Intermittent Maximal Exercise Improves Attentional Performance Only in Physically Active Students

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Background and Aims. Regular physical activity participation seems to be linked to brain metabolism and to be one factor responsible for different effects of high intensity exercise on cognition. Due to this, we investigated the effect of an intermittent maximal exercise intervention on a neuropsychological test requiring sustained and selective attention in a group of low and high physically active subjects.

Method. Forty six healthy students (age: M = 23.11, SD = 2.60 years) performed in a cross-over design an intermittent incremental exercise until they reached their maximal heart rate (HR Max; intervention condition) or rested for the same duration (control condition) followed by the administration of the d2-test.

Results. A significant interaction between physical activity participation level and exercise effect on cognitive performance emerged, with only the more physically active participants improving the performance in the cognitive test after the intervention.

Conclusion. These data extend the current knowledge base by showing that a higher participation rate in physical activity may lead to neurobiological adaptations that facilitate selected cognitive processes (i.e., attention) after high exercise intensities. © 2012 IMSS. Published by Elsevier Inc.

Key Words: Intermittent exercise, Cognitive processes, Attention, Physical activity.

Introduction

Research on the effects of acute exercise on cognitive performance has shown that it can positively influence cognition in adults (1,2) and adolescents (3). Effects, however, differ according to the characteristics of the exercise intervention (i.e., intensity, duration, and type) and of the cognitive test utilized (e.g., its typology and the time of administration) [References (1) and (2) for review]. Moreover, subjects’ characteristics such as gender, age, fitness status and level of physical activity participation (4–8) play a fundamental role in the determination of the effects of exercise on cognitive performance.

The assumption that there is an increase in arousal (i.e., neurophysiological activation) with increasing exercise intensity led some authors (9) to propose that exercise can affect cognitive performance in an inverted-U shape with better performance corresponding to submaximal exercise intensity and poorer performance occurring during or after minimal and maximal exercise. Accordingly, when focusing on a particular class of electroencephalogram (EEG) activity...