

Effect of Treadmill Exercise on Fluid Intelligence in Early Adults: Electroencephalogram Study

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Abstract : Fluid intelligence declines along with age, but it can be developed. For this reason, increasing fluid intelligence in young adults can be possible. This study examined the effects of a two-month treadmill exercise program on fluid intelligence. The researcher designed a treadmill exercise program to promote cardiorespiratory fitness. Thirty-eight healthy voluntary students from the Boromarajonani College of Nursing, Chon Buri were assigned randomly to an exercise group (n=18) and a control group (n=20). The experiment consisted of three sessions: The baseline session consisted of measuring the $VO_{2\max}$, electroencephalogram and behavioral response during performed the Raven Progressive Matrices (RPM) test, a measure of fluid intelligence. For the exercise session, an experimental group exercises using treadmill training at 60 % to 80 % maximum heart rate for 30 mins, three times per week, whereas the control group did not exercise. For the following two sessions, each participant was measured the same as baseline testing. The data were analyzed using the t-test to examine whether there is significant difference between the means of the two groups. The results showed that the mean $VO_{2\max}$ in the experimental group were significantly more than the control group ($p < .05$), suggesting a two-month treadmill exercise program can improve fluid intelligence. When comparing the behavioral data, it was found that experimental group performed RPM test more accurately and faster than the control group. Neuroelectric data indicated a significant increase in percentages of alpha band ERD (%ERD) at P3 and Pz compared to the pre-exercise condition and the control group. These data suggest that a two-month treadmill exercise program can contribute to the development of cardiorespiratory fitness which influences an increase fluid intelligence. Exercise involved in cortical activation in difference brain areas.

Keywords : treadmill exercise, fluid intelligence, raven progressive matrices test, alpha band

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