ISEH INSTITUTE OF SPORT EXERCISE & HEALTH

EXERCISE & NEUROSCIENCE

Can we personalise exercise recommendations to support mental wellbeing?

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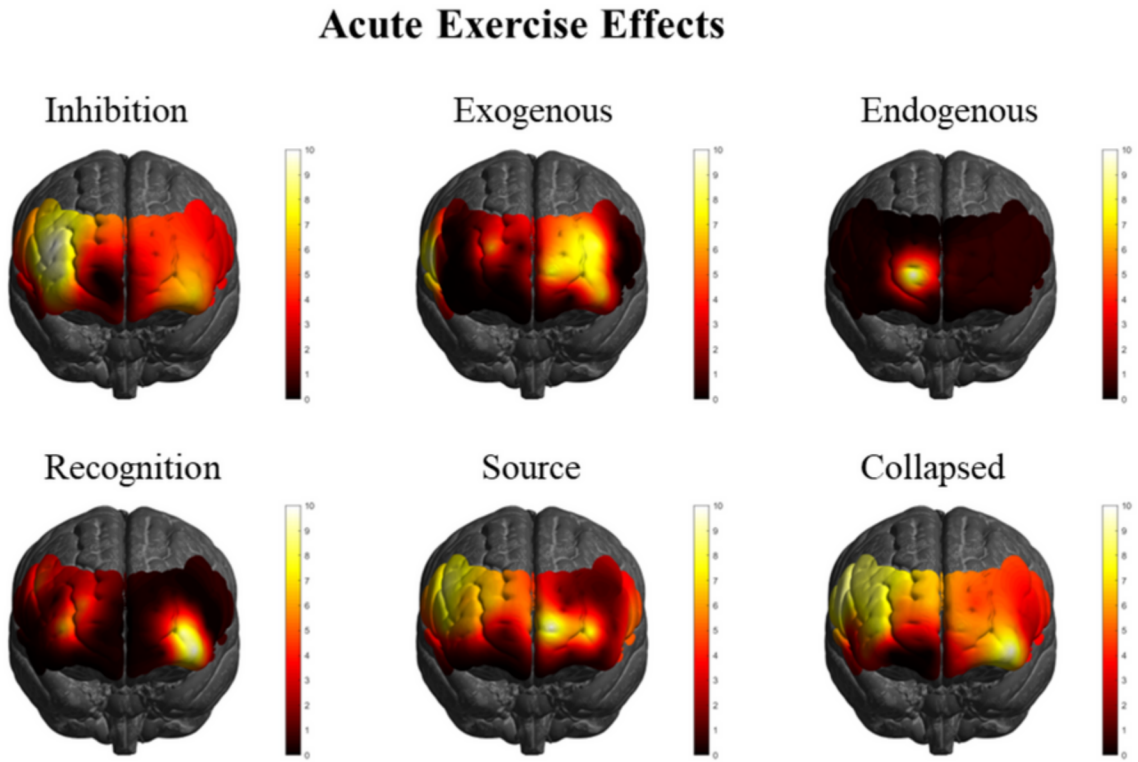
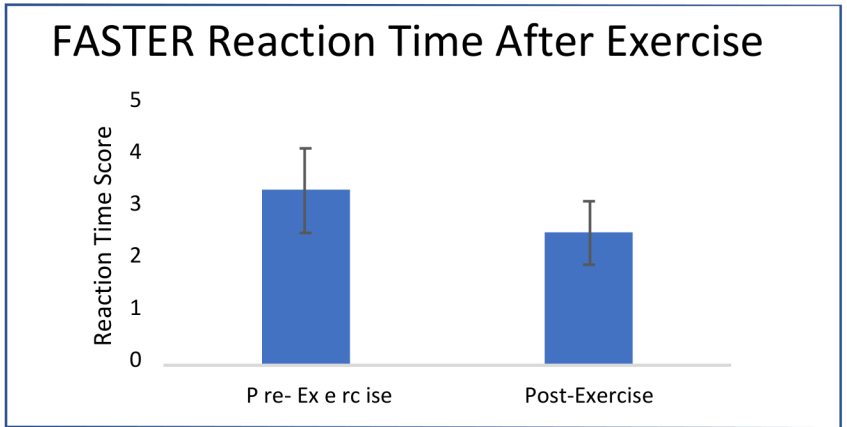
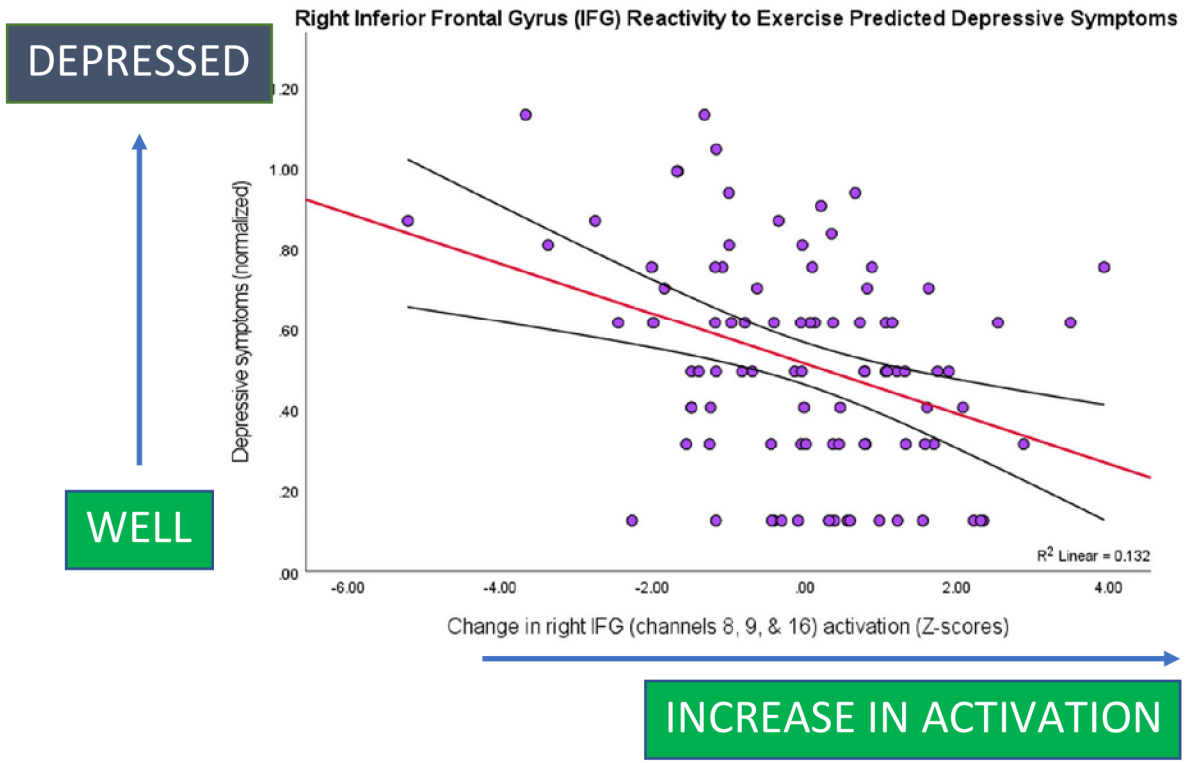
15min of maximal exercise increase activation

