

The Effect of Sprint Interval Training and Intermittent Fasting on Cognitive Function

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Introduction

- Sprint interval training (SIT) is an increasingly popular and highly time-effective exercise modality, usually consisting of 30s maximal effort sprints interspaced by brief recovery periods.¹
- Time-restricted eating (TRE) is a dietary practice whereby caloric intake is limited to a 6 to 10-hour window without altering the quality or quantity of the diet.²
- Both SIT and TRE are easily implemented lifestyle habits that present significant brain challenges.
- SIT enhances cognitive function by elevating levels of neurochemicals such as brain-derived neurotrophic factor (BDNF) and peripheral lactic acid concentration.³
- Intermittent fasting has been shown to elicits improvements in brain structures and functions by reducing oxidative stress in the brain.⁴
- However, to our knowledge, no studies have examined how the potential synergistic effects of SIT and TRE will impact cognitive function.

Rationale & Objectives

- **Rationale:** Combining an intermittent fasting eating style with regular sprint interval training may result in greater cognitive enhancements than either intervention alone.
- **Objectives:** The study's objective is to determine if a combination of SIT and TRE elicits enhancements in cognitive function (primary objective) and body composition (secondary objective) over 6 weeks.

Outcome Measures

- **Cognitive Function:** measured biweekly via the Stroop Test and Corsi Blocks Test. These tests will be performed using an software called PEBL.
 - The Stroop Test measures executive function
 - The Corsi Blocks Test measures short-term memory
- **Body Composition:** measured every 3 weeks via BodPod®. This will determine body composition by indicating percentage of fat mass and lean mass.

Methodology

Participants:

- Inclusion criteria: participants must be between 18-39 years old, sedentary (not meeting 50 minutes of moderate to vigorous physical activity per week), and pass the PARQ+ questionnaire

Study Procedures:

- Participants will be matched on baseline cognitive function scores, and systematically assigned into one of three groups, where they will complete the following interventions over 6 weeks.
- Group 1: Exercise (SIT) + Diet (TRE). Group 2: Exercise (SIT) Only. Group 3: Diet (TRE) Only.

Exercise (SIT)

- The exercise protocol consists of 4 repetitions of 30-second maximal effort sprints using a shuttle-run protocol, interspaced by 2-minute low intensity walking active recovery.
- Participants will be instructed to sprint the greatest possible distance in 30 seconds, starting by running to the 5m marker and back, then to the 10m marker and back, then to the 15m marker, etc (Figure 1).
- SIT will be performed 3x/week for participants in Groups 1 and 2 (progression=1 extra sprint per 2 weeks).

