

The effects of a mid-morning circuit based exercise session on Stroop test performance in adolescents

Simon B. Cooper¹, Stephan Bandelow², Maria L. Nute², John G. Morris¹ & Mary E. Nevill¹

1: Department of Sports Science, Sport, Health and Performance Enhancement (SHAPE) Research Group, School of Science and Technology, Nottingham Trent University, UK

2: School of Sport, Exercise and Health Sciences, Loughborough University, UK

Previous literature has shown a small but positive effect of exercise on cognitive function in young people (Chang et al [2012]. *Brain Research*, 1453, 87-101), though this relationship is complicated by factors such as the mode, intensity and duration of exercise, the components of cognitive function examined and the timing of the cognitive tests relative to exercise. Specifically, bilateral coordinative exercise (exercise with a greater cognitive involvement) has been demonstrated to improve subsequent attention in adolescents (Budde et al [2008]. *Neuroscience Letters*, 441, 229-223).

The aim of the present study was to examine the effects of a circuit of aerobic and coordinative exercises on Stroop test performance in adolescents.

Following approval from the institutions ethical advisory committee, 34 adolescents (age: 13.2±0.3 years; height: 155.4±6.0 cm; body mass: 50.2±9.9 kg) completed a familiarisation session followed by two (exercise and resting) experimental trials. Sixty minutes following provision of an *ad libitum* breakfast (matched for subsequent experimental trial), participants completed the 15 min bout of exercise or continued to rest. The exercise consisted of a circuit of 10 exercises (alternate aerobic and coordinative exercises), each completed for 1 min with 30 s rest between stations. The Stroop test, measuring attention and executive function, was completed 30 min pre-, 5 min post- and 60 min post-exercise.

Heart rate during the exercise was 158±15 beats·min⁻¹. Response times were not different across the morning on the exercise and resting trials, between the baseline and complex levels of the Stroop test (trial by session time by test level interaction, $P=0.408$). However, there was a significant trial by session time by test level interaction for accuracy on the Stroop test ($P=0.039$). Upon further analysis, this was due to an improvement in accuracy 5 min post-exercise on the baseline level of the Stroop test (exercise + 2.1%, resting -1.8 %; trial by session time interaction, $P=0.010$), an effect which was not evident on the complex level (trial by session time interaction, $P=0.543$).

The findings of the present study suggest that the accuracy of attention and executive function (as assessed by the Stroop test) is enhanced immediately following circuits based exercise in adolescents, but that this effect is not evident 60 min post-exercise. There was no effect of the circuits based exercise on response

times on the Stroop test. These results have implications for school policy makers, given the importance of cognitive function (and in particular executive function) for academic performance.