

# The Effects of Menthol Mouth-Rinsing upon Modified Three Minute Maximal Test Performance in the Heat.



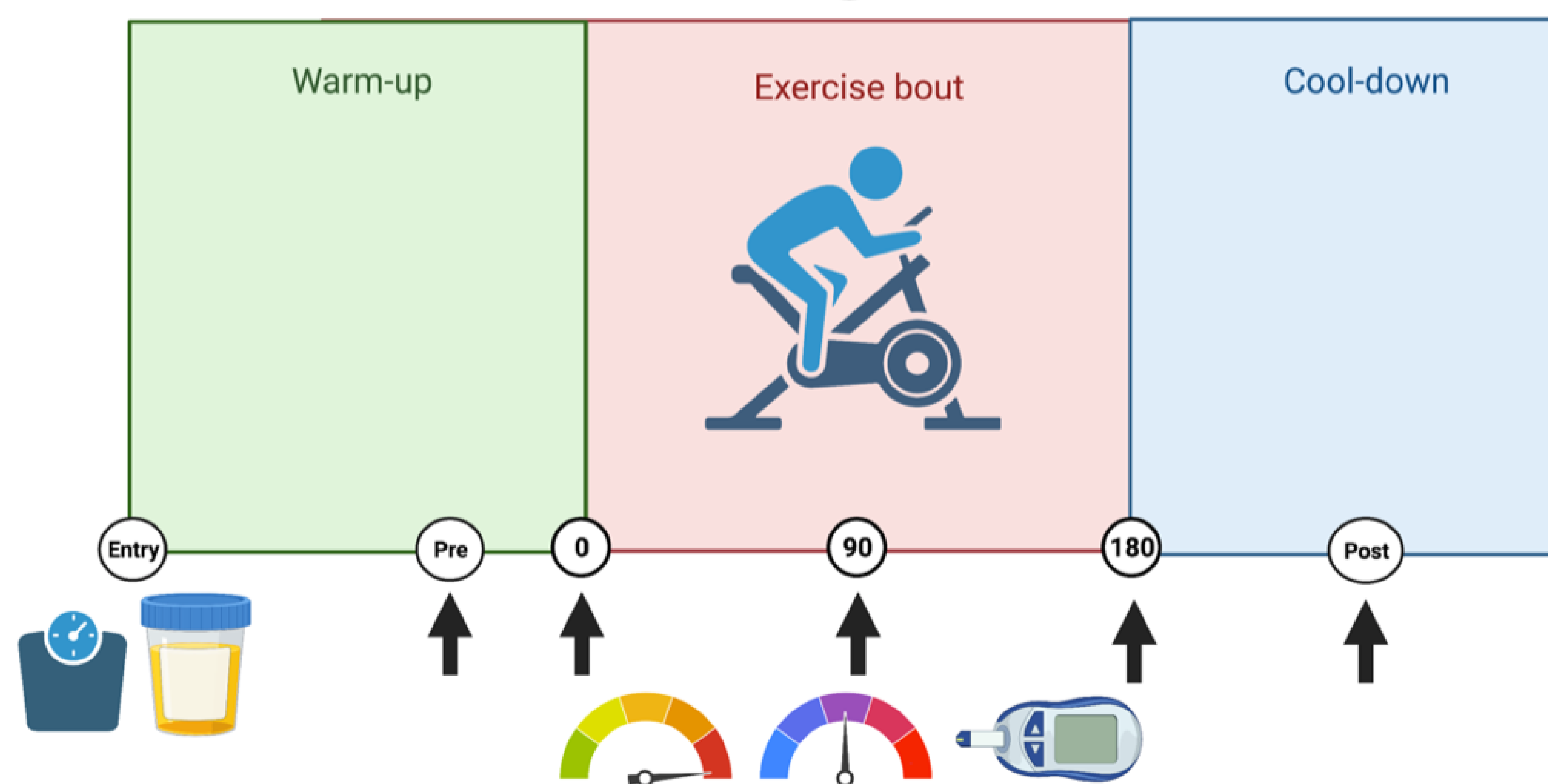
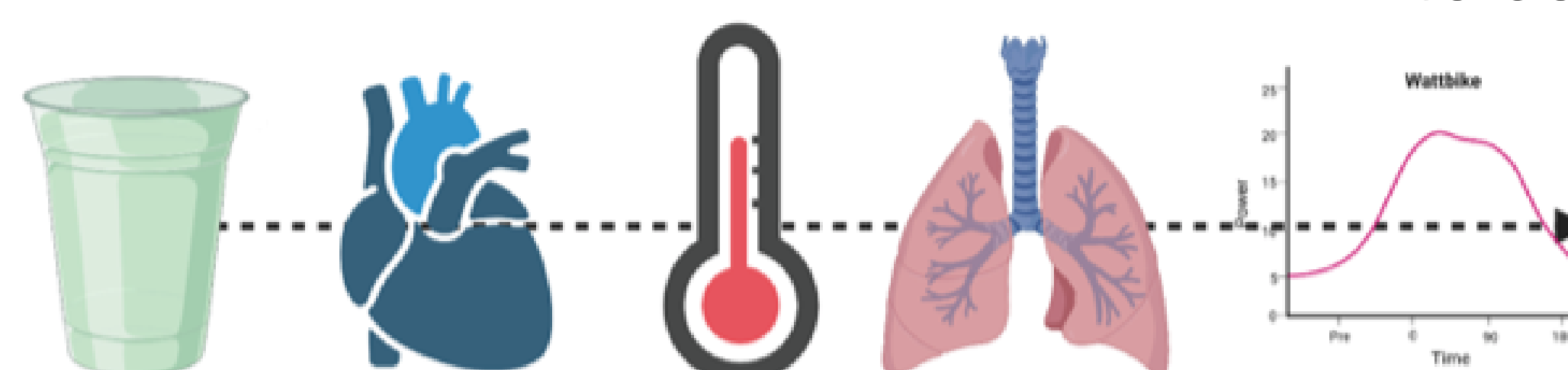
Seana Crosby and Russ Best