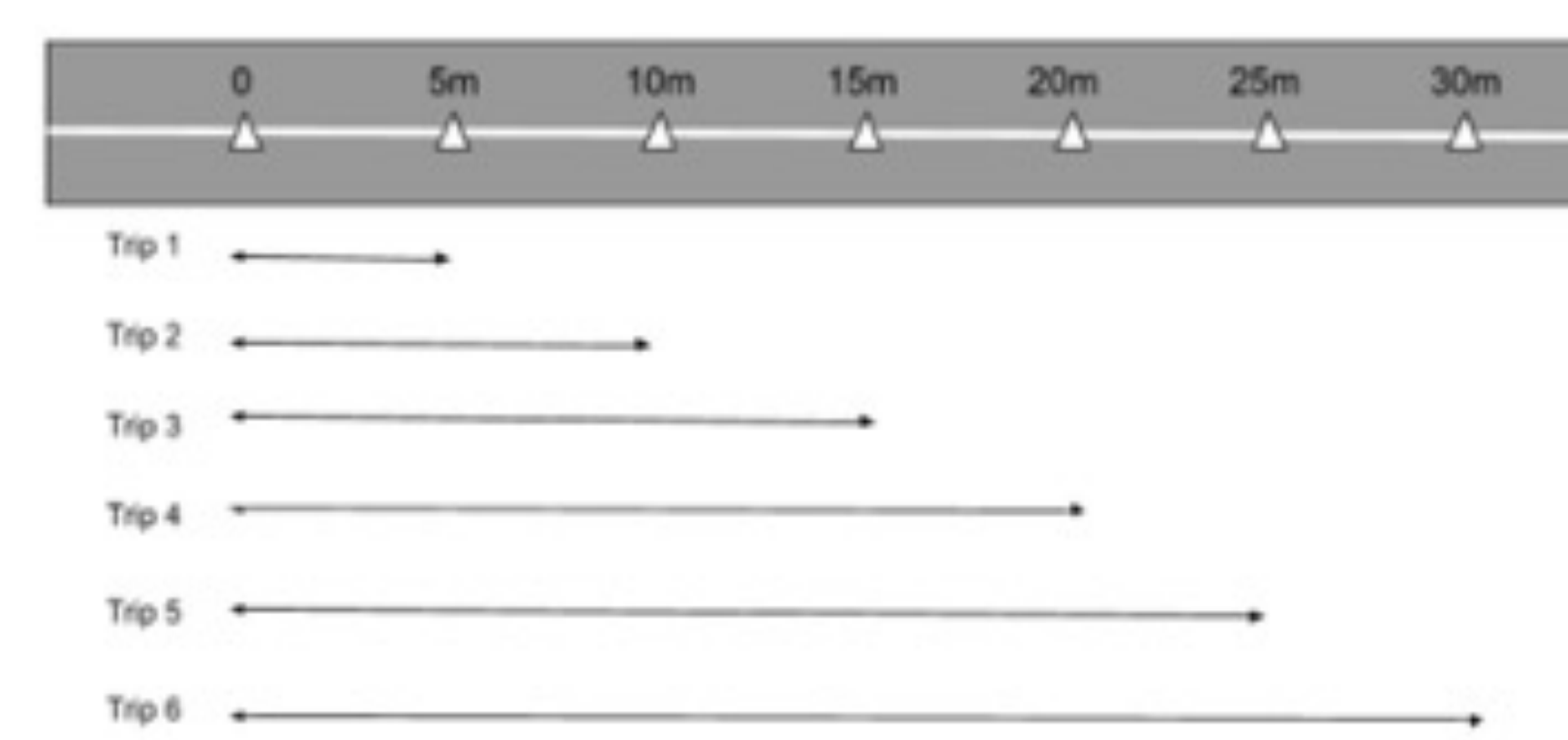


Figure 1: Representation of the Sprint Interval Training Setup (complete as many trips as possible within the 30s sprint period, starting from Trip 1)

Diet (TRE)

- The TRE pattern involves limiting food intake between the hours of 12 pm to 8 pm, with no restrictions to the type or amount of food consumed in the feeding window (Figure 2)
- Group 1 and 3 will perform the cognitive tests in the fasted state (Figure 2)

