



**Traits, states and
behaviours that predict
COGNITIVE RESILIENCE**

Cognitive Resilience

The capacity to maintain, and/or recover cognitive function under conditions of challenge or stress







We had **three** questions

1. Is cognition similarly affected by different stressors?
2. Can individual characteristics predict cognitive resilience?
3. Does physiology precede performance decrement?

Cognitive battery

Challenges and stressors

Individual characteristics

Physiological measures

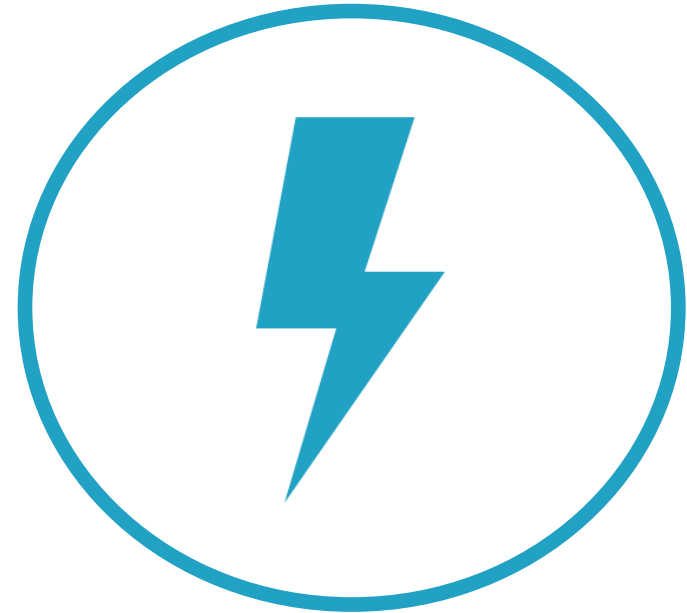


Cognitive battery

Challenges and stressors

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Cognitive battery

Challenges and stressors

Individual characteristics

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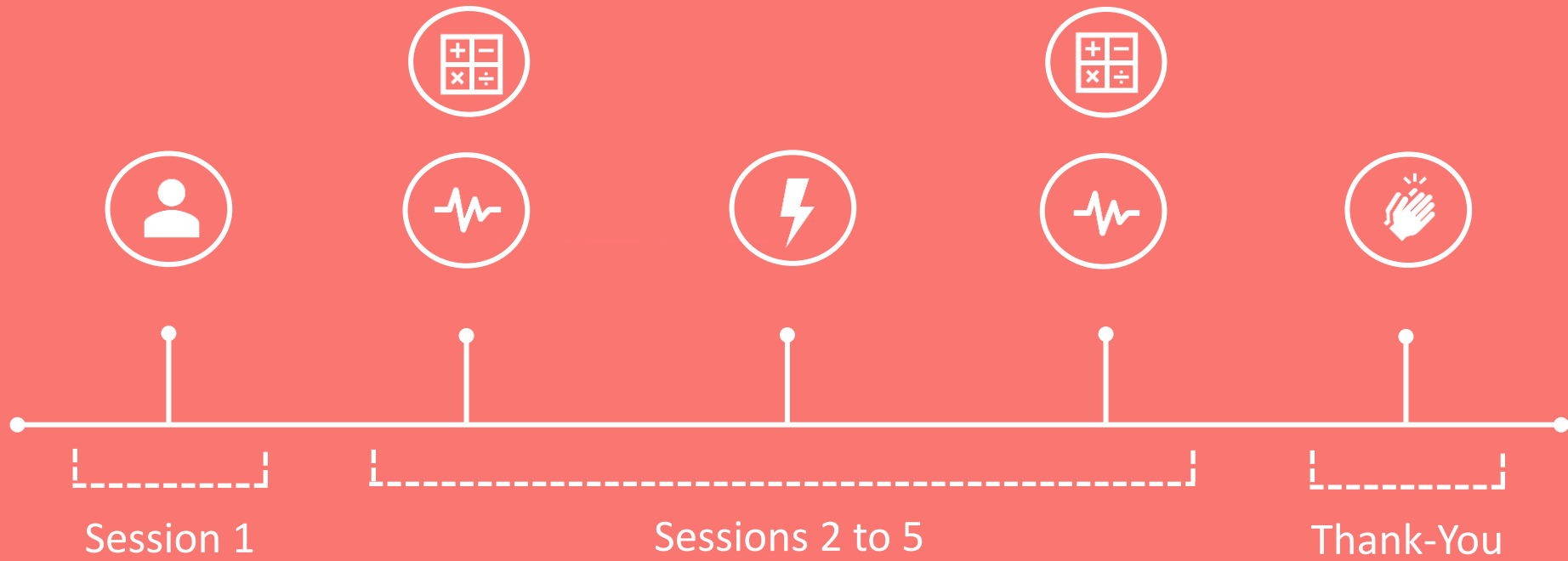
Cognitive battery

