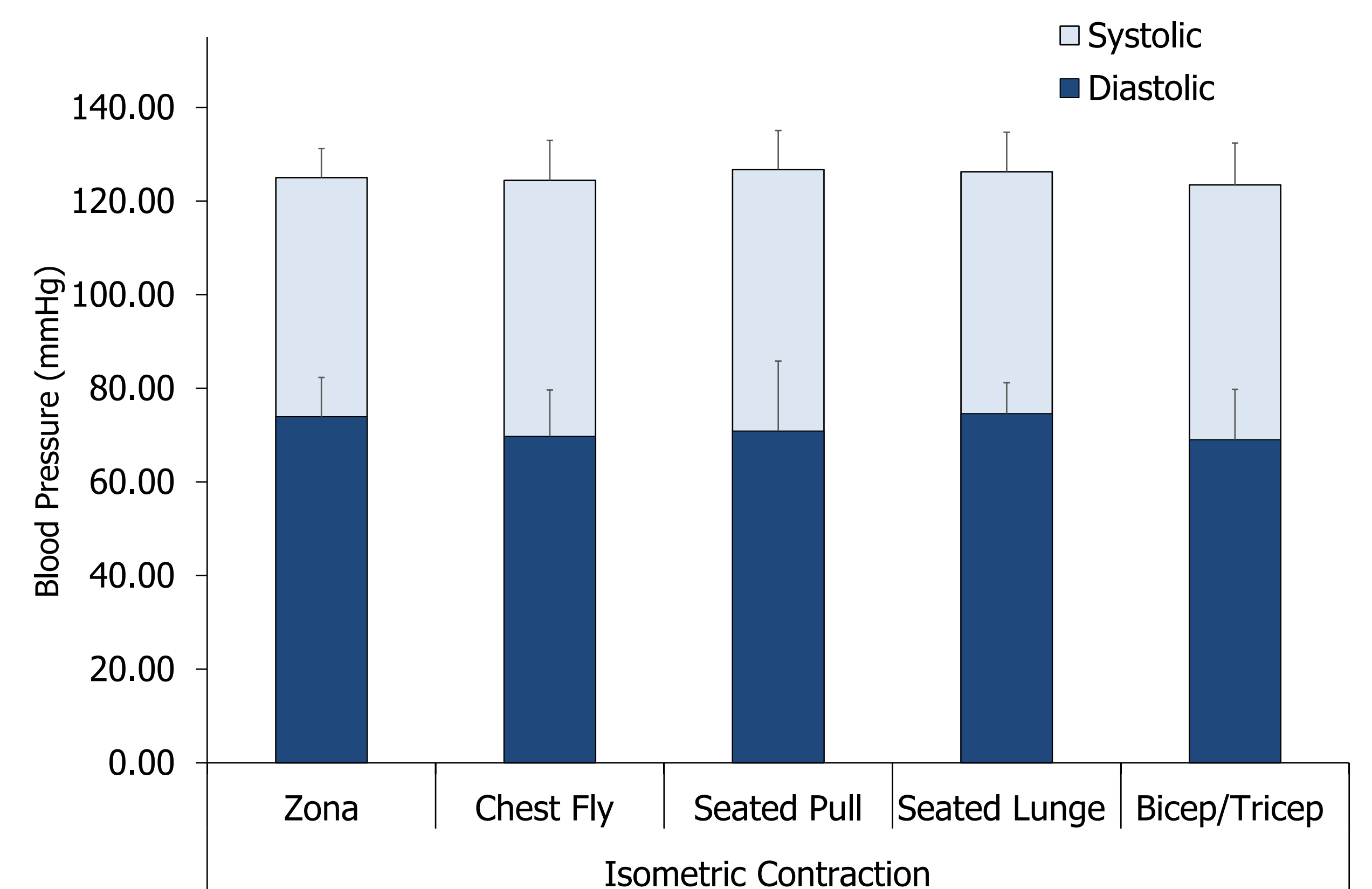


Figure 3. Systolic and diastolic blood pressure responses (mean ± SD) to individual 2-minute isometric contractions.