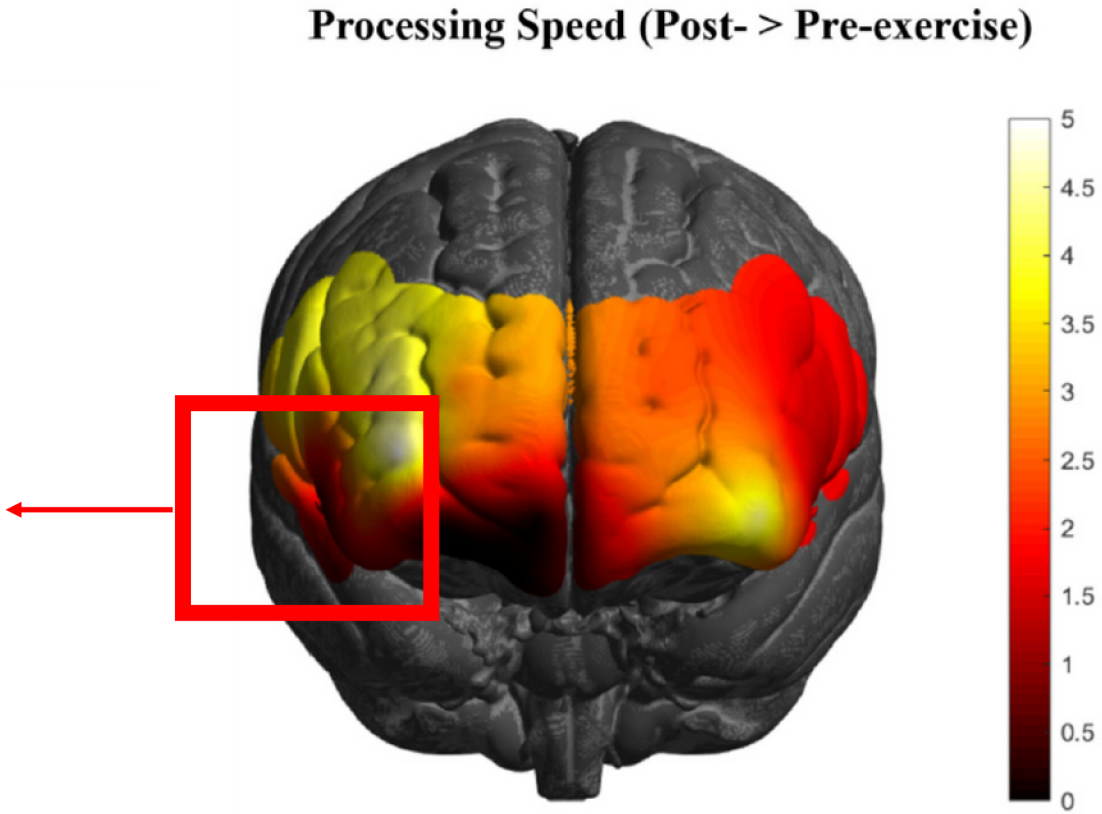
N = 92





Depression modulates this response to exercise

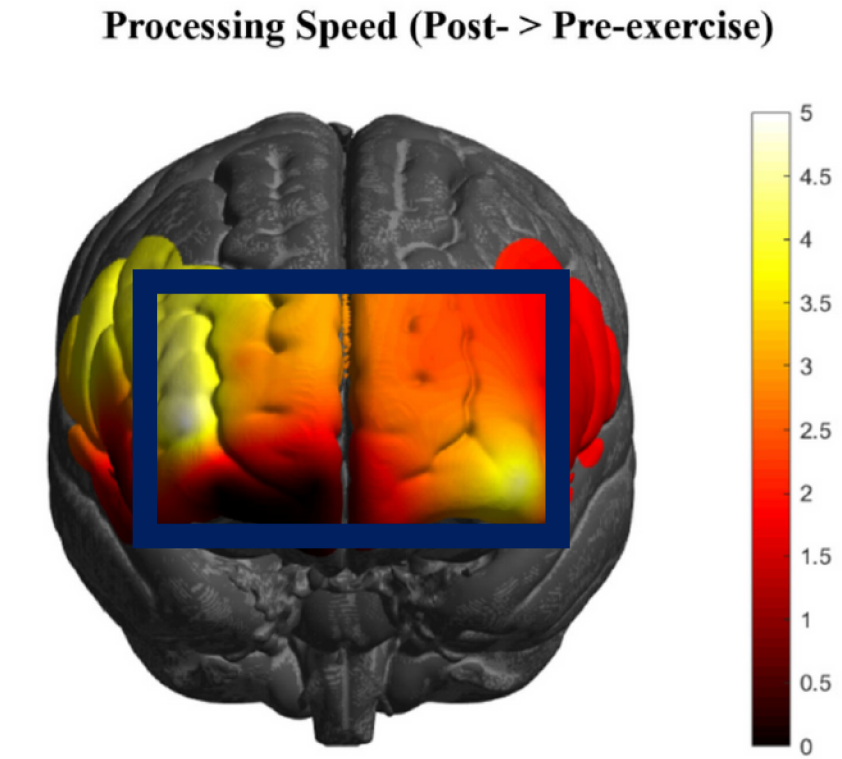


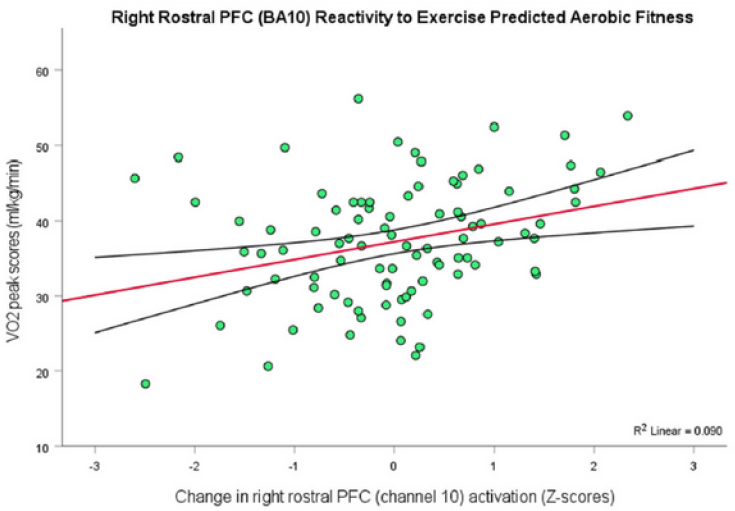


Smaller increase in activation in the inferior frontal gyrus ventrolateral PFC), which is implicated in the downregulation of negative emotions, and is hypoactive during emotion regulationindepressedindividuals

