World Academy of Science, Engineering and Technology
International Journal of Sport and Health Sciences
Vol:10, No:04, 2016

The Influence of Active Breaks on the Attention/Concentration Performance in Eighth-Graders

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Abstract : Introduction: The positive relation between physical activity and cognition is commonly known. Relevant studies show that in everyday school life active breaks can lead to improvement in certain abilities (e.g. attention and concentration). A beneficial effect is in particular attributed to moderate activity. It is still unclear whether active breaks are beneficial after relatively short phases of cognitive load and whether the postulated effects of activity really have an immediate impact. The objective of this study was to verify whether an active break after 18 minutes of cognitive load leads to enhanced attention/concentration performance, compared to inactive breaks with voluntary mobile phone activity. Methodology: For this quasi-experimental study, 36 students [age: 14.0 (mean value) ± 0.3 (standard deviation); male/female: 21/15] of a secondary school were tested. In week 1, every student's maximum heart rate (Hfmax) was determined through maximum effort tests conducted during physical education classes. The task was to run 3 laps of 300 m with increasing subjective effort (lap 1: 60%, lap 2: 80%, lap 3: 100% of the maximum performance capacity). Furthermore, first attention/concentration tests (D2-R) took place (pretest). The groups were matched on the basis of the pretest results. During week 2 and 3, crossover testing was conducted, comprising of 18 minutes of cognitive preload (test for concentration performance, KLT-R), a break and an attention/concentration test after a 2-minutes transition. Different 10-minutes breaks (active break: moderate physical activity with 65% Hfmax or inactive break: mobile phone activity) took place between preloading and transition. Major findings: In general, there was no impact of the different break interventions on the concentration test results (symbols processed after physical activity: 185.2 ± 31.3 / after inactive break: 184.4 ± 31.6; errors after physical activity: 5.7 ± 6.3 / after inactive break: 7.0. ± 7.2). There was, however, a noticeable development of the values over the testing periods. Although no difference in the number of processed symbols was detected (active/inactive break: period 1: 49.3 ± 8.8/46.9 ± 9.0; period 2: 47.0 ± 7.7/47.3 ± 8.4; period 3: 45.1 ± 8.3/45.6 ± 8.0; period 4: 43.8 ± 7.8/44.6 ± 8.0), error rates decreased successively after physical activity and increased gradually after an inactive break (active/inactive break: period 1: 1.9 ± 2.4/1.2 ± 1.4; period 2: 1.7 ± 1.8/ 1.5 ± 2.0, period 3: 1.2 ± 1.6/1.8 ± 2.1; period 4: 0.9 ± 1.5/2.5 ± 2.6; p= .012). Conclusion: Taking into consideration only the study's overall results, the hypothesis must be dismissed. However, more differentiated evaluation shows that the error rates decreased after active breaks and increased after inactive breaks. Obviously, the effects of active intervention occur with a delay. The 2-minutes transition (regeneration time) used for this study seems to be insufficient due to the longer adaptation time of the cardio-vascular system in untrained individuals, which might initially affect the concentration capacity. To use the positive effects of physical activity for teaching and learning processes, physiological characteristics must also be considered. Only this will ensure optimum ability to perform.

Keywords : active breaks, attention/concentration test, cognitive performance capacity, heart rate, physical activity
Conference Title : ICPESS 2016 : International Conference on Physical Education and Sport Science
Conference Location : Boston, United States
Conference Dates : April 25-26, 2016