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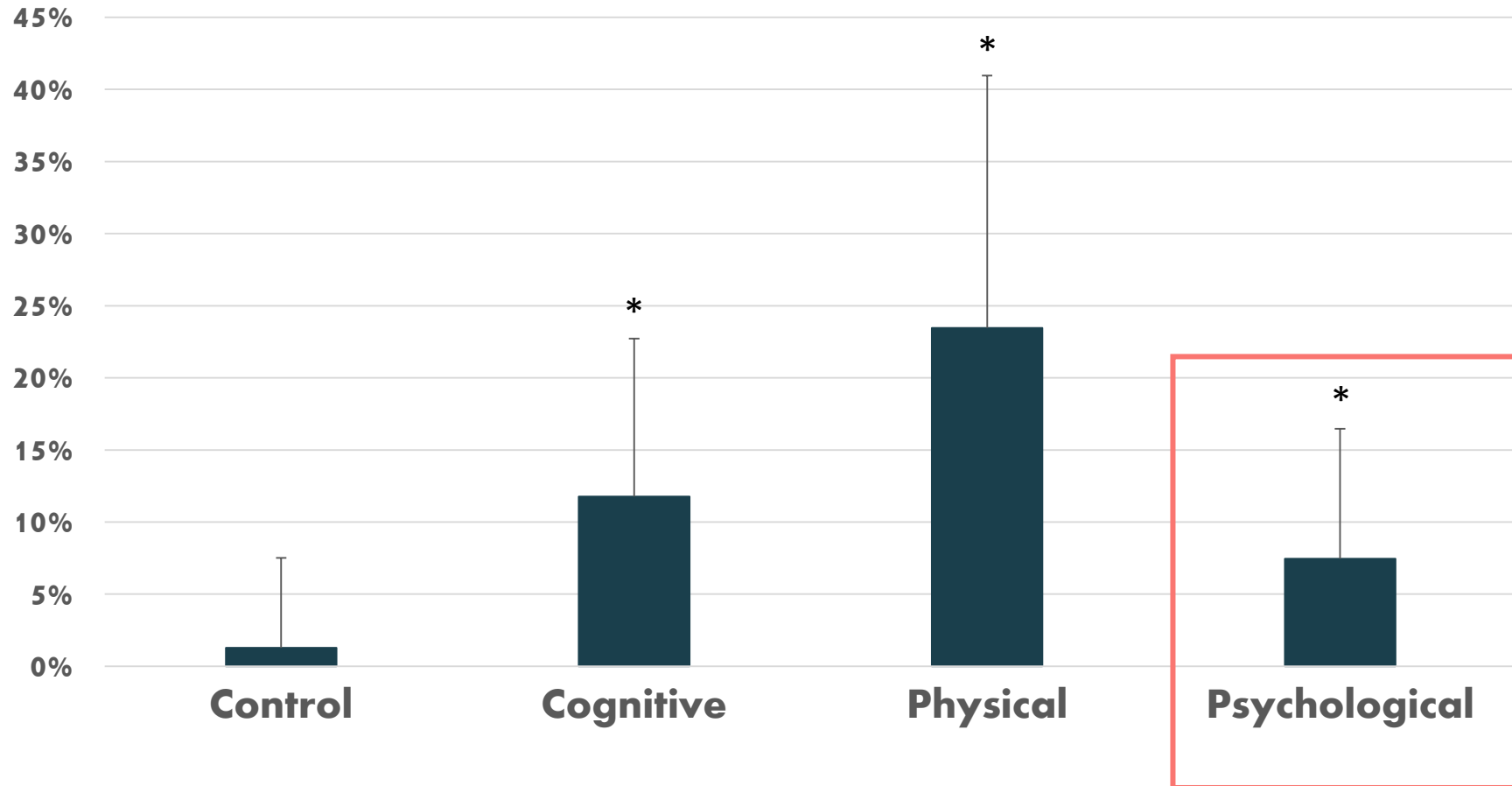
Reaction time on the psychomotor vigilance task was slower

