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Sprint-based Exercise and Cognitive Function in Young People

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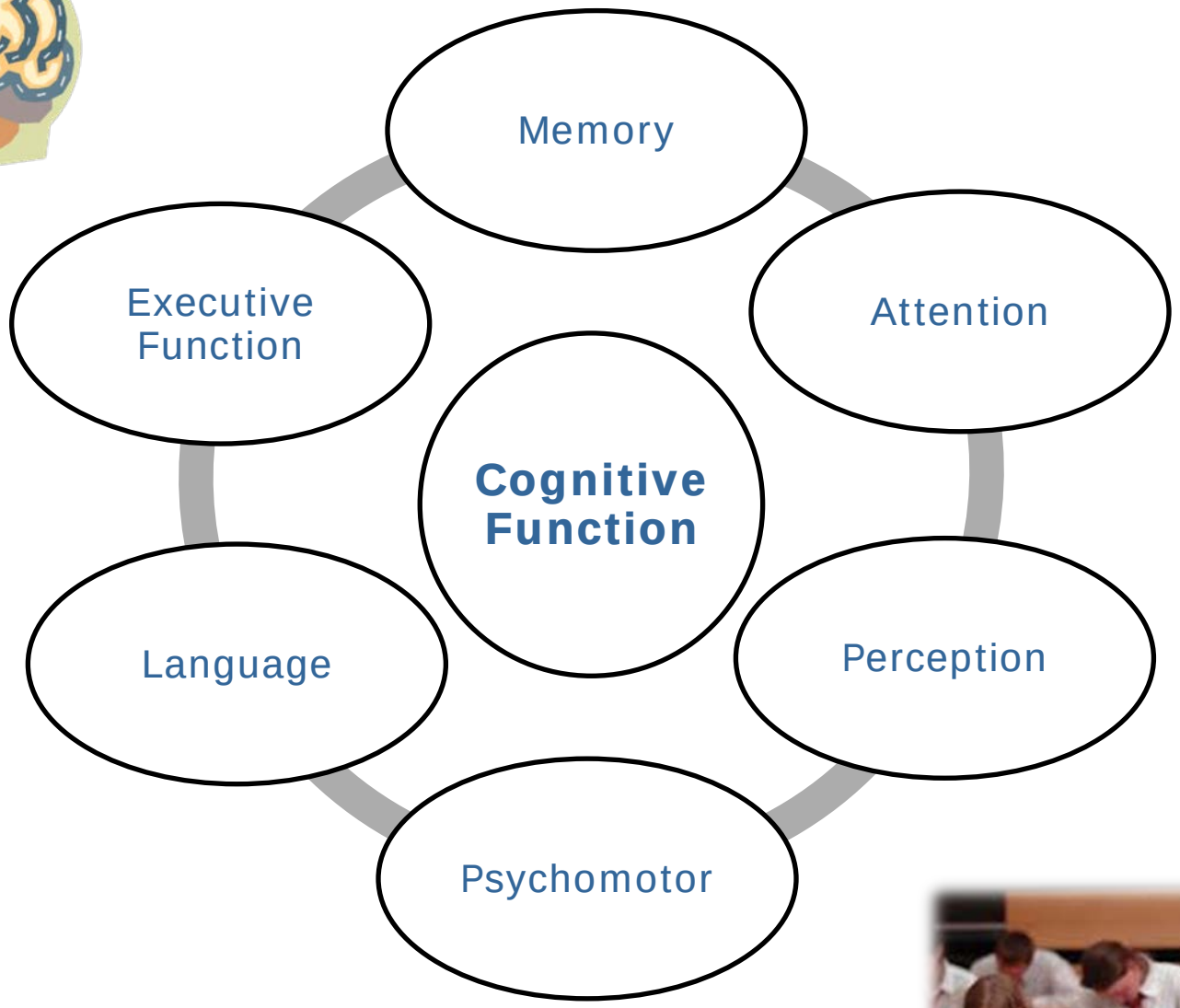
shape sport, health and performance enhancement

