

The effects of acute high-intensity interval exercise on the temporal dynamics of inhibitory control and ERPs



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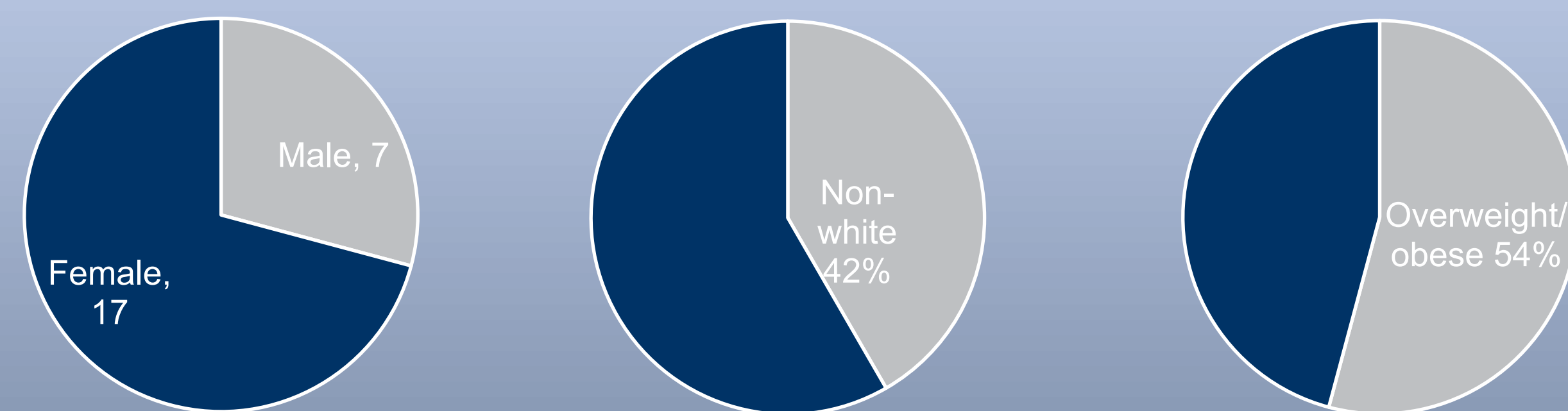
INTRODUCTION

Acute aerobic high intensity interval training (HIIT) has demonstrated positive effects on inhibitory control in young adults. However, the evidence is not well established regarding the combination of HIIT aerobic and resistance training in accordance with underlying neural mechanisms following acute exercise. The purpose of the present investigation was to examine the transient effects of HIIT-aerobic and HIIT-aerobic resistance on event-related potentials (ERP's) during an inhibitory control task in 18- 30-year-old adults. All participants (n = 24) completed the flanker task on three separate counterbalanced days (i.e., HIIT-aerobic, HIIT-aerobic resistance, and seated rest). Task performance and the P3 ERP component were assessed at approximately 30-minutes and 85-minutes following 9-minutes of each condition. Results revealed no improvements or decrements in behavior and P3 measures of latency and amplitude following the HIIT and rest conditions. Together, these data suggest inhibitory control and neuroelectric underpinnings are not affected by different modalities of HIIT at 30-minutes and 85-minutes following the exercise bouts. Such findings have implications for promoting time-efficient healthy physical activity behaviors without disrupting necessary cognitive functioning throughout the day.

PARTICIPANTS

- Undergraduate students were recruited from the University of North Carolina at Greensboro.
- All participants were free of neurological diseases.

N = 24
MEAN AGE = 21.5



STUDY DESIGN

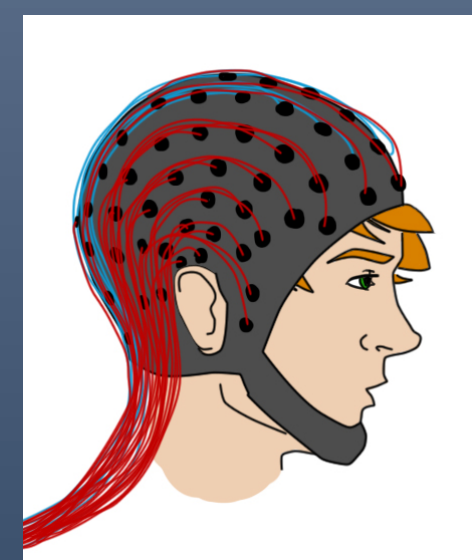
(DURATION OF EACH CONDITION)