Centre for Sport Science and Human Performance, Wintec, Hamilton, New Zealand (2021)

## Results

Small to moderate effects (Cohen's d and accompanying a 90% confidence intervals) between solutions A, B and C were observed towards the end of the test in relation to relative power. Specifically, from 75-105 sec between solutions A and B, A and C this continued between A and B, A and C from 105-135 sec. Between 135-165 seconds there was a moderate difference between solutions A and B. This indicates participants produced higher relative power for longer durations with the addition of the menthol mouth rinse, compared to cold water or placebo.

*The aim of the present study was to examine whether a single menthol mouth rinse influenced performance and or thermal perception during a 3-minute modified maximal test compared to cold water mouth rinse and placebo mouth rinses.*



## Conclusions

The findings of this investigation suggest that 0.1% menthol used as a mouth rinse, prior to the completion of a modified 3-minute maximal test in the heat, increases the power produced towards the end of the test, in comparison to a cold water or placebo mouth rinse. However, no improvements to perceptual measures of thermal comfort, thermal sensation, RPE or ventilation during the test were observed.

Previous menthol studies have demonstrated ergogenic effects in endurance-based activity. There is a need for research in sport whose physiological requirements exceed maximal aerobic capacity. Modifying a three minute maximal test was designed to elicit maximal oxygen up and profile the rate of deterioration to critical power. The recent combination of menthol with other cooling methods has sparked interest in both research and applied settings as a novel and safe ergogenic aid.

## Materials and Methods

- Trials were completed over 5 visits to the laboratory, visit 1 including a VO<sub>2</sub>max test, visit 2 a familiarisation session in the heat chamber completing a 3 minute test with visits 3-5 being full experimental trials.
- Menthol mouth rinse consisted of 0.1% menthol concentrate and 25mL of de-ionised water.
- Eleven healthy non-heat-acclimated male and female participants were included in this study.
- Conditions in the environmental heat chamber were set to 33.0 ± 3.0° with RH 46.0 ± 5.0%.
- Prior to exercising the participants were asked to weigh themselves, provide a urine sample for hydration testing and insert a thermistor for accurate internal body temperature measures.
- Throughout the test physiological, ventilatory and perceptual measures were taken.

## References

Gillis, D., House, J., & Tipton, M. (2010). The influence of menthol on thermoregulation and perception during exercise in warm, humid conditions. *European Journal Of Applied Physiology*, 110(3), 609-618.  
 Mundel, T., & Jones, D. (2009). The effects of swilling an (-)-menthol solution during exercise in the heat. *European Journal Of Applied Physiology*, 109(1), 59-65.  
 Barwood, M., Corbett, J., Thomas, K., & Twentyman, P. (2015). Relieving thermal discomfort: Effects of sprayed L-menthol on perception, performance, and time trial cycling in the heat. *Scandinavian Journal Of Medicine & Science In Sports*, 25, 211-218.  
 Stevens, C., Ross, M., & Vogel, R. (2020). Development of a "Cooling"  
 Best, R., Spears, I., Hurst, P., & Berger, N. (2018). The Development of a Menthol Solution for Use during Sport and Exercise. *Beverages*, 4(2), 44.

