

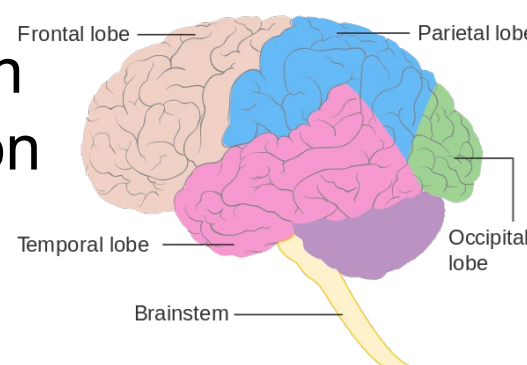
# Impact of Aerobic Exercise on Reaction Time and Working Memory in Healthy Adults

Abouelnaga N, Gjersvik G, Kaari V, Karls K, Sund S, Lojovich J

## Introduction

### •Cognitive Domains<sup>1</sup>

- Complex Attention
- Executive Function
- Language
- Social Cognition
- Learning & Memory
- Perceptual-Motor Control



### •Aerobic exercise has been shown to change:

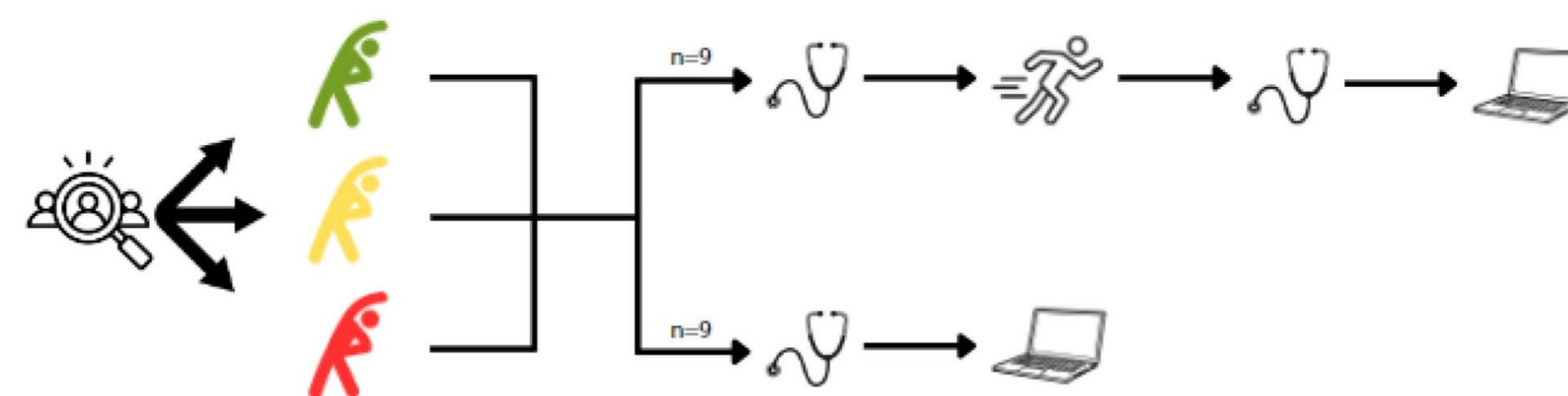
- ↑ Brain-Derived Neurotrophic Factor (BDNF)<sup>2</sup>
- ↑ Cortisol, lactic acid, glutamate, and glutamine<sup>2,3,4</sup>
- EEG, fMRI, and TMS
  - Correlates with ↑ working memory<sup>5,6</sup>
- ↓ Reaction time<sup>7</sup>
- ↑ Overall health<sup>8</sup>

### •Long-term can alter neurochemicals and have positive impacts on cognitive domains<sup>7,8</sup>

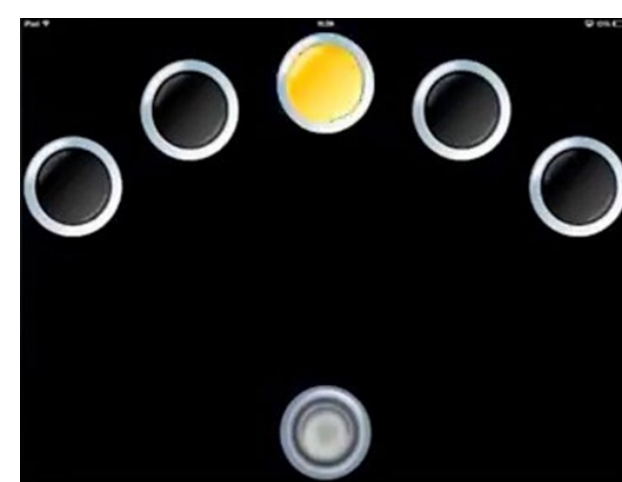
## Purpose

•The purpose of this study is to identify if an acute, single bout of aerobic exercise at moderate intensity is sufficient to elicit a change in cognition, particularly reaction time and working memory.