Increased commission errors on response inhibition task

Working memory and task-switching unaffected



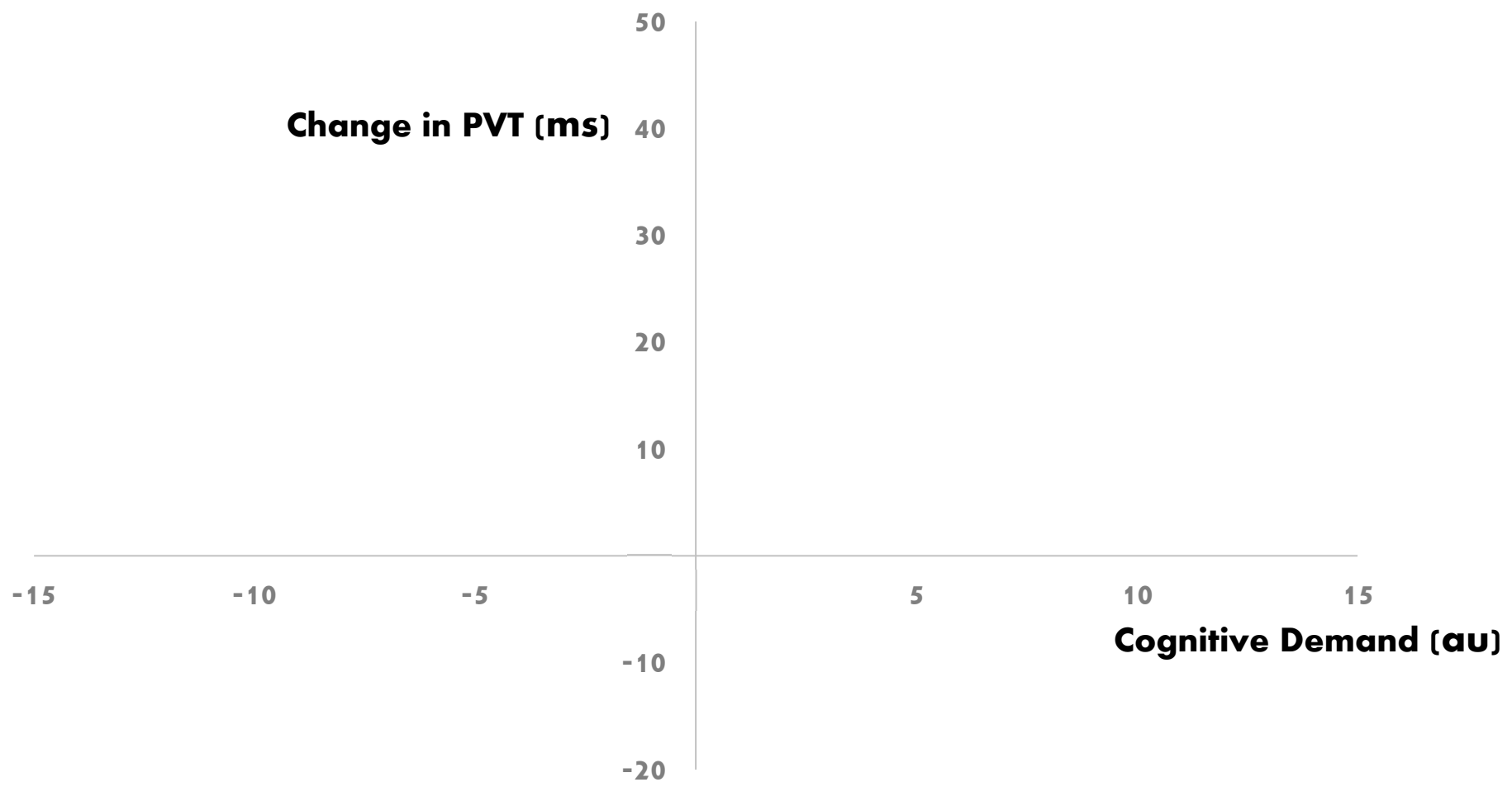
Percent change in subjective workload