National Centre for Sport & Exercise Medicine
Working for Health & Wellbeing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Attention
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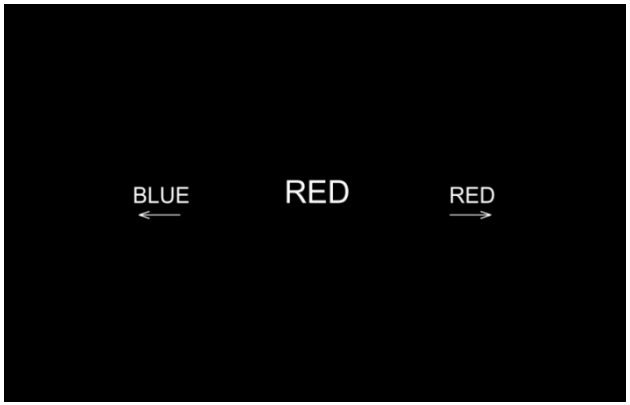
Executive Function
Cognitive Function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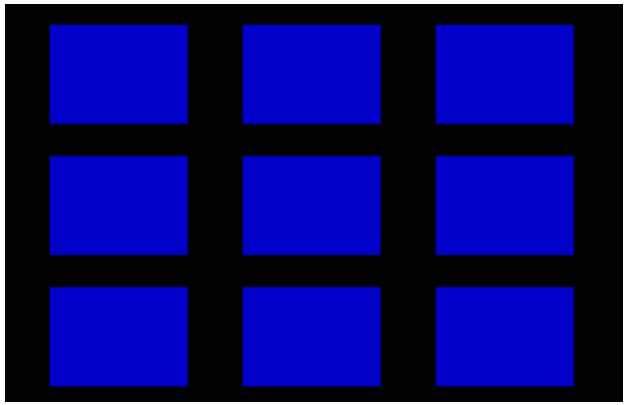


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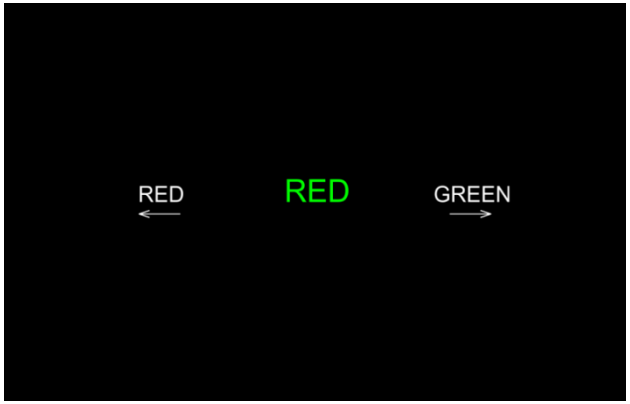
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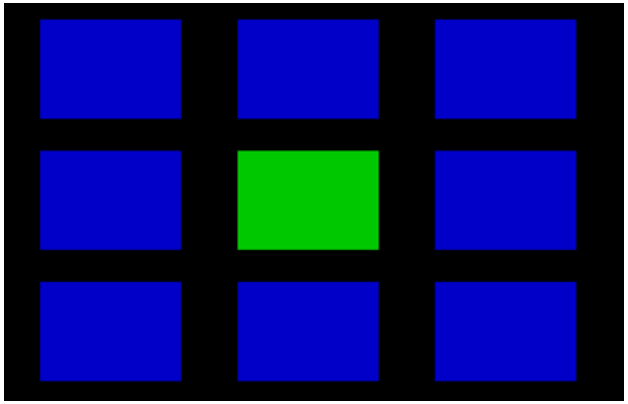


Exercise & Cognitive Function

- Exercise is (or should be!) a part of the school day
  - break time/PE
  - active lessons
  - part of the extended school day
- Some evidence that exercise improves behaviour in school children (Kibbe et al, 2011)
- Recent meta-analysis suggests exercise has a small but positive acute effect on cognitive function (Chang et al, 2012)
- BUT many confounding variables mediate the exercise-cognition relationship