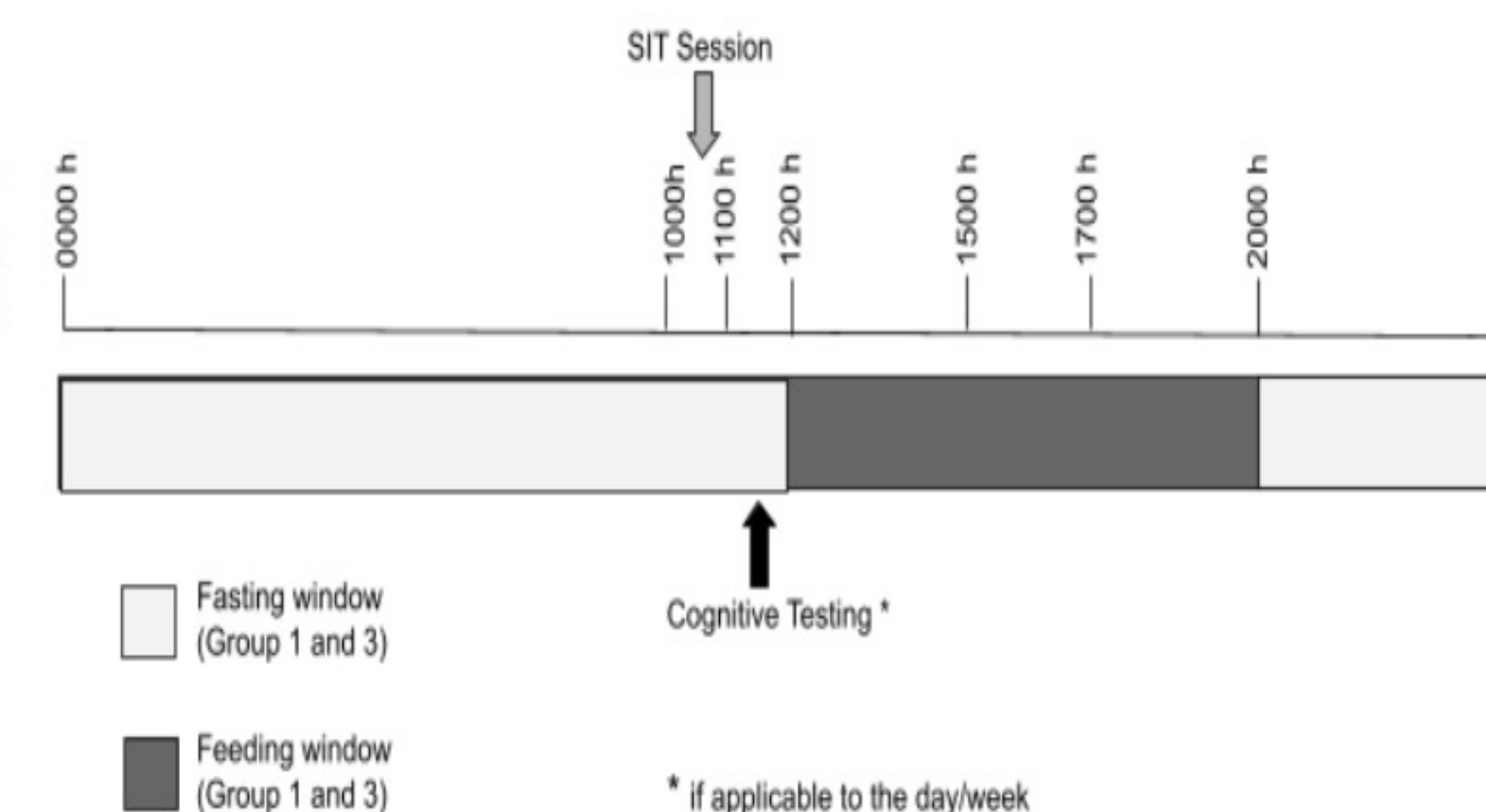


Figure 2: Daily Study Protocol (Feeding window = time period where calories may be consumed)

Anticipated Results

- Previous data has shown that:
 - Sprint Interval Exercise (SIE) elicits improvements in Stroop execution time from pre to post-exercise, compared to a no-exercise control (Figure 3).³
 - Intermittent Fasting elicits improvements in memory, when compared to a regular diet and high-fat diet (Figure 4).⁴
 - Intermittent Fasting combined with exercise (resistance training) promotes fat loss while retaining lean body mass.⁵
- Based on these findings, we expect that a combination of SIT and TRE will elicit greater improvements in cognitive function and body composition than either intervention alone.