9 MINUTES 20 MINUTES 30, 85MINUTES

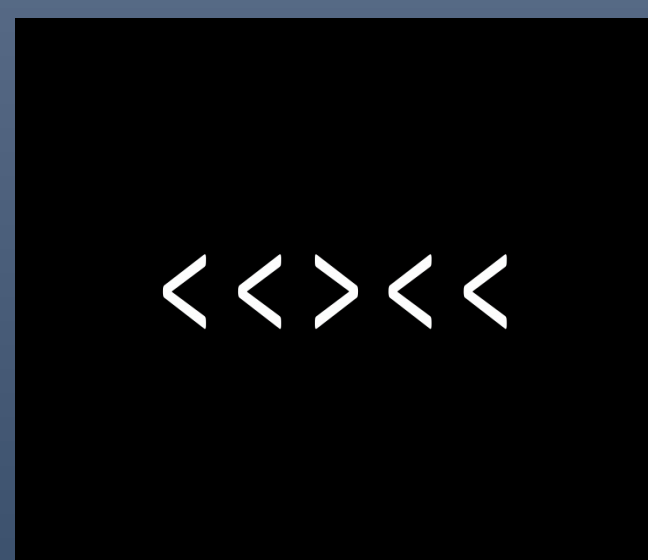


1 minute warm-up at 60% HR max
1.5 minute 90% HR max
1 minute walking
1.5 minute 90% HR max
1 minute walking
1.5 minute 90% HR max
1.5 minute cool down