Duration

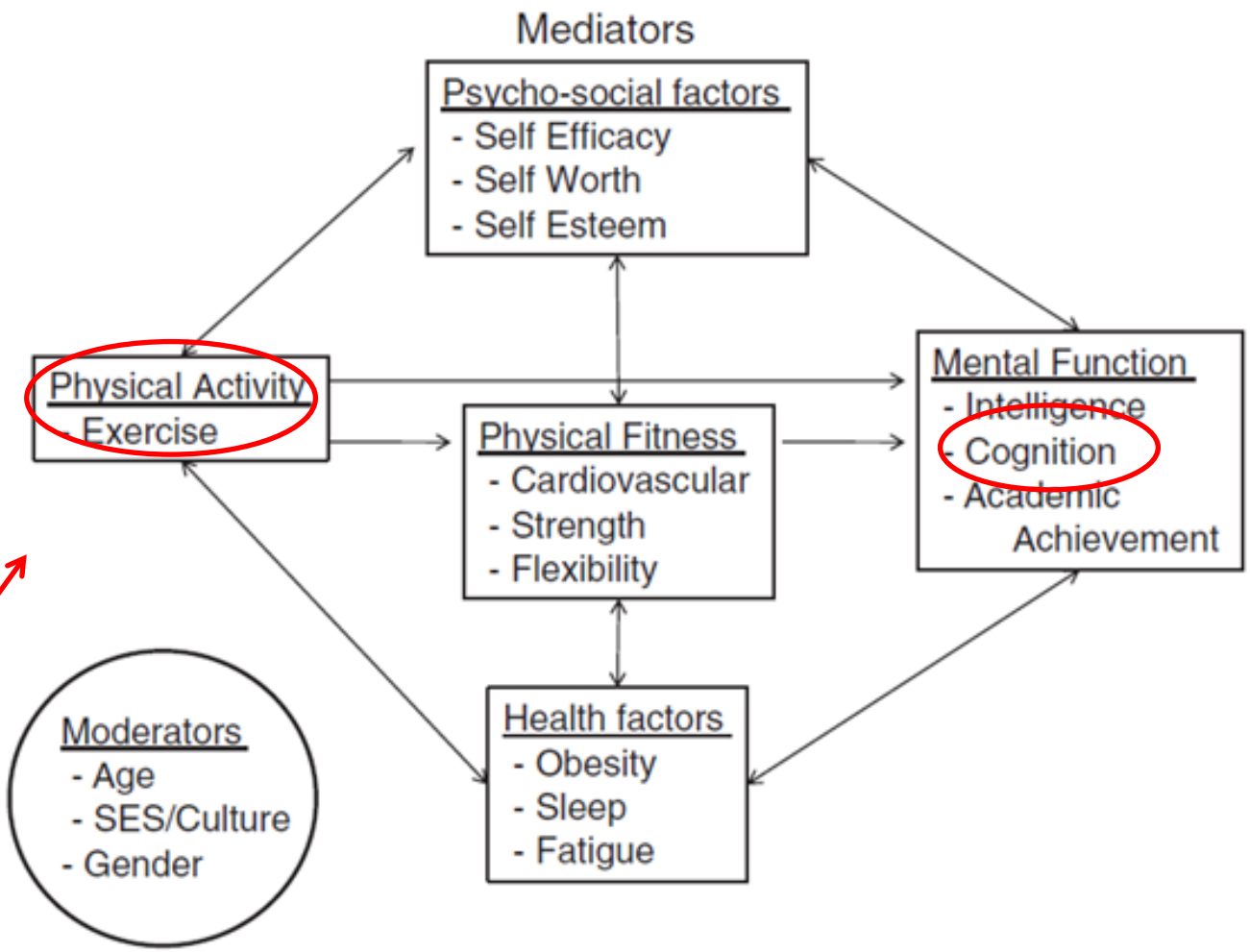
Intensity

Type

Timing

Frequency

Fitness



(Tomporowski et al, 2011)

Background Work

Our previous work has shown:

- Mid-morning moderate intensity exercise enhances cognitive function
- The effects are evident immediately following exercise and persist 45 min – 1 hour post-exercise
- Circuits-based exercise also enhances cognitive function
- These effects seem particularly evident for executive function
- There may be combined effects of breakfast consumption and exercise

BUT young people's activity patterns are typically high intensity and intermittent in nature (Howe et al, 2010; Armstrong & Welsman, 2006; Bailey et al, 1995)

Sprint-based Exercise

n = 44 adolescents (12.6 ± 0.6 years old)

