SUMMARY REPORT

Timecourse of Cognitive and Brain Adaptation to Cognitive Training in At-risk Elderly

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Translating dementia research into practice
Timecourse of Cognitive and Brain Adaptation to Cognitive Training in At-risk Elderly

Maintaining cognitive ability in the elderly is a global priority. In this regard, Computerised cognitive training (CCT) is among the few effective interventions but there are several key gaps in the evidence base needed for clinical implementation. Specifically, we do not understand which specific cognitive skills can be effectively targeted, which design features ensure effective delivery, or what happens in the brain during training. This thesis reports results from three inter-related studies designed to address this problem:

First, by systematically reviewing previous research findings on the effects of CCT in healthy elderly and analysing them using various meta-analysis techniques, this thesis provides strong evidence that CCT is effective on memory, working memory, processing speed, attention, language and visuospatial skills, but not on executive functions. Interestingly, however, not all CCT programs were equally effective. Most notably, CCT was effective mainly when delivered in supervised (group-based) format, when sessions were 30-60 minute in length and delivered up to 3 times per week.

Second, this thesis describes the methods and findings of the Timecourse Trial, a DCRC-funded randomised, double-blind, active controlled longitudinal trial of CCT in 80 healthy elderly. Significant effects were found on global cognition, memory and processing speed, as well as distinct dose-response curves across domains. These domain-specific gains also followed different decay curves after training cessation, yet positive residual effects were still noted at 12 months follow-up.

Finally, some of the trial participants also underwent MRI scans before, during and after training. These revealed unique changes in brain structure and function that were associated with training.

Overall, these results suggest that CCT is an effective intervention for supporting cognition in the elderly. The field may do well to now focus on improving standards, large-scale trials and a further understanding of biological mechanisms.

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