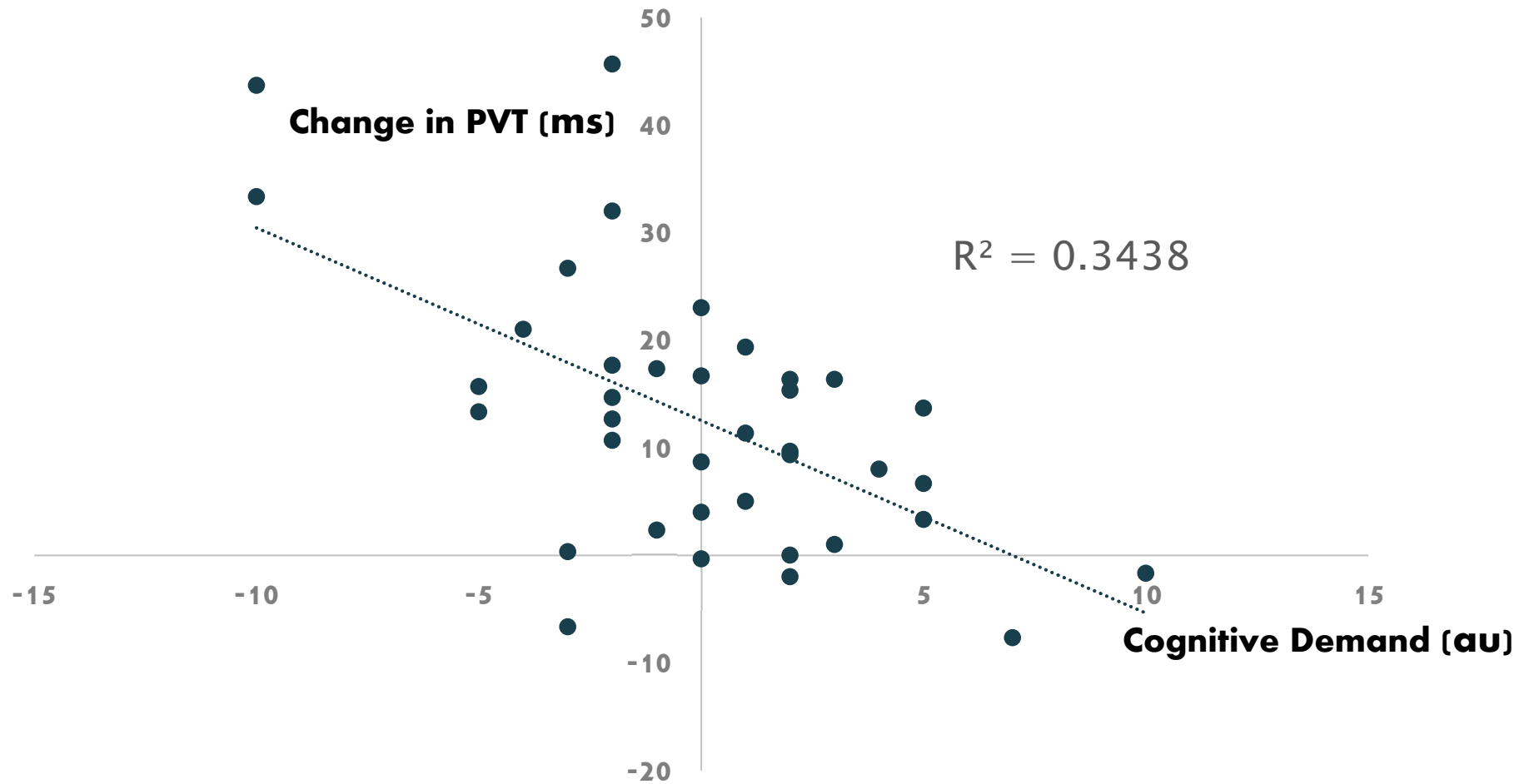


* $p < 0.05$, pre vs post

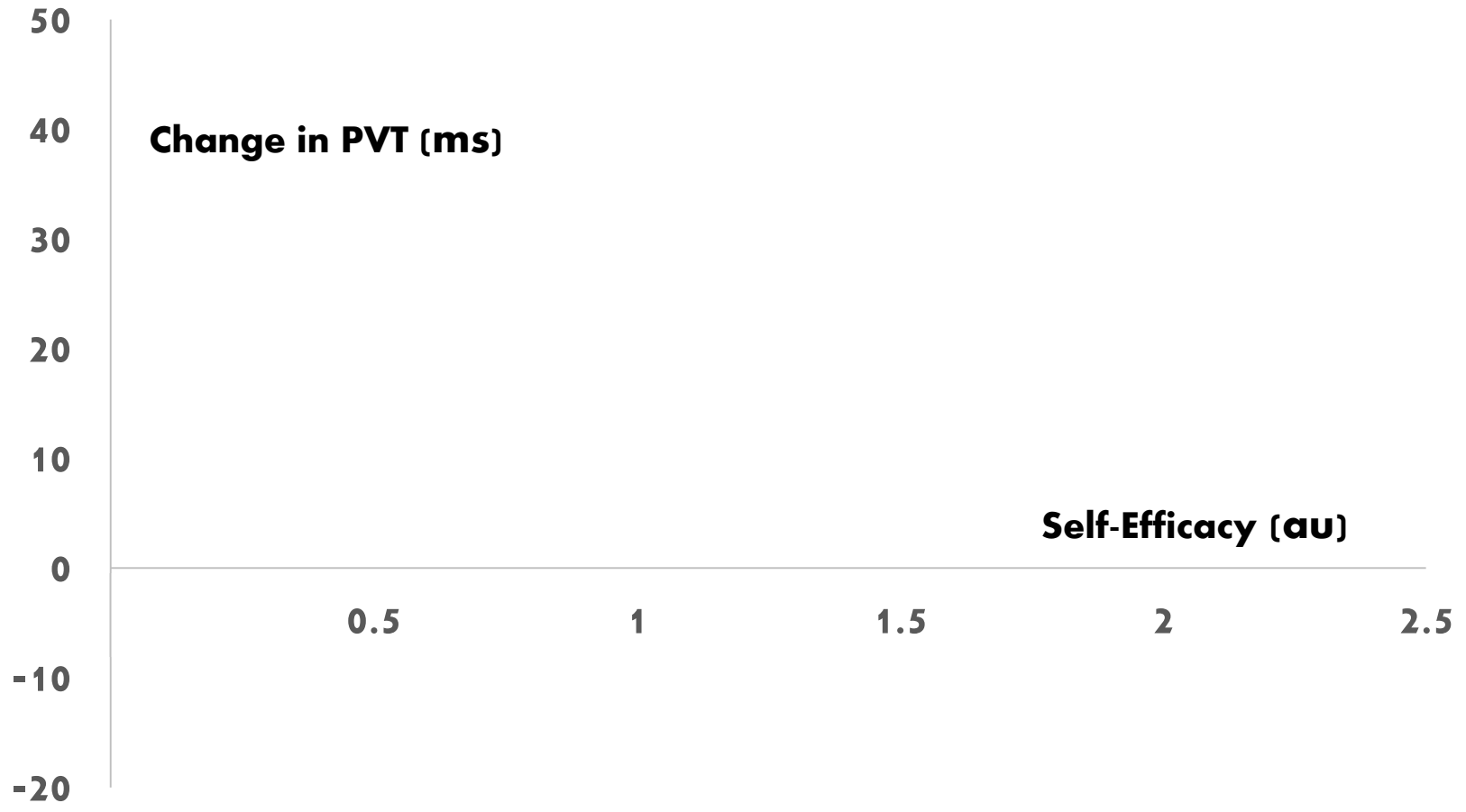
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