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Cognitive benefits of physical activity increased when producing rhythmic actions

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Abstract

The changes in human cognitive performance that take place after an acute session of physical activity (PA) have attracted much attention in later years. A variety of exercise protocols have reported that cognitive performance is facilitated after the cessation of exercise regardless of the exercise regimen (Chang et al., 2012) and more specifically, response execution and inhibition (reaction times) are shortened (e.g., Colcombe et al., 2003; Joyce et al., 2009). Nevertheless, less clear-cut results have been reported when considering the higher cognitive functions like action planning (Chang et al., 2011). In the present study, we predict that the absence of findings is primarily due to the fact that cyclic movements only have been used (cycling, walking, running). Considering the fact that motor planning requires the capacity to anticipate action consequences and determine the timed requirements to achieve sub-goals, we posit that significant impact of PA on the higher cognitive functions will be observed especially when using sequential activities that require the predictive timing of motor actions.

Thirty-six young sedentary adults participated in the study. They were randomly assigned to a cycling, dancing, and reading group. Participants performed 4 sessions of 30 minutes of activity, on four separate days. The groups were matched for age and sex. A neuropsychological test battery was used at inclusion, and after each session to test for cognitive performance changes including the *Tower of London* and the *Spatial-Tapping* tests to assess motor planning and motor timing capacities more specifically. Results revealed a significant cognitive improvement in those individuals engaged in PA compared with the control group. The benefits on cognitive flexibility and inhibition capacities were greater in the dancing compared to the cycling group. More importantly, planning and timing abilities were observed in the dancing group only.

We confirmed the cognitive and psychological benefits of a PA in healthy subjects. The benefits on motor planning and timing are most important when sequential activities are performed, probably due to the necessity during such activities to produce series of movements through space and time. These findings open the possibility of using sequential physical activities as new cognitive stimulation programs for improving timing capacities in clinical populations.

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