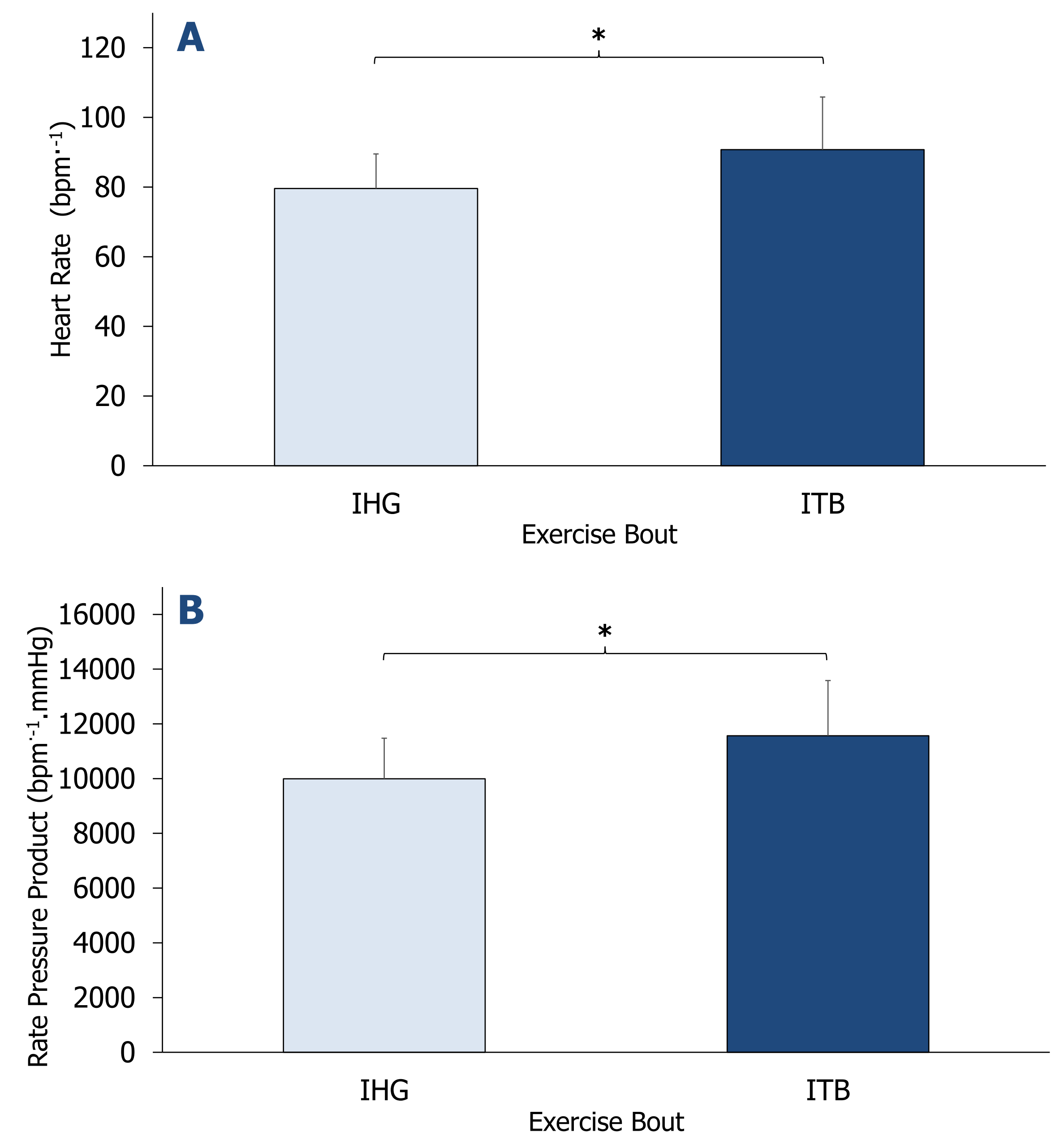


Figure 4. Heart rate (A), and rate-pressure product (B) data (mean ± SD) between exercise bouts. IHG, isometric handgrip, ITB, isometric training band. *($P < 0.05$).

Discussion & Conclusion

The CV demands reported during and after undertaking the novel ITB exercises are comparable to established IHG methods. Although the HR and RPP responses were greater in the ITB bout, values did not exceed reported unsafe thresholds (Liguori, 2020).

These findings suggest the novel ITB, and associated protocol, may serve as a versatile, cost-effective, and accessible alternative method for performing IRT.

References

Hansford, H.J., Parmenter, B.J., McLeod, K.A., Wewege, M.A., Smart, N.A., Schutte, A.E. and Jones, M.D., (2021). The effectiveness and safety of isometric resistance training for adults with high blood pressure: a systematic review and meta-analysis. *Hypertension Research*, 44 (11), pp.1373-1384.

Liguori, G. and American College of Sports Medicine, (2020). *ACSM's guidelines for exercise testing and prescription*. Lippincott Williams & Wilkins.