

# The Effects of a Prior Exercise Bout on the Energetic and Cardiometabolic Responses to Acute Mental Stress

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## METHODS

### Study Design

- Two randomized cross-over trials (RCT)
- RCT 1: Stress vs. Control (No Stress)
- RCT 2: Exercise + Stress vs. Exercise + Control (No Stress)

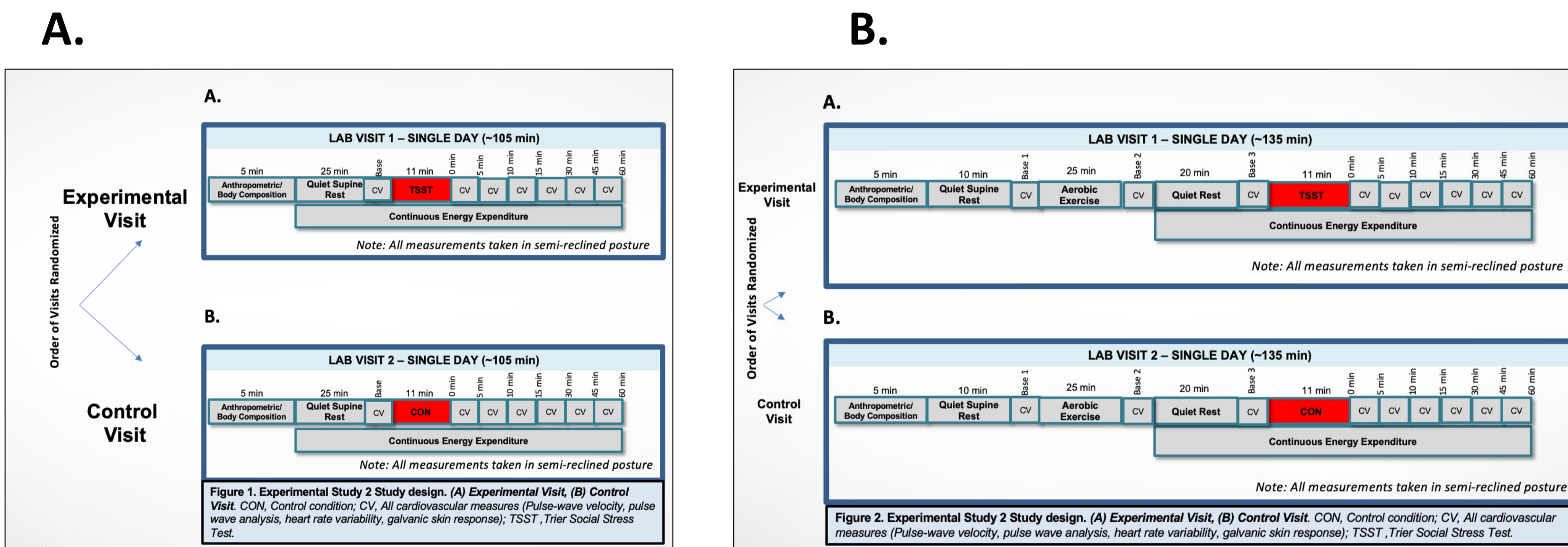
### Participants/ Sampling

- RCT 1: n=20, 21.0 (2.5) years, 55% F, 23.6 (4) kg/m<sup>2</sup>
- RCT 2: n=20, 20.0 (1.9) years, 60% F, 24.2 (4.5) kg/m<sup>2</sup>

### Primary Outcomes

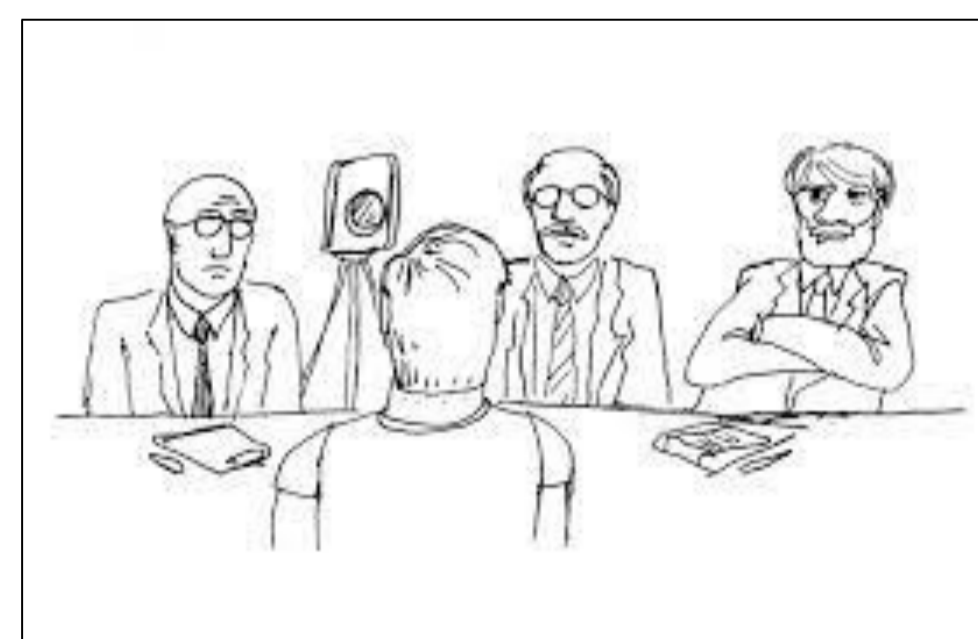
- Energy Expenditure (Indirect calorimetry; kcal/kg/min)
- Arterial Stiffness (Pulse-wave velocity [PWV]; m/s)

