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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 ± .95 s; p=.016) and 40 (.12 ± .98 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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