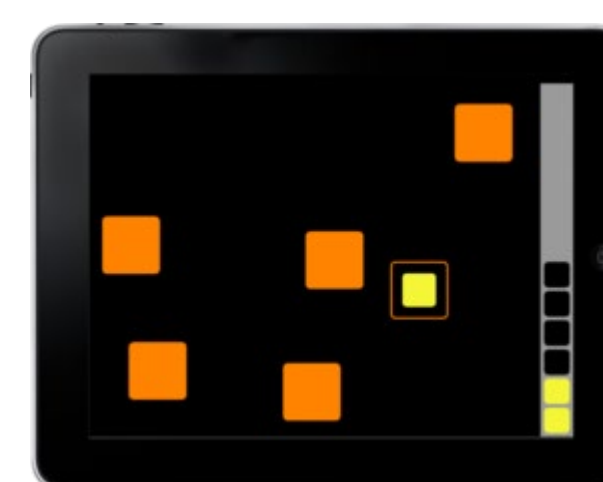
## Methods



Reaction Time Index (RTI)



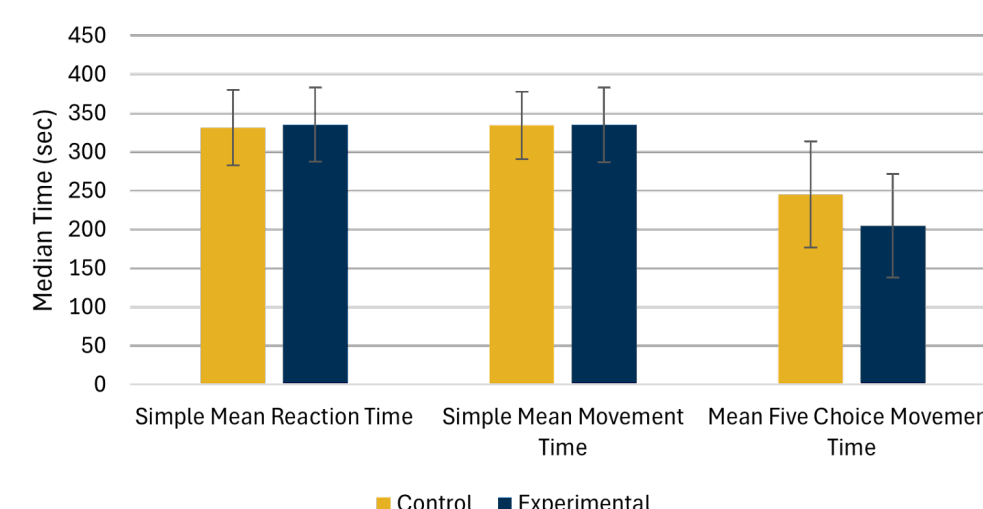
Spatial Working Memory (SWM)



Statistical analysis via Mann-Whitney U

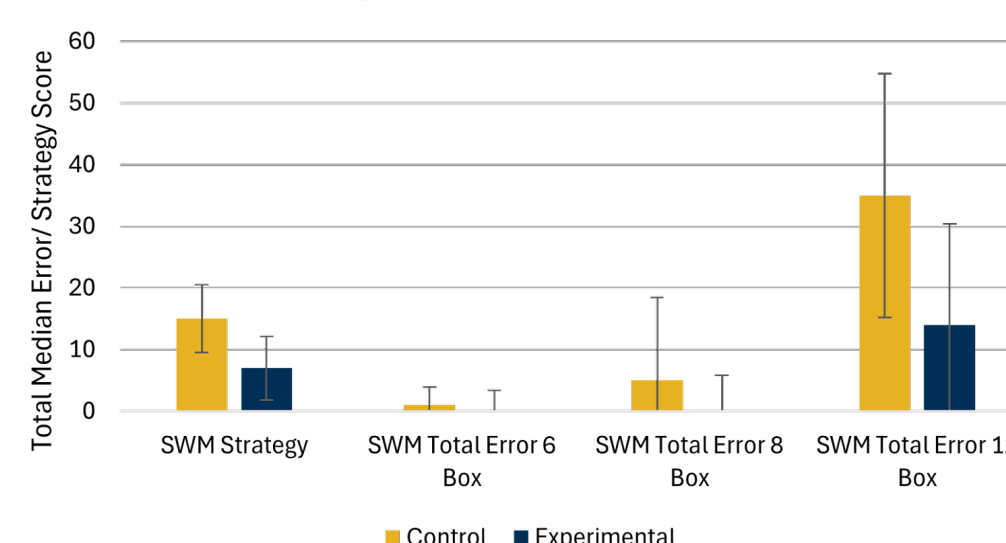
## Results

Reaction Time Index Median Comparisons



•There were no significant difference between exercise group and control group Reaction Time Index or Spatial Working Memory test outcome measures ( $p>0.05$ ).

Spatial Working Memory Test Median Comparison



•Median time, error, and strategy scores reported above with standard deviation bars for each population.

## Limitations

- BDNF levels fluctuate throughout the day, possibly interfering with our results.<sup>9</sup>
- The SWM may require multiple cognitive domains to complete efficiently.
- Power Analysis: at least 23 total participants would have been required to identify any statistically significant differences.

## Conclusions

- No significant effect on reaction time or spatial working memory.
- Exposure to different external stimuli during the 12-Minute Cooper Run Test might have influenced participant's performance.
- Future studies should be conducted on a larger scale to account for power analysis and should utilize different working memory tests

## Acknowledgments

We want to thank Concordia University - St. Paul for the Concordia Quasi-Endowment Grant to purchase the CANTAB software and supplying the gym space to run our experiment.

## References



SCAN ME