EEG CAP PREPARATION



FLANKER TASK

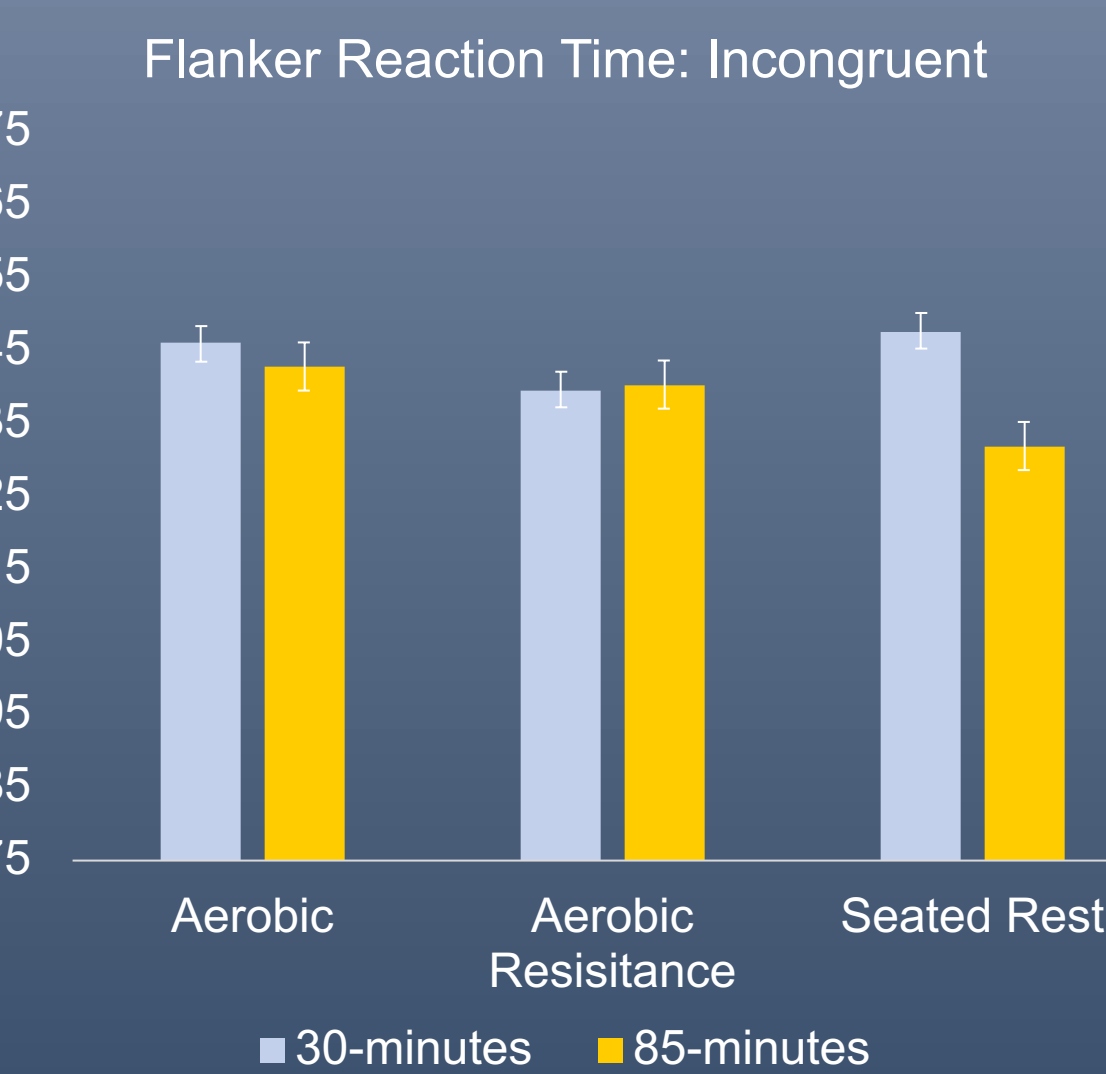