Exercise and resting trials

Exercise: 10 x 10 s running sprints, interspersed by 50 s active recovery

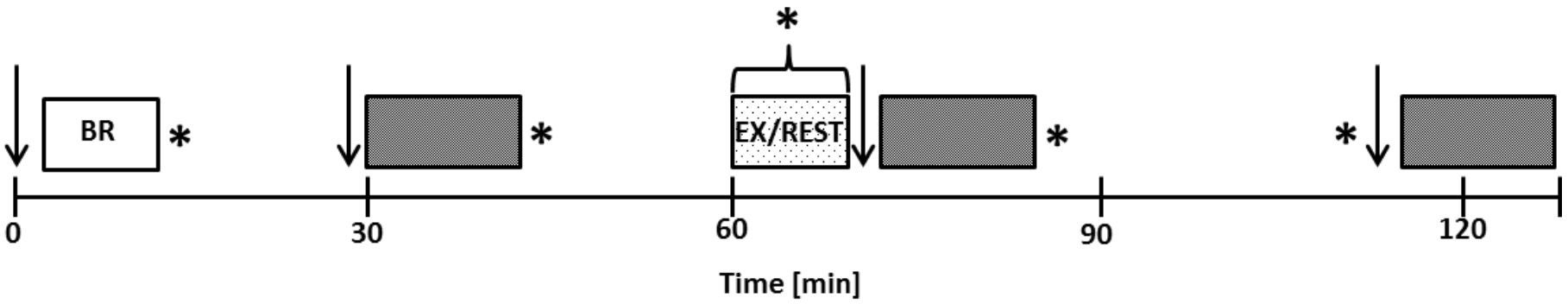
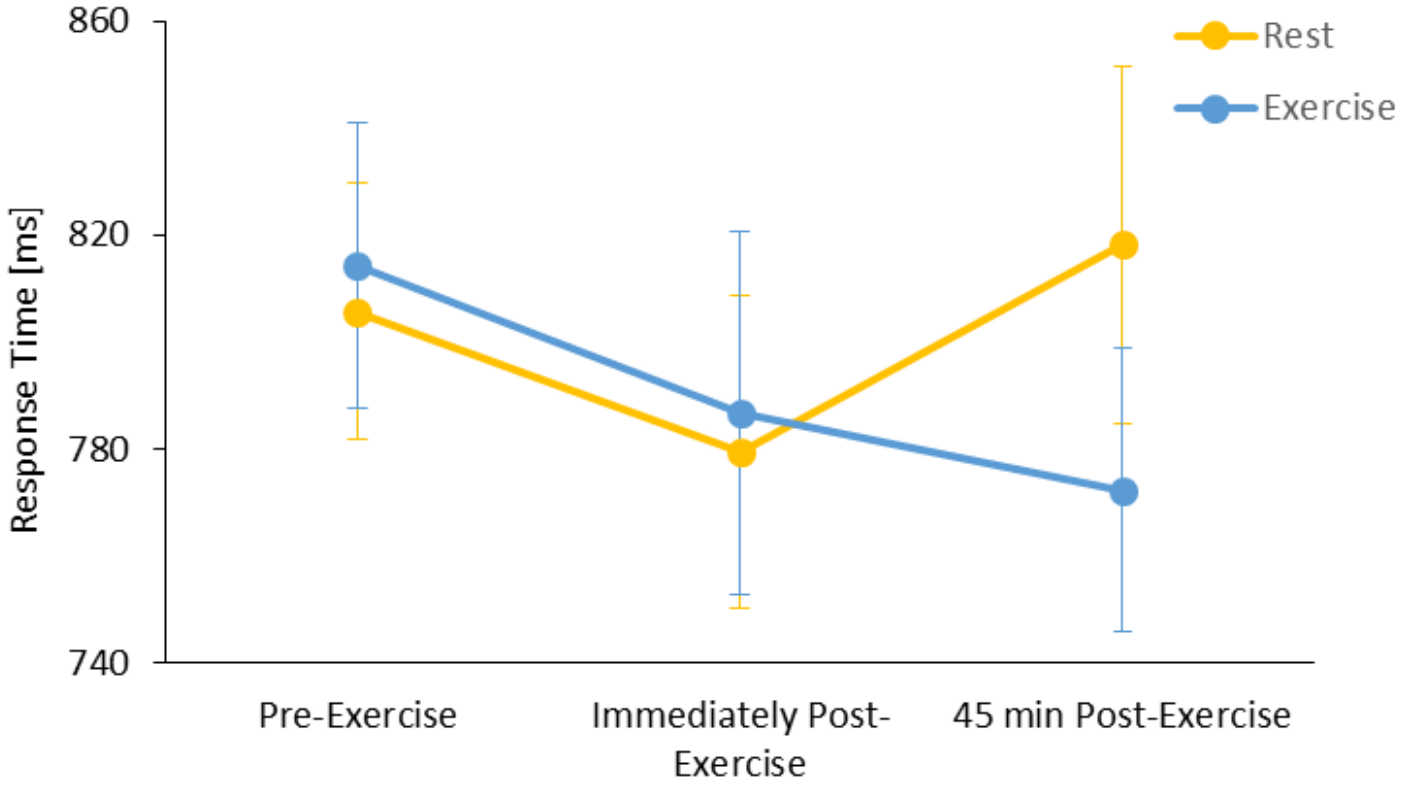


