

## The Effects of Exercise on Executive Function in Parkinson's Disease

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**Background/Purpose:** Parkinson's disease (PD) is characterized by progressive loss of motor function, followed by behavioral, physiological, and cognitive modifications in a great proportion of patients. Cognitive function impairments are observed relatively early after the onset of PD and if not treated accordingly, can progress to dementia. Exercise is considered a valuable tool in improving or delaying the progression of motor and cognitive aspects of the disease. However, the optimal delivery content of exercise for people with PD has not been identified yet. The purpose of this study was to identify the effects of different frequencies of exercise on selective aspects of executive function, such as working memory (WM) and cognitive flexibility (shifting) in individuals with PD.

**Method:** Forty-three participants ( $M_{\text{age}} = 68.5$  (SD = 11.3), 26 males), with idiopathic PD stages 2 - 3 (Hoehn & Yahr scale) completed two cognitive tasks (Auditory Switch Task and *N*-back task), at baseline, and after 12 weeks of multimodal exercise training. Global switch costs (ms) and response accuracy (% correct responses) were calculated for the switch task, and response time (RT) (ms), and accuracy (% correct responses) for the *N*-back task. The participants were divided into two training frequency groups: a) a high - frequency: 4 - 5 times each week ( $N = 23$ ,  $M_{\text{age}} = 68.6$  (SD = 5.8), 16 males), and b) a low - frequency: 3 times or less each week ( $N = 20$ ,  $M_{\text{age}} = 67.6$  (SD = 4.5), 10 males).

**Analysis/Results:** Although both frequency groups improved global switch costs and *N*-back RT, the high - frequency group displayed greater gains than the low - frequency group. Mixed factorial ANOVA revealed a significant interaction between time and exercise - frequency for global switch costs ( $F(1, 41) = 5.53$ ,  $p < .05$ , partial eta squared = 0.09), and *N*-back RT ( $F(1, 41) = 14.96$ ,  $p < .001$ , partial eta squared = 0.26), and significant main effects of time for global switch costs accuracy ( $F(1, 41) = 5.08$ ,  $p < .05$ , partial eta squared = 0.11), and *N*-back accuracy ( $F(1, 41) = 17.37$ ,  $p < .001$ , partial eta squared = 0.29).

### Conclusions:

The results of the study suggest that high frequency of multimodal exercise is beneficial for WM and cognitive flexibility in individuals with PD and could be an important component in preserving executive functioning in this population.