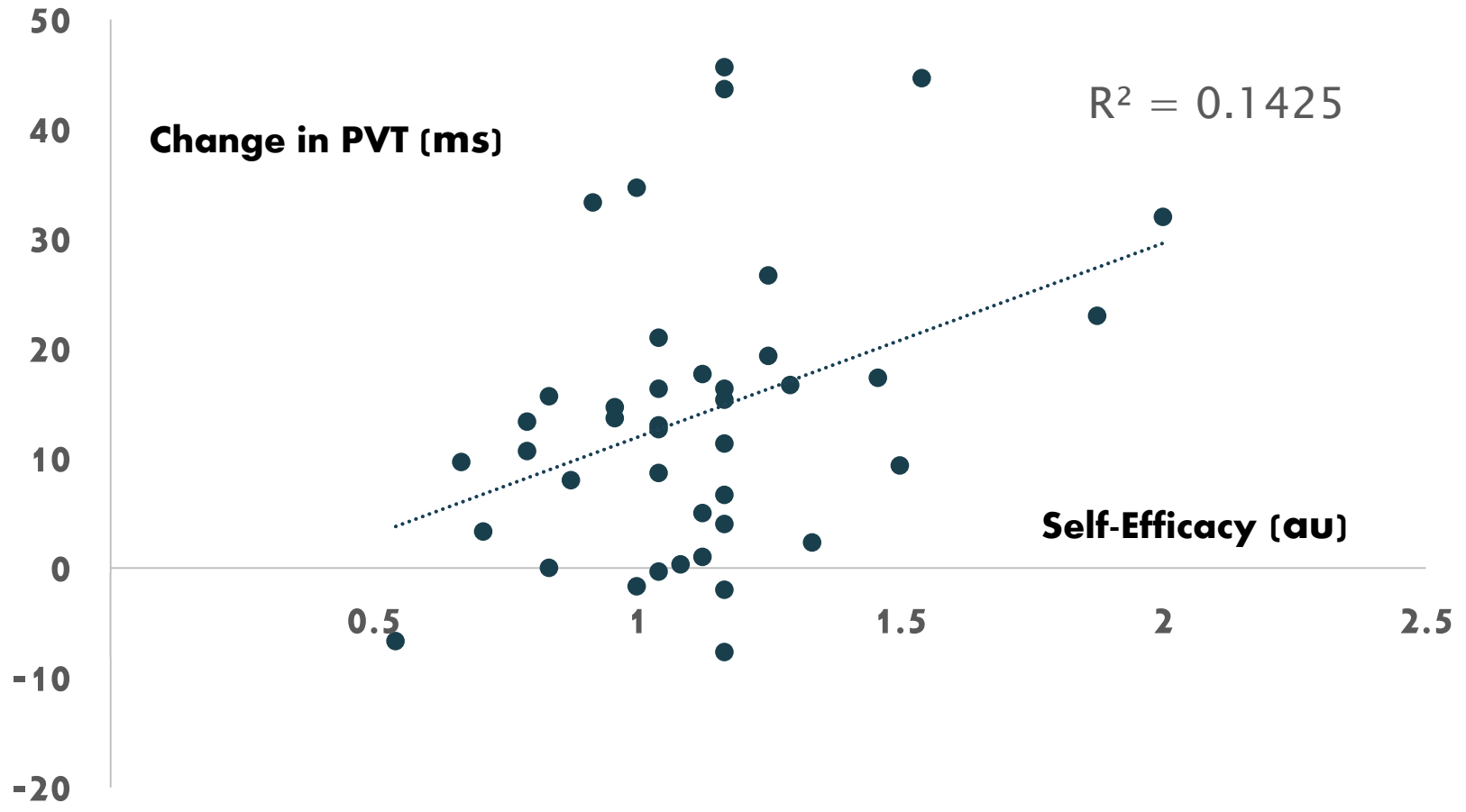
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Participants who reported higher cognitive demand were more cognitively resilient