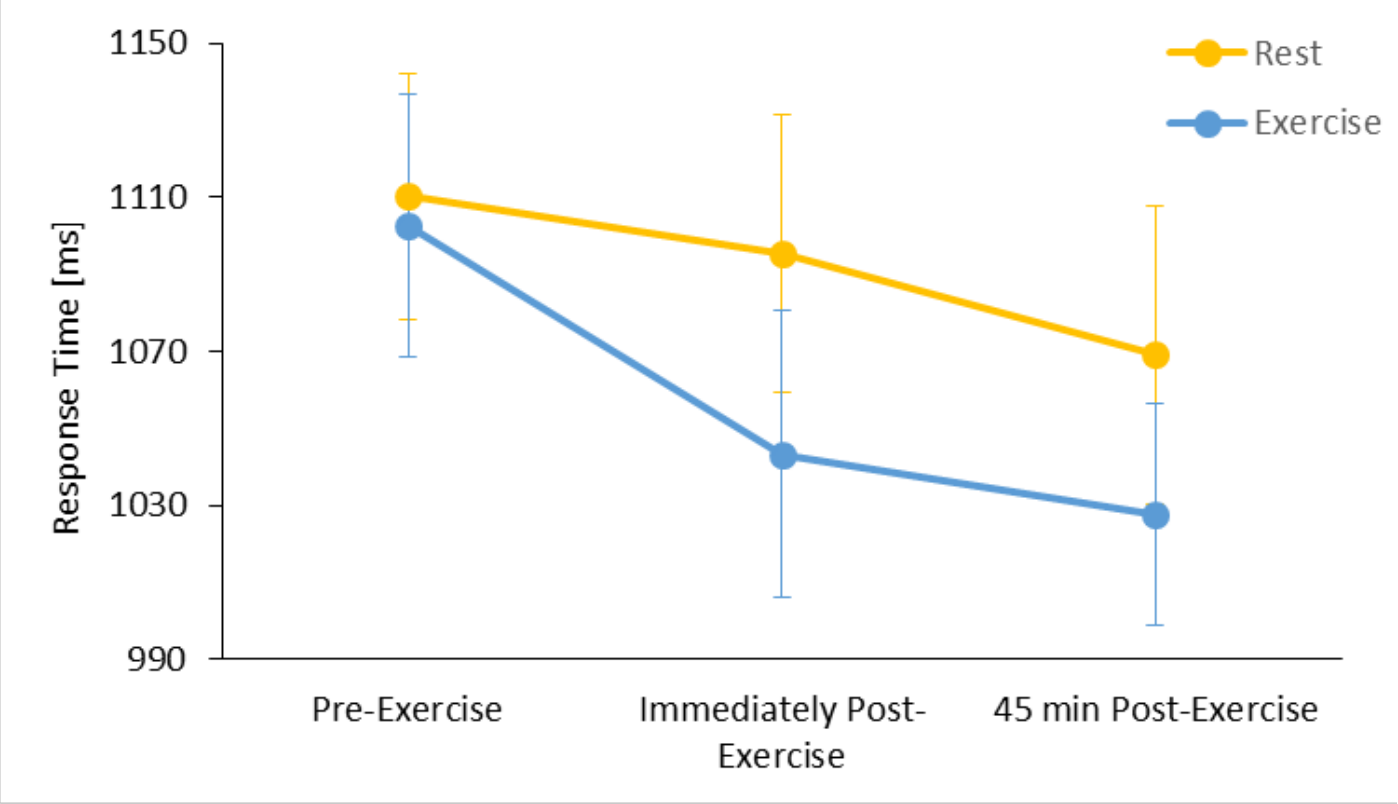
Fig. 1: Experimental Protocol. BR: breakfast; ▭ cognitive function tests; EX/REST exercise or rest period; ↓ mood questionnaire; * heart rate measurement.