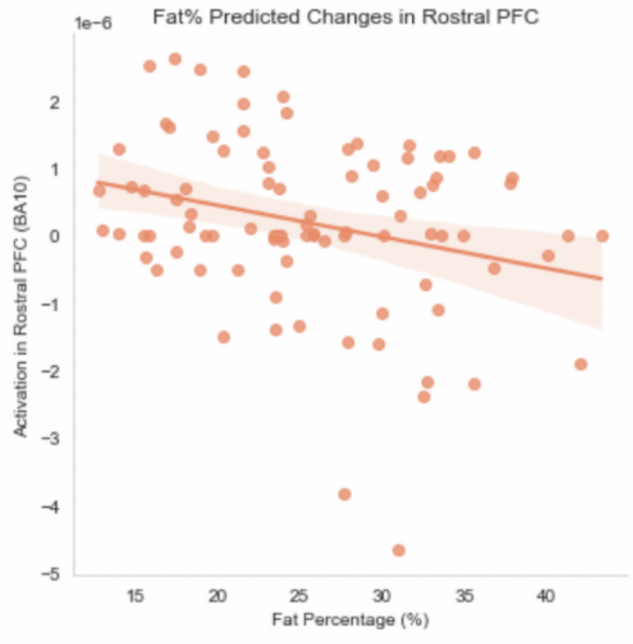
Crum, J., Ronca, F., Herbert, G., Funk, S., Carmona, E., Hakim, U., Jones, I., Hamer, M., Hirsch, J., Hamilton, A. and Tachtsidis, I., 2022. Decreased Exercise-Induced Changes in Prefrontal Cortex HemodynamicsAre Associated With Depressive Symptoms.*Frontiers in Neuroergonomics*,*3*, p.806485.

Fatness and fitness influence this response too





Crum et al., (2022)



Crum et al., (2024)

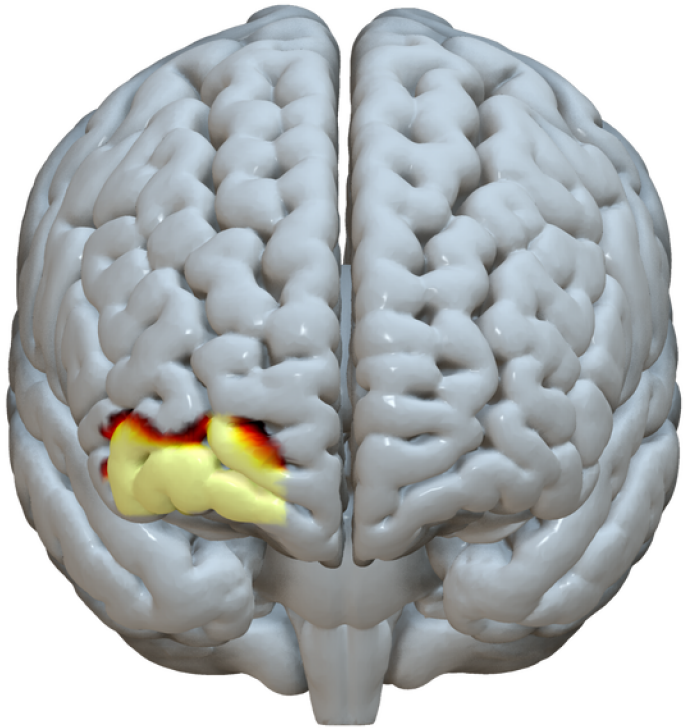
Greater increase in activation in the rostral prefrontal cortex (BA10) were observed in participants with **less body fat, and greater cardiovascular fitness**.

BA10istypically involvedinregulating thought that isdependent orindependent ofexternal stimuli (i.e. focusing on a task at hand vs processing information inside of our head).

Crum, J., Ronca, F., Herbert, G., Carmona, E., Jones, I., Hakim, U., Hamer, M., Hirsch, J., Hamilton, A., Tachtsidis, I. and Burgess, P.W., 2024. Body fat predictive of acute effects of exercise on prefrontal hemodynamicsand speed.*Neuropsychologia*, p.108805.

Two months of exercise improve BA10 function

Intervention Group > Control Group



Main Effects of Intervention pre-post 8 weeks of:

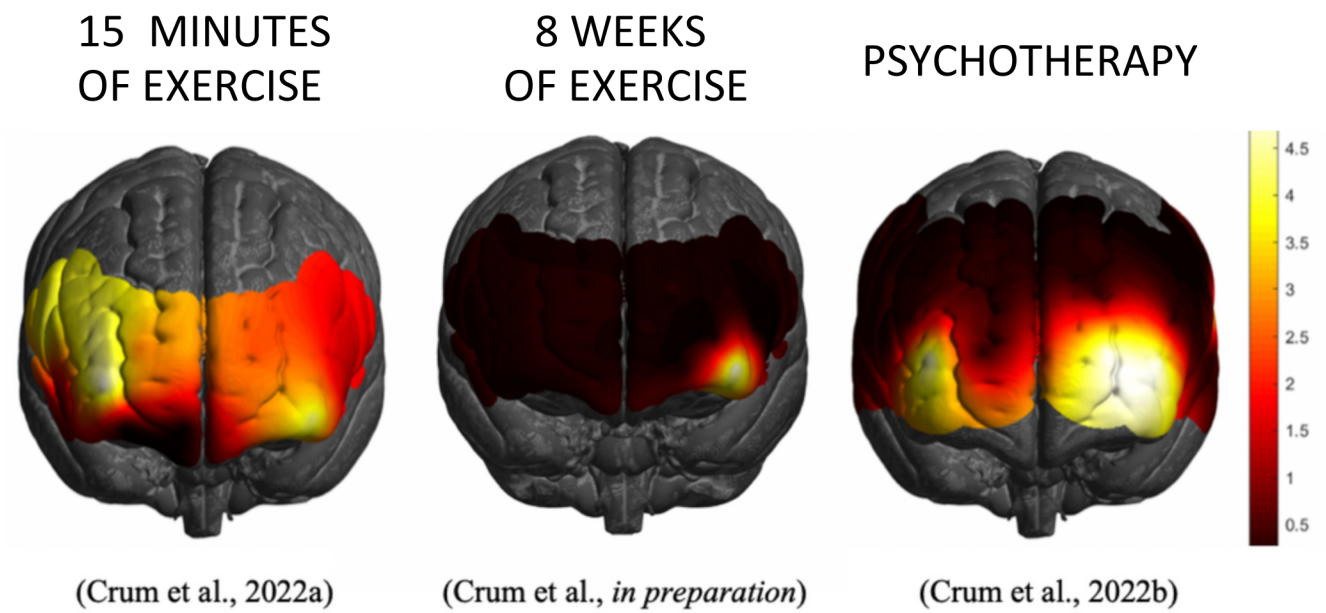
30 minutes vigorous	Strength	30 minutes HIIT	60 minutes easy