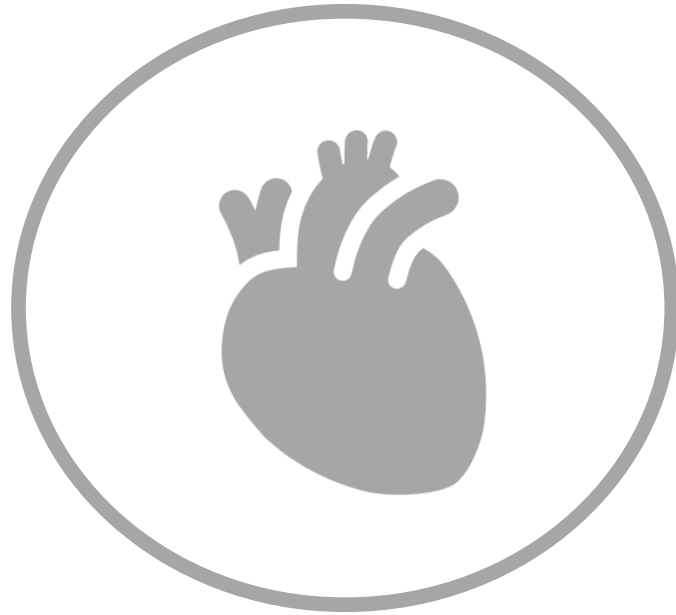
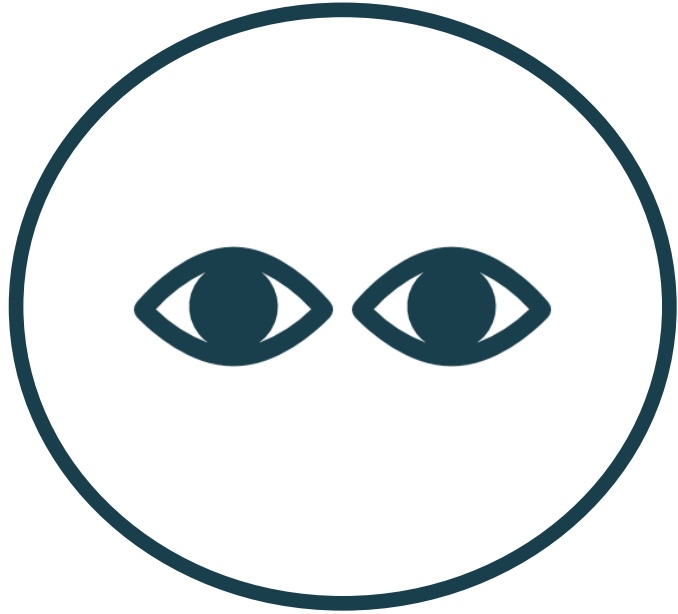