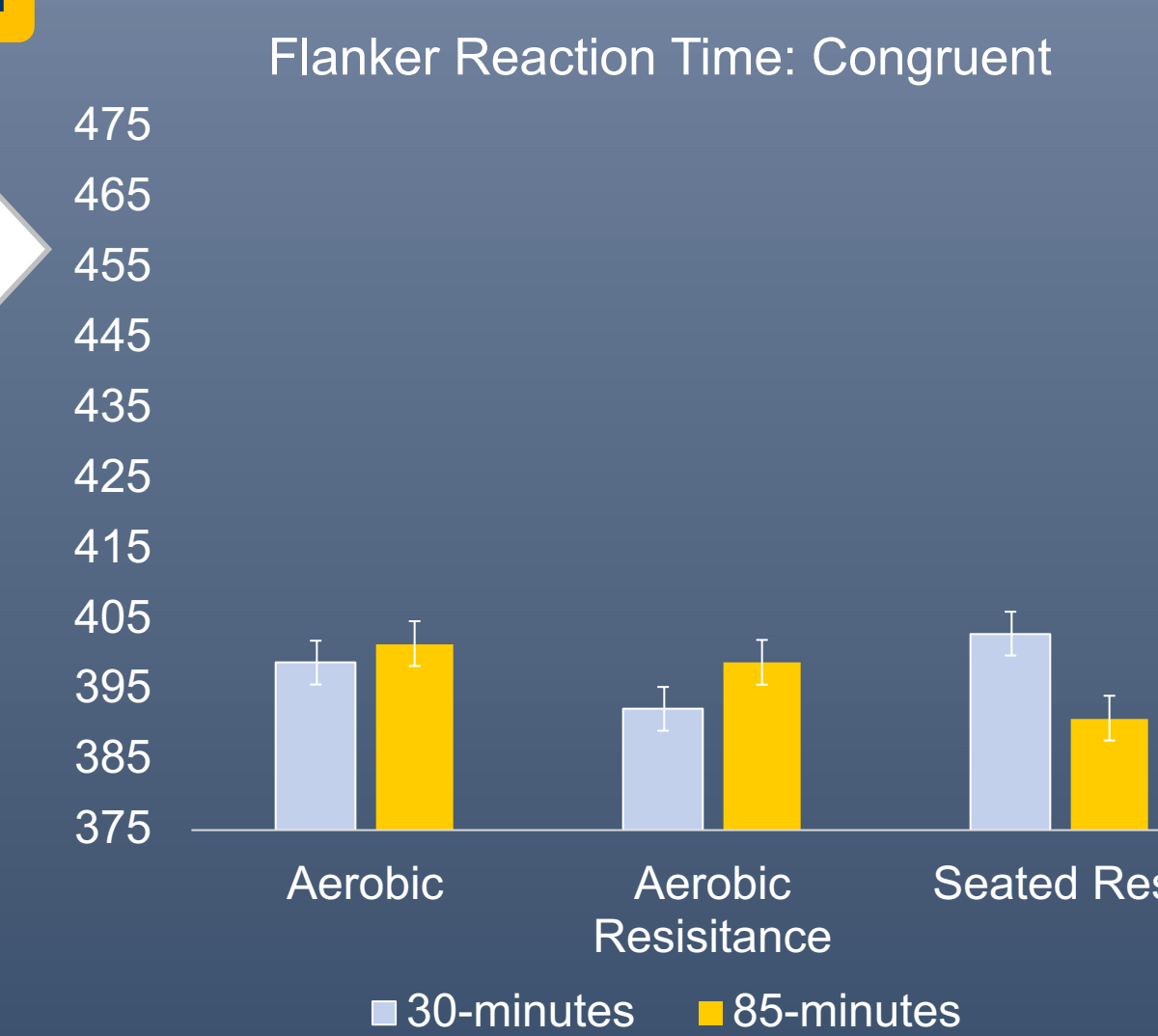