Intervention group: more activation in the rostral PFC (BA10) compared to Control group after 8 weeks of exercise

N = 120

EXERCISE and THERAPY use the same brain regions!

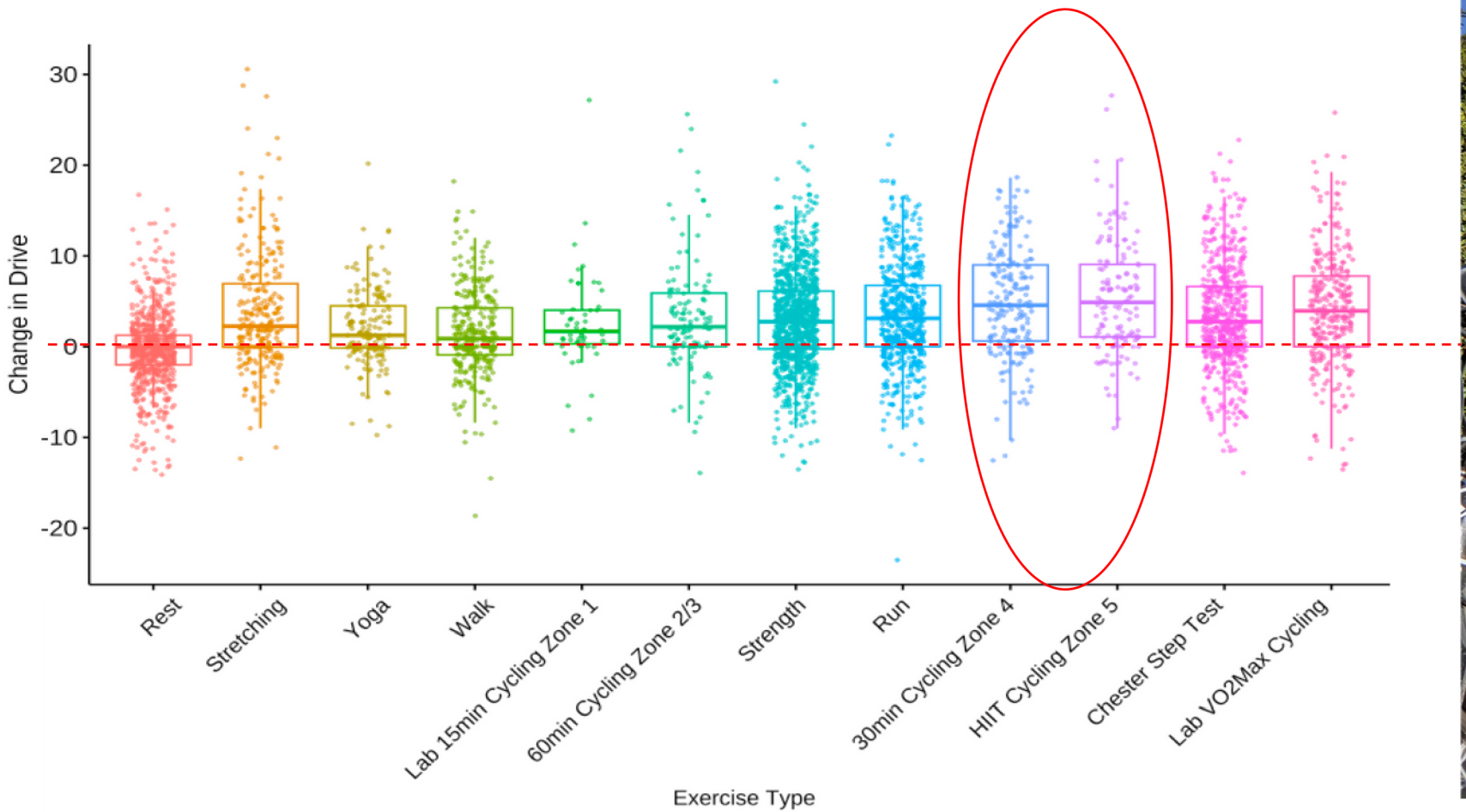
Exercise activates the same region of the brain that we use to assess our emotions during psychotherapy.