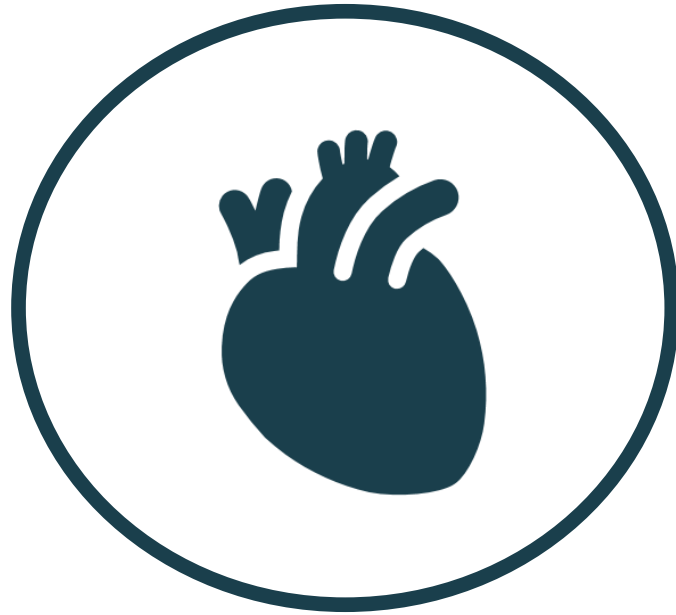
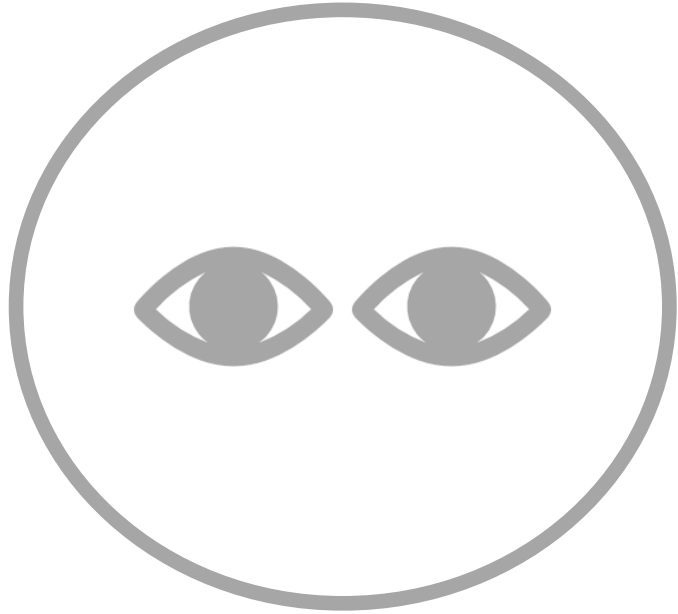
Participants who reported greater self-efficacy were less cognitively resilient