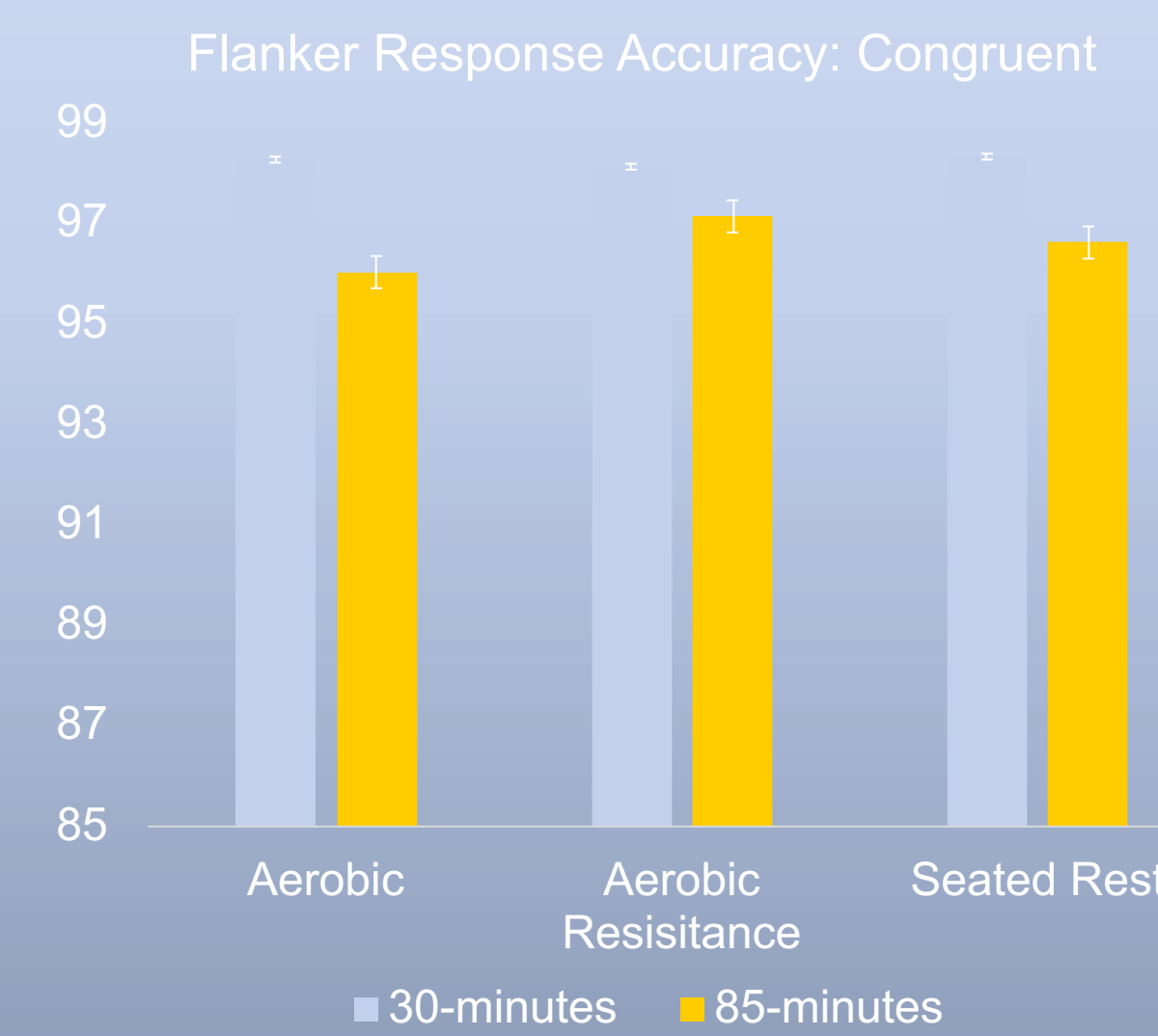
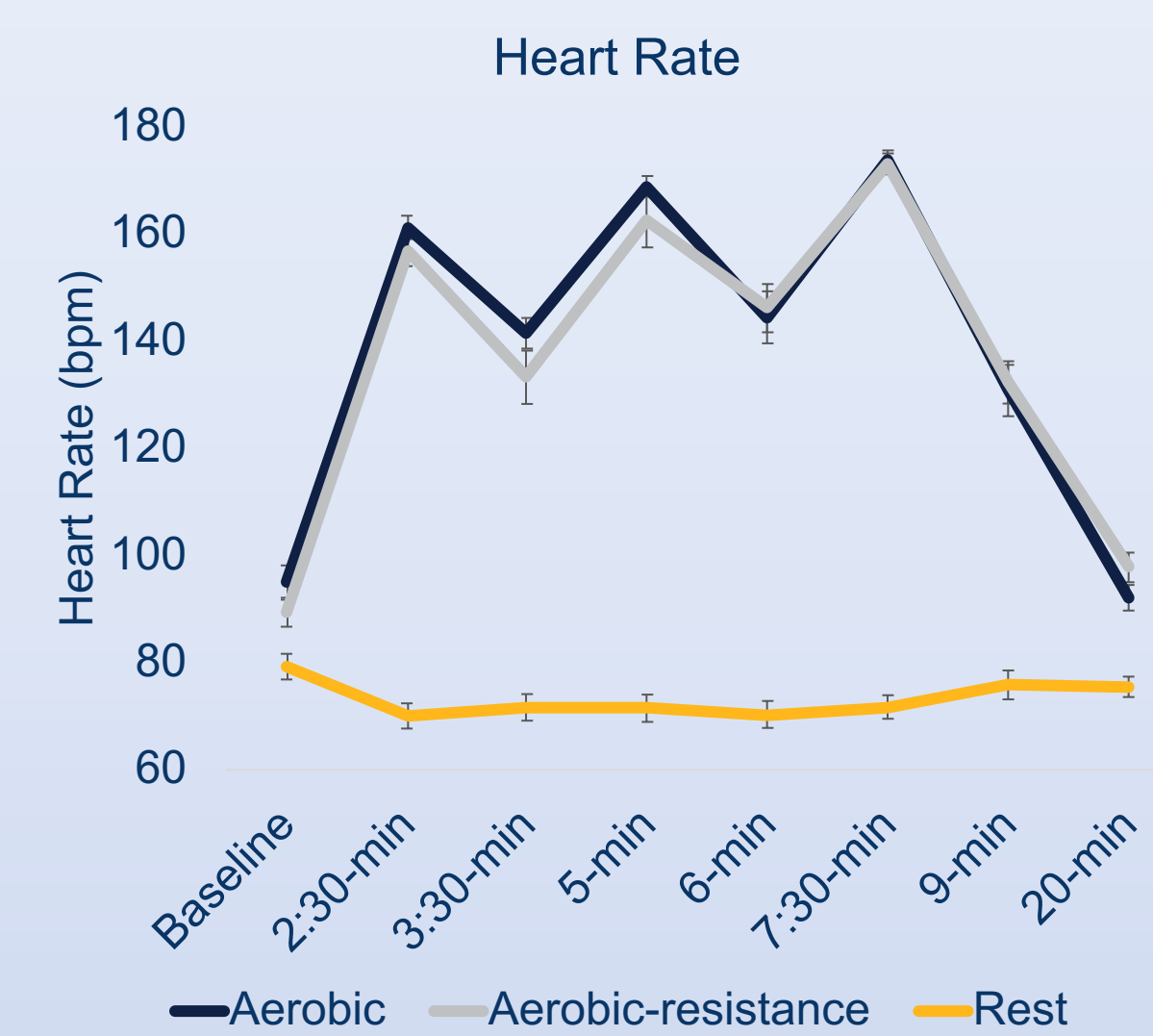