(Cooper et al., 2016. *Prev Med Reports*, 4, 155-161)



Simple level: significantly quicker response times 45 min post-exercise (trial * time interaction, p = 0.027)

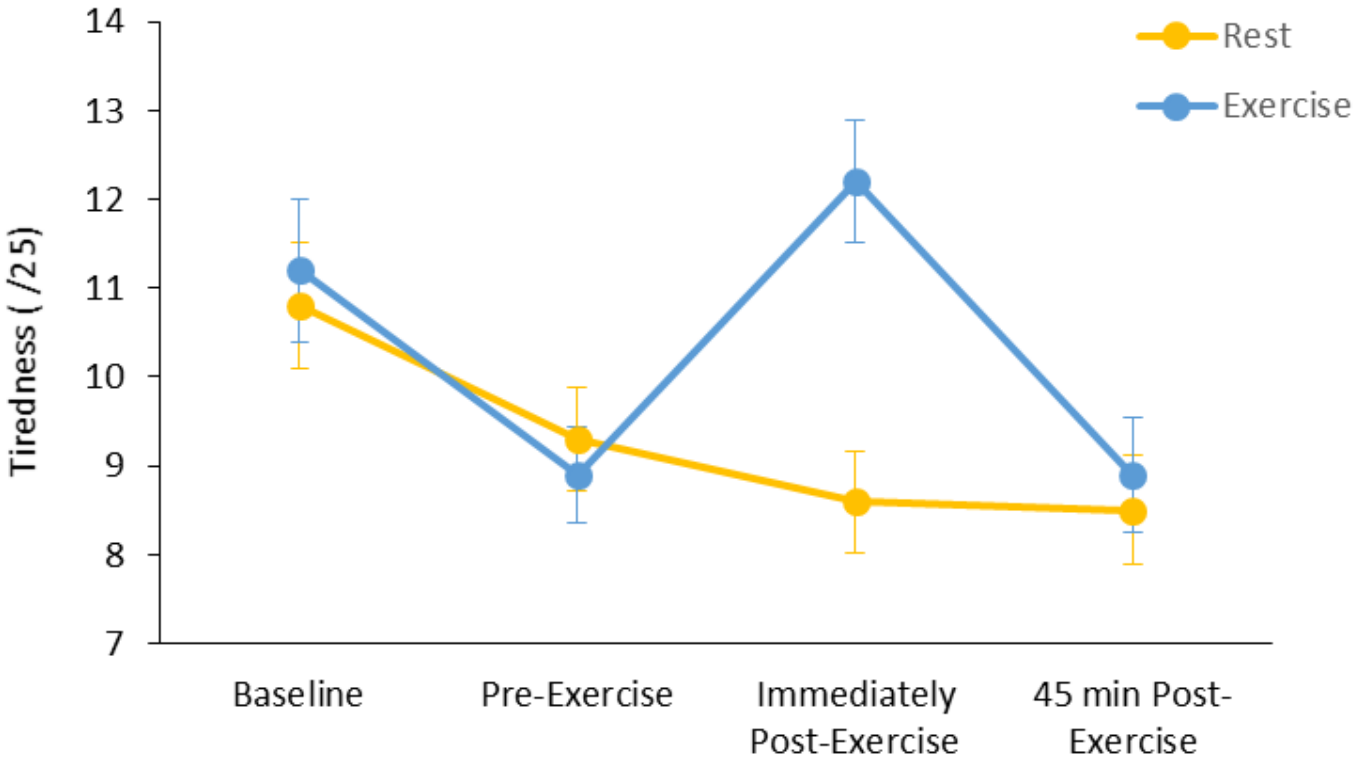
(Cooper et al., 2016. *Prev Med Reports*, 4, 155-161)



Complex level: significantly quicker response times immediately post-exercise (trial * time interaction, p = 0.038)

No effect on accuracy on Stroop test, or other cognitive function tests

(Cooper et al., 2016. *Prev Med Reports*, 4, 155-161)



Significantly higher self-report tiredness immediately following exercise (trial * time interaction, $p < 0.0005$)

No difference for other components of mood assessed (energy, tension and calmness)

(Cooper et al., 2016. *Prev Med Reports*, 4, 155-161)

Conclusions

- Mid-morning exercise appears to have beneficial effects on cognitive function in an adolescent population
- In particular, 10 * 10 second sprints improved the speed of attention and executive function
- This is of particular interest given the typical activity patterns of young people and the importance placed upon academic achievement
- Future work could examine:

  - interaction between nutrition and exercise

  - most effective modes and intensities of exercise

  - chronic effects of training (running) interventions on cognitive function and academic achievement

Thank You