Significant activations of left rostral lateral PFC (BA10) across 3 studies. Greatest activation changes are represented in bright yellow and white, with little to no effects represented in dark red and black, respectively (t values of the images are scaled from 0-5+).

Exercise intensity matters

30 minutes of moderate/vigorous aerobic exercise provide the best 'mood and focus' boost •ANYTHING IS BETTER THAN NOTHING
•THERE ARE LARGE INDIVIDUAL DIFFERENCES

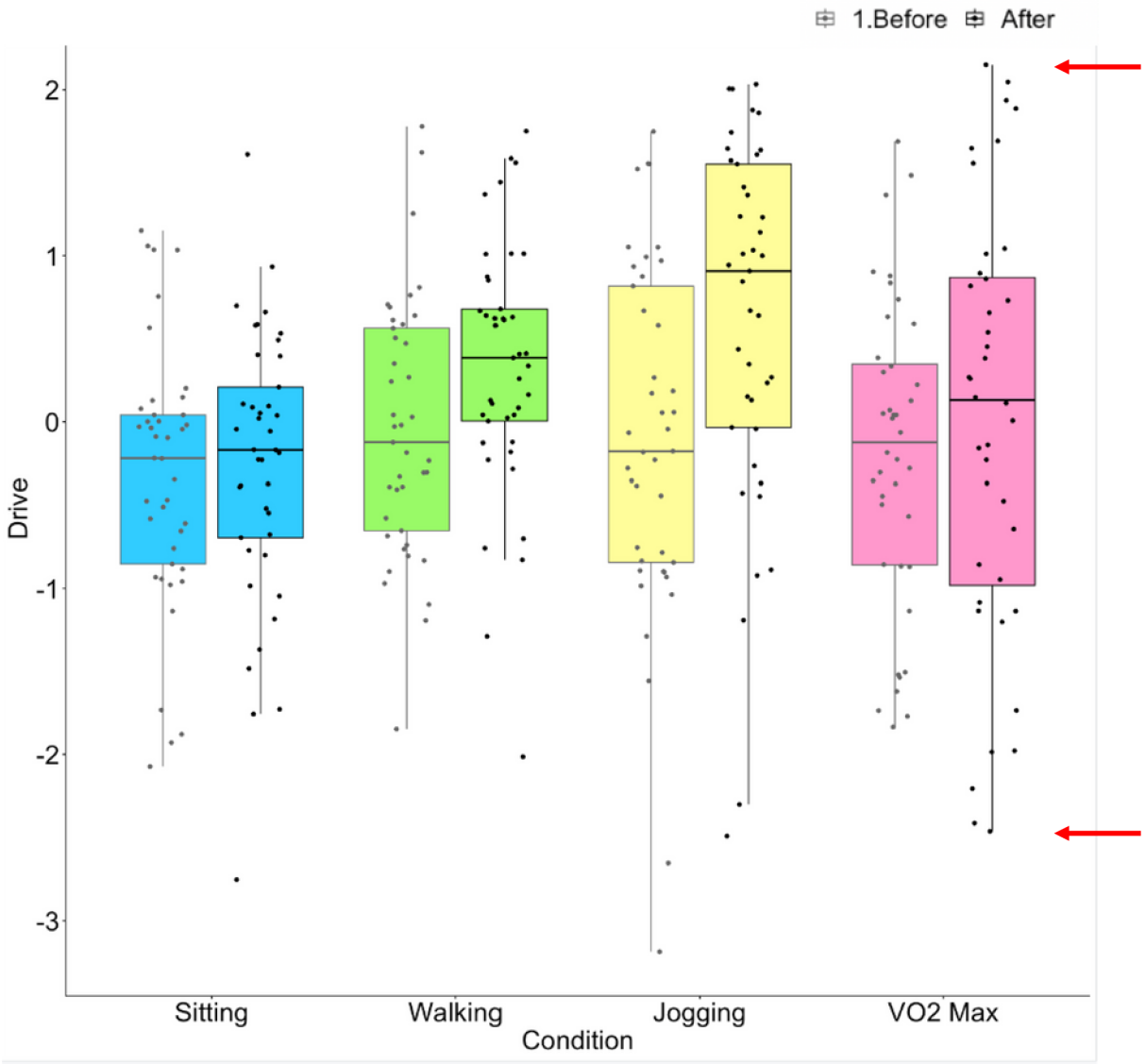


N = 550+ adults

Intensity

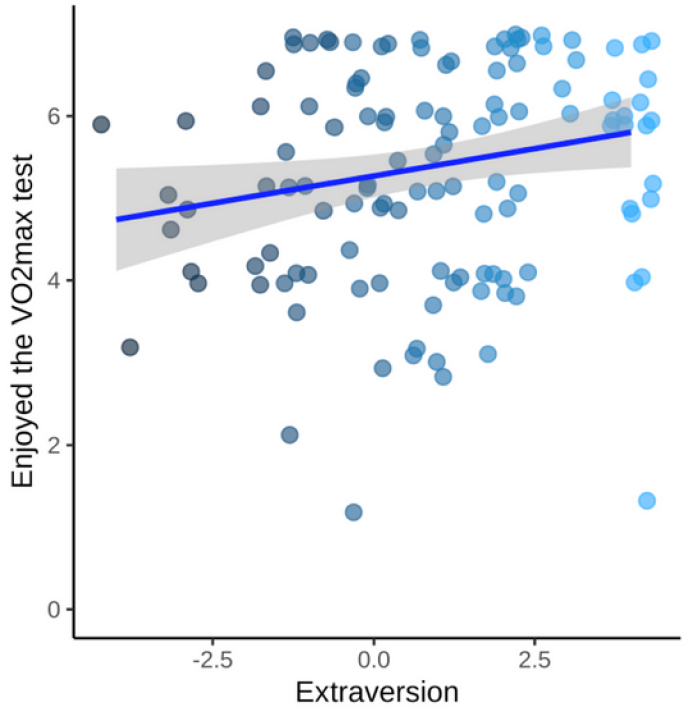
Jackson et al. (in preparation)

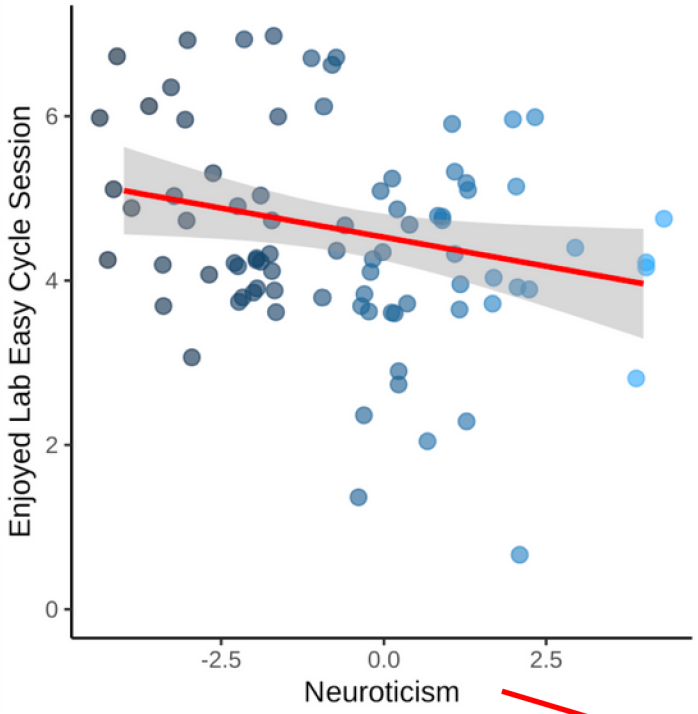
15 minutes of jogging provide the biggest boost