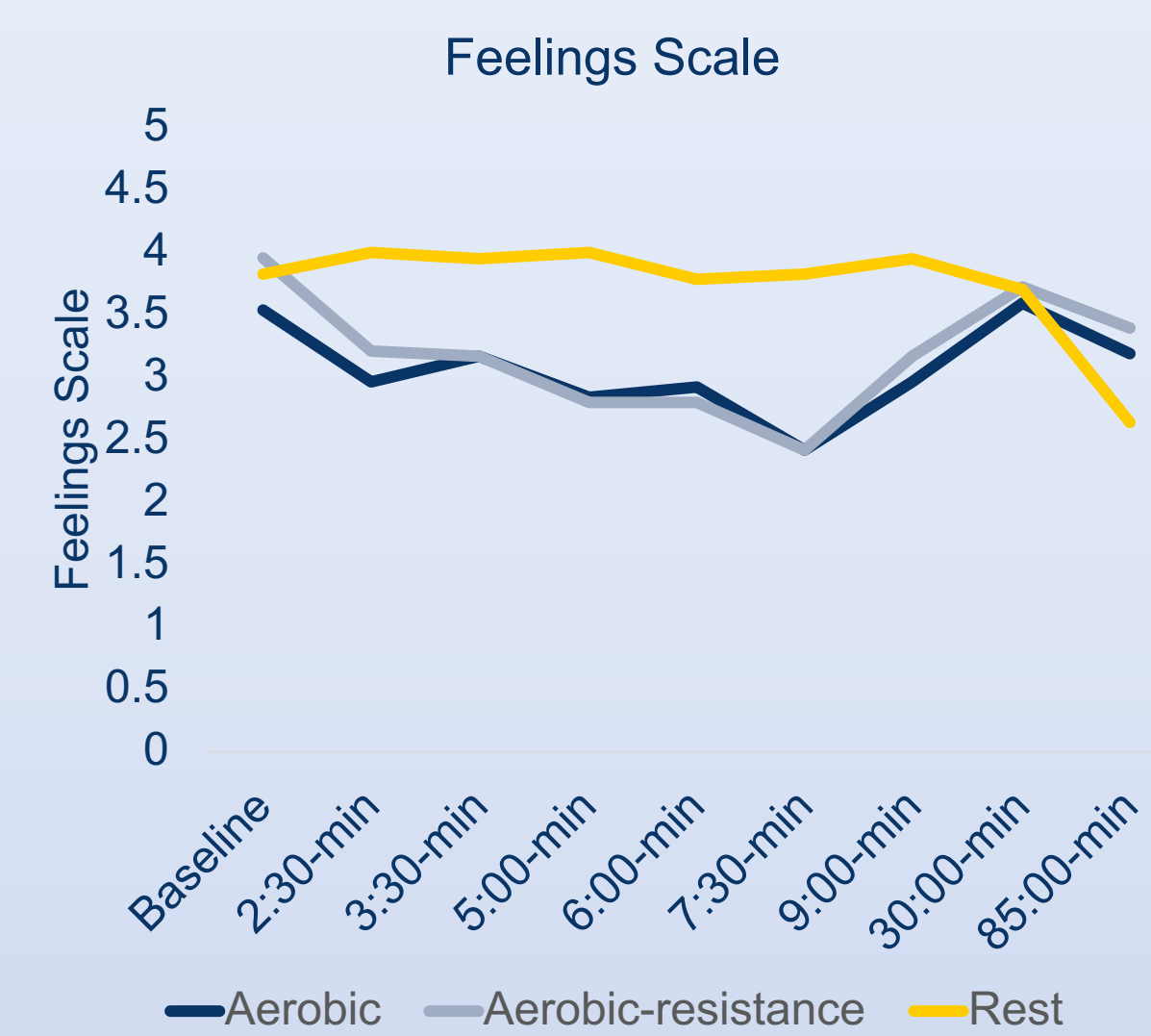