**Figure 1.** Schematic of Lab Visits in RCT 1 (A) and RCT 2 (B)



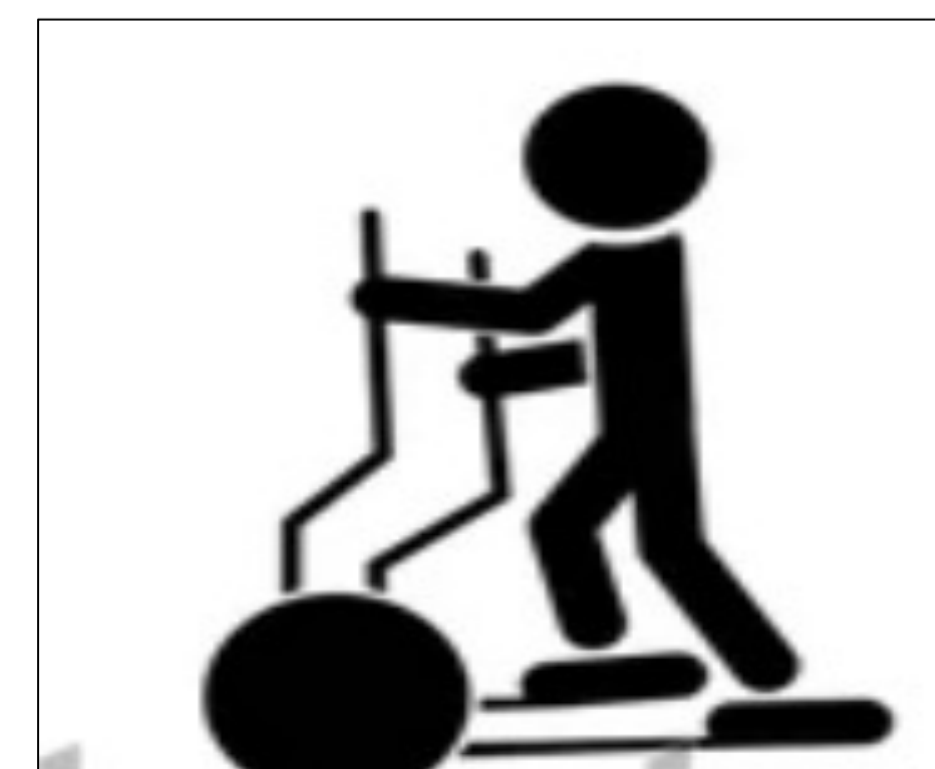
### Acute Lab Stressor (RCT 1 and RCT 2): Trier Social Stress Test

- 10-min psychosocial task
- 5-min mock job interview + 5-min mental math
- Uses social evaluative pressure and elements of uncertainty/surprise to induce stress



### Whole-body Aerobic Exercise (RCT 2 only)

- 25 minutes elliptical exercise using arms and legs
- Moderate-intensity (55-70% heart rate reserve)



### Analysis

- Mixed model regression: condition x time interactions



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## PROBLEM

Mental stress is associated with cardiovascular disease (CVD) risk, but the arterial stiffness and energy expenditure (EE) responses to acute mental stress, and whether prior exercise impacts post-stress cardiometabolic reactivity are not known.

## OBJECTIVE

To assess arterial stiffness and EE responses to acute mental stress and to determine the impact of a prior exercise bout on these responses

## TAKE HOME

Arterial stiffness and EE may be key players in the relationship between mental stress and CVD risk. Exercise may beneficially moderate this relationship.



## RESULTS

### RCT 1:

#### Arterial Stiffness

- Small interactions for PWV (B=0.68 m/s, 95%CI: 0.39, 0.97)
- Stress: ↑0.81 m/s, Control: ↑0.15 m/s

#### Energy Expenditure

- Small interactions for EE (B=0.0010 kcal/kg/min, 95%CI: 0.0004, 0.001)
- Stress: ↑0.0016 kcal/kg/min, Control: ↑0.0005 kcal/kg/min

### RCT 2:

#### Arterial Stiffness

- Small interactions for PWV (B=0.47 m/s, 95%CI: 0.21, 0.72)
- Stress: ↑0.43 m/s, Control: ↓0.05 m/s

#### Energy Expenditure

- No interaction effect
- Small main effects of condition (B=0.0005 kcal/kg/min, 95%CI: 0.0003, 0.0008) and time (B=0.0011 kcal/kg/min, 95%CI: 0.0006, 0.0016)

### Comparing RCT 1 and 2

**Figure 2.** Prior exercise dampened the arterial stiffness (A) and energy expenditure (B) responses