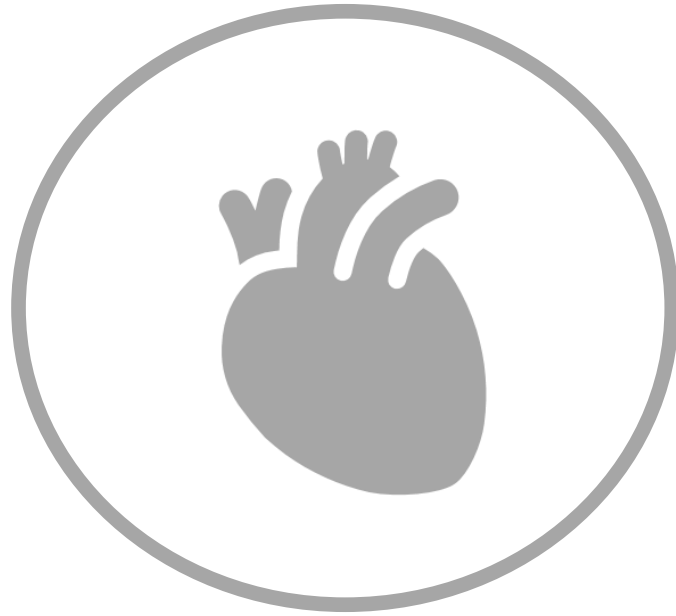
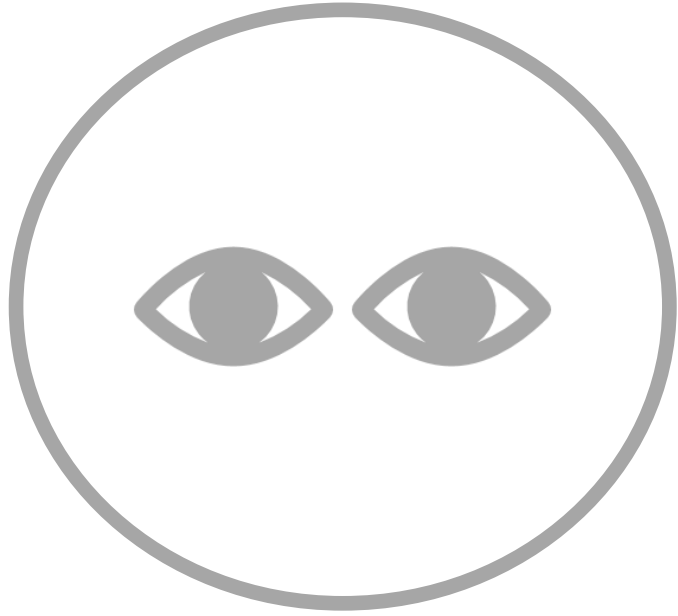
**Cognitive resilience was not predicted by
resilience, coping, appraisal, fitness or subjective workload**

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What can we do with this information?

Improve awareness of the tasks that can be detrimental to cognitive performance

Account for the greater effort required by a cognitive task following a challenge or stressor

Use cognitive demand as a training stimulus

Can we combine challenges or stressors to enhance the adaptation?





BRAIN ENDURANCE TRAINING

Reported by Bradley Stulberg in @Outsidemagazine



1 The experiment

35 soldiers trained three times a week on stationary bikes for the experiment, riding each time for the same duration and intensity relative to their own baseline fitness. In addition to the physical effort, half of the soldiers were also asked to engage in a mentally demanding task—watching combinations of letters appear on a computer screen and clicking only when certain combinations appear—while they pedaled



2 The results

At the end of the 12-week study, both groups showed comparable increases in VO2 max, a common indicator of physical fitness. This makes sense since the training regimens were physiologically identical. However, when the soldiers completed a "time to exhaustion test" in which they rode at a constant effort—80 percent of their respective VO2 maxes—for as long as possible, things changed



The group that had trained without the mentally demanding task improved their time to exhaustion, on average, by an impressive 42 percent

42%

126%

3X

Soldiers who clicked letter combinations on the computer during their workouts, however, improved by a whopping 126 percent...

...three times as much as the control group



3 What does the expert say?

"Training themselves to tolerate a harder perceived effort, so when the cognitive task was removed, the effort felt easier," says Dr. Samuele Marcora, an expert on fatigue who oversaw the study. "Something unique was happening inside the heads of the brain endurance training group."



4 Strengthening the brain

"You strengthen that part of your brain and increase your tolerance for effort," Marcora says, "so that when the cognitively straining task is eliminated, you are able to endure a much greater physical load." In other words, if you stress your brain at the same time as your body, when you get rid of the mental stress, the physical training seems easier



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