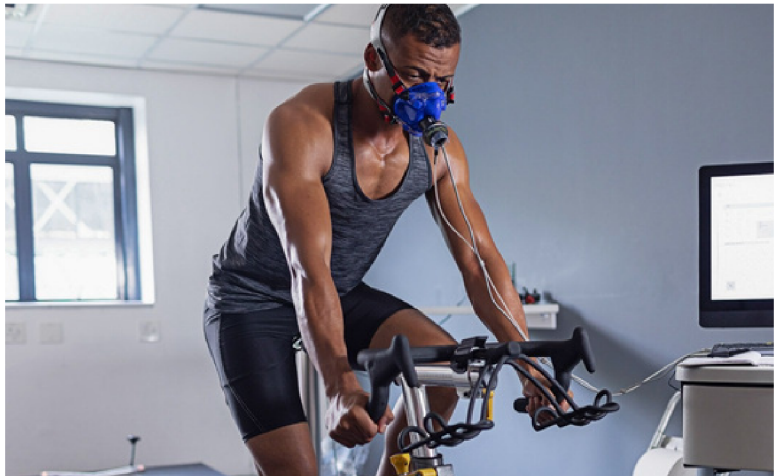


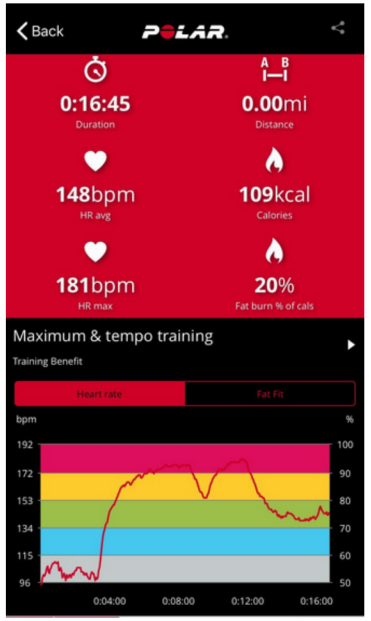
15 minutes of within-subject effects

Our personality affects our exercise engagement





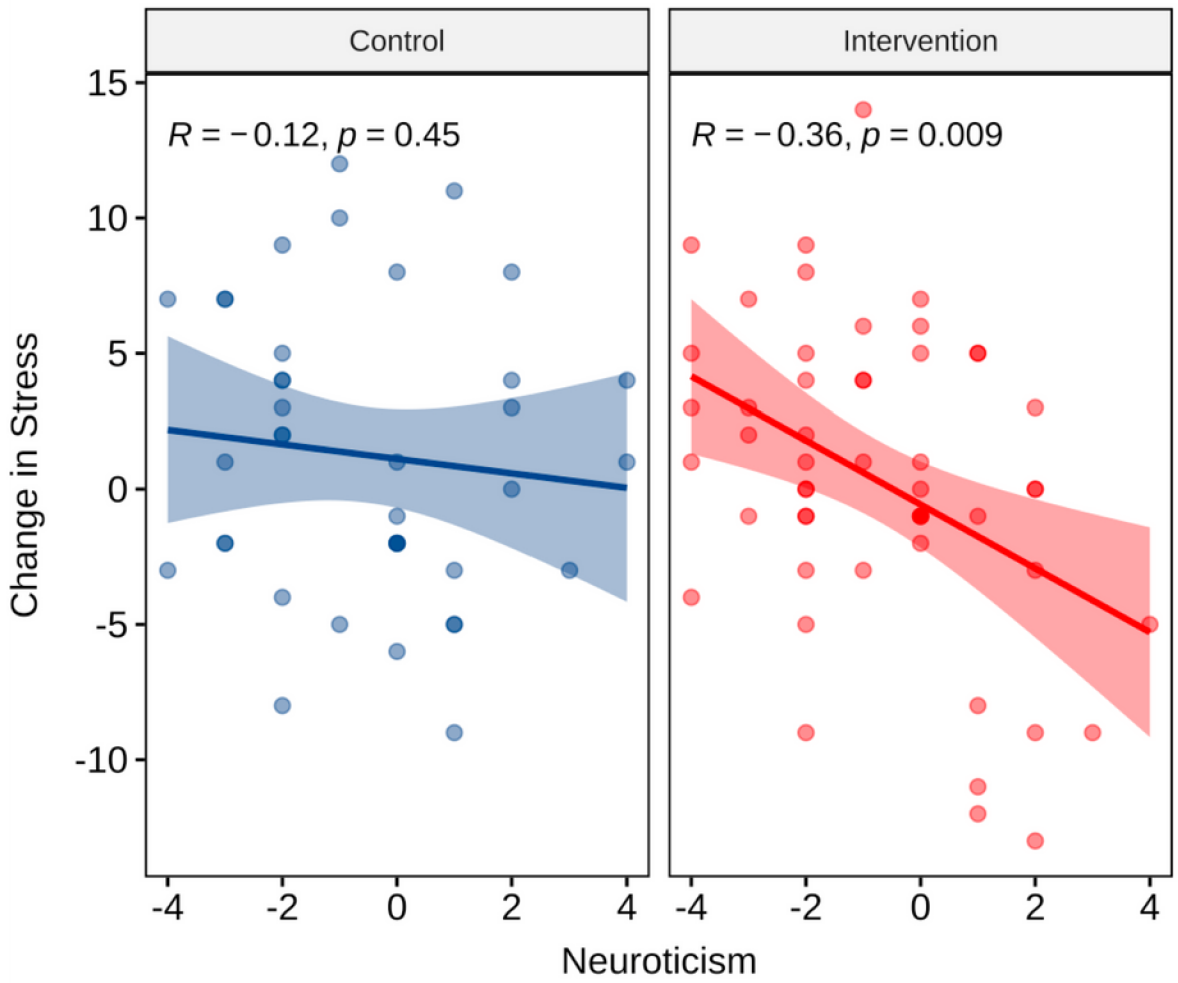




Least likely to record their sessions!

Ronca et al., under review

EXERCISE REDUCED STRESS in high neuroticism



Relationship between neuroticism scores and changes in stress after the 8-week training programme. The prediction was significant in the intervention group only

Ronca et al., under review

KEY POINTS

15 minutes of exercise are enough increase alertness and engage our brain.

15-30min moderate/vigorous activity are most effective in boosting mood.

But anything is better than nothing! Even 10 minutes of stretching.

8 weeks of endurance training can improve brain function and reduce stress.

Exercise engages the regions of the brain that we require to regulate emotion. Different personalities need different approaches to exercise.