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# Targeted exercise therapy to enhance neural activation

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## Abstract

SKC - 250 words

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Title. Targeted exercise therapy to enhance neural activation

Various types of exercise therapies, have been implemented into treatment for those suffering from psychological disorders and traumatic brain injury. The prefrontal cortex (PFC), which houses key cognitive constructs is responsive to exercise, and is commonly measured using functional near infrared spectroscopy (fNIRS). Evidence suggests that exercise mediates neural adaptation through increased blood flow and neurogenesis, which enhances neural activation leading to improved cognitive performance. However, the intensity of exercise that has the most robust impact on brain blood flow is currently unknown. **Purpose.** Therefore, the primary aim of the study is to compare PFC activation during cognitive tasks performed after low-intensity, high intensity, and yoga exercises. **Methods.** Eight subjects (4=M, 4=F), aged  $35\pm 5$  years completed a control, high intensity, low intensity, and yoga exercise trial followed by administration of a cognitive task (NIH Toolbox Fluid Cognition). Left and right PFC oxygenation were measured during the post-exercise cognitive assessment using fNIRS technology. **Results.** Oxygenation during the cognitive task was higher in the left PFC region after low intensity exercise compared to all other trials (control, high intensity, yoga). Regression model analysis showed that a 10% increase in %HRmax up to 70% intensity predicts an increase in left PFC oxygenation by 2.11  $\mu\text{mol}$ . **Conclusion.** Acute exercise below 70% aerobic intensity increased brain blood flow during a post-exercise cognitive task. Therefore, it may be beneficial for those who engage in any cognitive related activity to perform a brief bout of low-intensity exercise prior to the task (e.g. academic-based testing or motor training).