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Combined cognitive and state-control training for children with and without AD/HD: Effects on behaviour, working memory and resting EEG

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Abstract

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Keywords

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Combined cognitive and state-control training for children with and without AD/HD: Effects on behaviour, working memory and resting EEG

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Aims: There is increasing evidence that working memory, inhibitory control, and state-control training can lead to behavioural improvement in children with Attention-Deficit/Hyperactivity Disorder (AD/HD). State-regulation theories of AD/HD suggest it is a disorder characterised by an inability to adjust the energetic state level, which in turn has an effect on executive functioning and behaviour. As such, the present study examined the efficacy of a combined cognitive and state-control training program for children with a diagnosis of AD/HD and with sub-clinical symptoms, using a randomised control design. **Method:** The final sample consisted of 38 children aged 7-12 years, 18 in the training and 20 in the waitlist (WL) condition. Wizard-themed training games (Focus Pocus) took place in the childrens' home, with participants required to complete between 20 and 25 sessions over a 6-8 week period. Outcomes examined included questionnaires assessing AD/HD symptom severity and frequency, performance on a digit span and counting span task, and EEG topography and power during a 2-minute eyes-open (EO) and one minute Focus task before and after training. **Results:** Compared to children in the WL condition, children in the training condition showed significant reductions in AD/HD symptoms overall and specifically for the hyperactivity/impulsivity symptom of AD/HD. There was also a significant increase in digit length recall post-training for the digit span task. EEG power for the two EEG tasks showed typical AD/HD topographical differences at Time 1. Post-training there was some evidence of a directional trend towards EEG normalisation for children in the training condition, with more support for the active Focus than the resting EO task. **Conclusions:** Overall the results provide some support for the efficacy of a combined cognitive and state-control training program for children with AD/HD.

Conflict of Interest: SJ is co-inventor of intellectual property licensed by UOW to NeuroCog and used in Focus Pocus and is entitled to a small portion of royalties

Keywords: cognitive control, state-control, Neurofeedback, working memory, impulse control, ADHD, Attention-deficit/hyperactivity disorder (ADHD), Children, Attention, training program

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