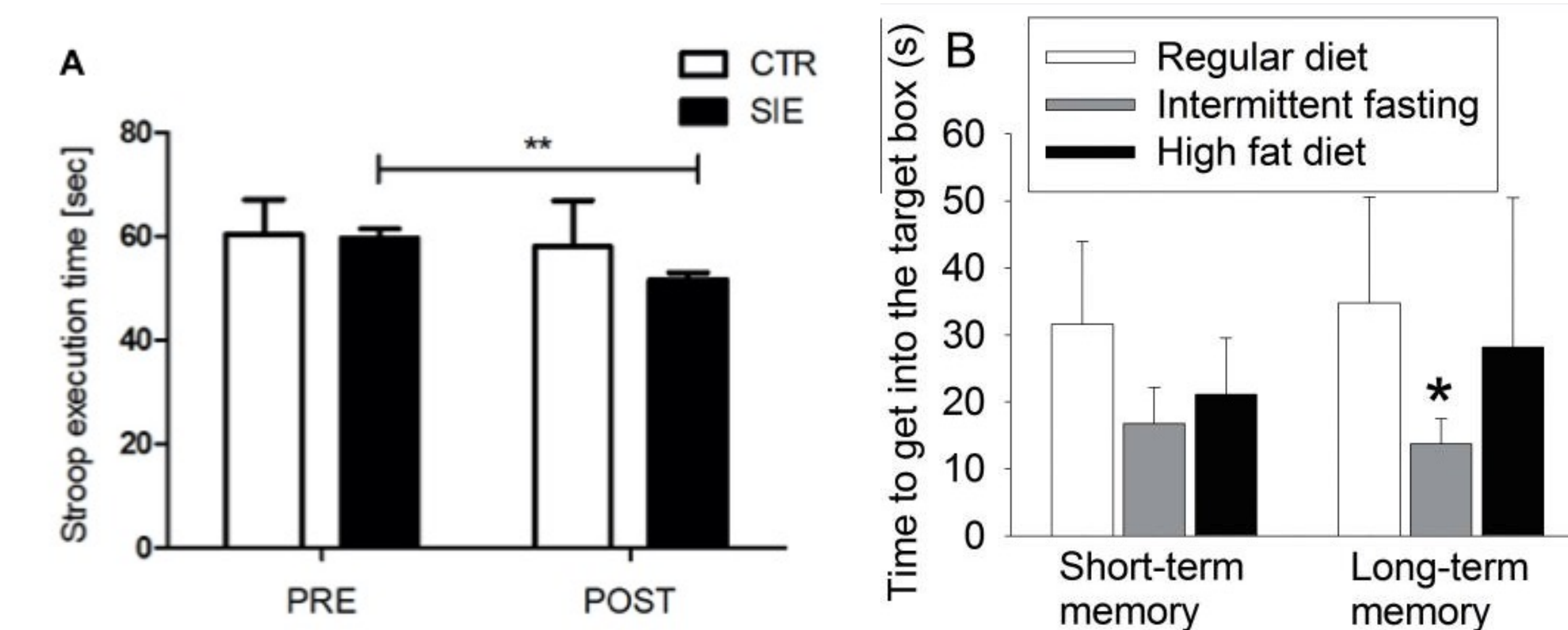


Figure 3: Sprint Interval Exercise (SIE) elicits improvements in Stroop execution time from pre- to post-exercise, compared to control.³

Figure 4: Intermittent Fasting elicits improvements in memory, as indicated by shorter time to get into the target box in a Barnes Maze Test.⁴

Conclusions & Future Directions

Conclusions:

- Exercise and nutrition are both powerful tools for improving cognitive function.
- This combination of SIT and TRE is a promising lifestyle modification, as both interventions require a minimal time commitment, have previously reported high adherence rates, and are easily implemented.
- Furthermore, this intervention can be implemented to reduce obesity and metabolic syndrome

Future Directions:

- It will be valuable for future research to explore the synergistic effects of intermittent fasting and exercise on cognitive function in different populations, such as Alzheimer's patients, seniors, etc.
- Additionally, future research should examine the effects of this intervention on a molecular level, for instance by measuring BDNF.

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