The Effect of Exercise and Different Exercise Intensities on Executive Function in College-Aged Individuals

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An acute bout of exercise improves executive function by facilitating exercise-induced arousal that helps the brain process and store information. There has been very little research on how long the improvements in executive function persist after exercise. **PURPOSE:** The aim of this study was to compare if different exercise intensities effected how long executive function remained elevated after exercise. **METHODS:** Thirteen subjects (11 females and 2 males; age 20.23 ± 1.3 years; height 166.7 ± 3.2 cm; weight 65.0 ± 13.0 kg) completed a randomized, cross-over study that consisted of three sessions exercising on a motorized treadmill and a control session. Before each session and immediately, 20 minutes, and 40 minutes after each session subjects completed the incongruent Stroop test and task switching on a computer. Each exercise session consisted of a 5-minute warm-up and then 20 minutes of exercise at either low (20–39% of heart rate reserve [HRR]), moderate (40–59% of HRR), or vigorous (60–85% of HRR) intensity. The control session consisted of subjects sitting quietly in the laboratory for 20 minutes. **RESULTS:** Independent of exercise intensity, one bout of aerobic exercise significantly increased the number of correct responses for incongruent Stroop test from pre (62.56 ± 2.53) exercise to immediately (66.19 ± 2.31; \( p = .047 \)), 20 (66.44 ± 2.34; \( p = .011 \)) and 40 (66.81 ± 2.54; \( p = .002 \)) minutes post exercise. There was a significant decrease in mean reaction time for incongruent Stroop test from pre (.63 ± .37 s) exercise to 20 (.58 ± .31 s; \( p = .017 \)) and 40 (.58 ± .29 s; \( p = .007 \)) minutes post exercise. There was a significant decrease in mean reaction time for correct responses in incongruent Stroop test from pre (.63 ± .37 s) exercise to 20 (.57 ± .32 s; \( p = .008 \)) and 40 (.58 ± .29 s; \( p = .009 \)) minutes post exercise. There was a significant decrease in mean reaction time for task switching from pre (.14 ± .10 s) exercise to 20 (.13 ± .05 s; \( p = .016 \)) and 40 (.12 ± .08 s; \( p = .015 \)) minutes post exercise. There was a significant decrease in mean reaction time for correct responses in task switching from pre (.15 ± .18 s) exercise to 20 (.14 ± .17 s; \( p = .042 \)) minutes post exercise. **CONCLUSION:** An acute bout of aerobic exercise on a motorized treadmill significantly improved executive function for 20 minutes and 40 minutes post exercise in college-aged individuals.

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