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## Effects of Different Exercise Modalities on Executive Cognitive Function

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Previous studies show a positive correlation of effect between cognitive function and chronic exercise (exercising for 3-12 weeks). However, there is little research on the neurological effects of acute, single session, exercise. Furthermore, no study has compared the effects of acute exercise on cognitive function using different exercise modalities. PURPOSE: To compare the acute effects of moderate-intensity treadmill and cycle ergometry exercise on cognitive function in males and females. METHODS: 22 subjects (11 male and 11 female, age  $20 \pm 2$  yrs,  $32.8 \pm 7.2$  ml/kg/min) completed a crossover, repeated measures study in which each subject completed a 20 min moderate-intensity exercise session on a treadmill (TREAD) and a cycle ergometer (CYCLE). Each session was separated by seven days. Prior to starting an exercise session, subjects were connected to an electroencephalogram (EEG) machine and completed four cognitive tests which included Stroop A, Stroop B, Trail Making A (TMA), and Trail Making B (TMB). During each cognitive test, subject's brain wave activity, number of errors, and the amount of time it took to complete the test was recorded. Once the cognitive tests were completed, subjects were randomized into either the TREAD or CYCLE condition. Subjects completed a 5 min warm-up on the designated exercise machine and then completed 20 min of exercise at 40-59% of subject's maximum heart rate. Immediately after the 20 min, subjects were reconnected to the EEG machine and completed the same four cognitive tests. Then a 5 min cool down was completed. RESULTS: A significant ( $P < .05$ ) difference was found in time to completion for TMA. Time to completion significantly ( $P < .05$ ) improved from pre ( $16.84 \pm 4.4$ ) to post ( $14.7 \pm 4.2$ ) in the TREAD condition, and significantly ( $P < .05$ ) improved from pre ( $16.7 \pm 4.6$ ) to post ( $13.5 \pm 4.7$ ) in the CYCLE condition. Additionally, a significant ( $< .05$ ) difference was found in time to completion for TMB. Time to completion significantly ( $P < .05$ ) improved from pre ( $33.9 \pm 12.1$ ) to post ( $27.1 \pm 11.1$ ) in the CYCLE condition. CONCLUSION: Acute exercise on a treadmill or a cycle ergometer is beneficial for improving cognitive function.

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