1 minute warm-up at 60% HR max
1.5 minute AMRAP*
1 minute walking
1.5 minute AMRAP*
1 minute walking
1.5 minute AMRAP*
1.5 minute cool down

9 minutes educational video

*AMRAP = 10 m shuttle run - 20 Jumping jacks - 10 m skipping - 15 air squats - 20 high knees - 10 m walking lunge

RESULTS



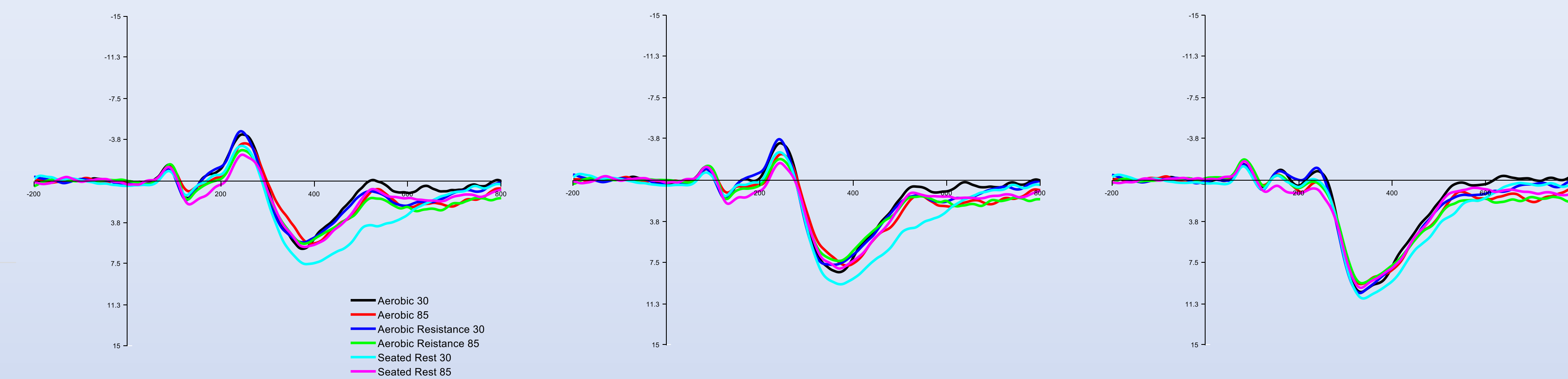
ERPs

CONGRUENT

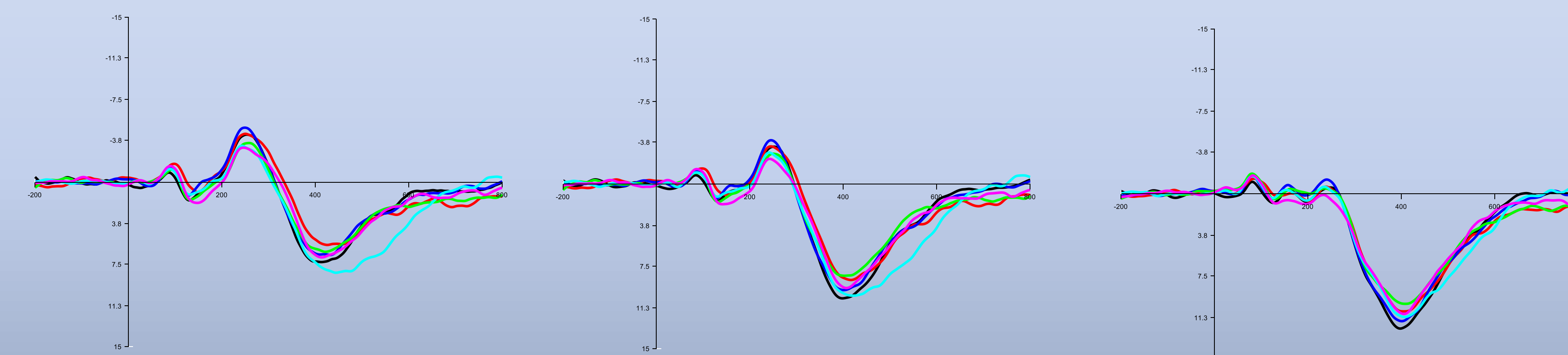
Fz

FCz

Cz



INCONGRUENT



CONCLUSION

- Flanker performance elicited shorter reaction time for congruent trials 30- and 85-minutes after compared to incongruent trials. Additionally, reaction time interference demonstrated greater interference 30-minutes after compared to 85-minutes after.
- Greater overall flanker accuracy was observed 30-minutes after exercise and rest compared to 85-minutes after.
- P3 measures of amplitude and latency following HIIT and seated rest conditions revealed no significant improvements or decrements.
- Together, these data suggest inhibitory control and neuroelectric underpinnings are not affected by different modalities of HIIT following the exercise and possess implications for promoting healthy physical activity behavior.

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