Can a web-based multi-modal therapy program improve executive functioning in children and adolescents with unilateral cerebral palsy?

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Aim:
To examine the efficacy of a multi-modal web-based therapy program, Move it to improve it (Mitii™), delivered in the child’s home in improving executive functioning capacity and performance in children with unilateral cerebral palsy (UCP).

Methods:
Design: Randomised wait-list controlled trial.
Participants: 102 children with UCP
Mitii™: n=51, 26 males; mean ± SD age = 11.63 ± 2.3 years; Full Scale IQ = 84.65 ± 15.19; 28 left hemiplegia; GMFCS I = 20, II = 25;
Wait-list (WL) controls: n=51, 25 males; mean ± SD age = 11.86 ± 2.45 years; Full Scale IQ = 84.65 ± 15.19; 28 left hemiplegia; GMFCS I = 25, II = 25.
Intervention: Mitii™ program involved games that targeted areas of working memory (WM), visual processing (VP), upper limb co-ordination and physical activity (57% involved WM, VP).

Assessments:
• Measures from the Wechsler Intelligence Scales for Children (WISC-IV) and the Delis Kaplan Executive Functioning System (DKEFS) were used to assess executive functioning capacity across four domains:
  i. Attentional control (Digits backwards WISC-IV)
  ii. Cognitive flexibility (Inhibition and number/letter sequencing Delis Kaplan Executive Functioning System (DKEFS)
  iii. Goal setting (Tower test DKEFS)
  iv. Information processing (Symbol search and Coding WISC-IV)
• Executive functioning performance was assessed with the parent reported Brief Rating Inventory of Executive Function (BRIEF).

Analysis: Data were compared between groups at 20 weeks using one sample t-tests (SPSS 21).

Results:
Groups were comparable at baseline.
At the 20 week follow up 9 children withdrew (4 in Mitii™, 5 in WL, 92 % retention).
Children completed a mean of 32.4 hours, range 3.7 to 74.7 hours of Mitii™.
Post intervention there were no significant between group differences on measures of executive functioning capacity:
• Attentional control (Digits backwards: Mitii™ = 8.26 ± 2.81, WL = 7.52 ± 2.65, p = 0.20, Fig 1).
• Cognitive flexibility (Inhibition: Mitii™ = 9.55 ± 3.07, WL = 8.86 ± 3.77, p = 0.34, Fig 2; Number/letter sequencing Mitii™ = 8.51 ± 4.14, WL = 7.32 ± 4.25, p = 0.18, Fig 3).
• Problem solving (Tower test: Mitii™ = 10.49 ± 3.16, WL = 9.75 ± 3.32, p = 0.28, Fig 4).
• Information processing (Symbol search: Mitii™ = 8.96 ± 3.00, WL = 8.66 ± 0.59, p = 0.08, Fig 5; Coding: Mitii™ = 8.40 ± 2.91, WL = 7.20 ± 3.41, p = 0.07, Fig 6).
Executive functioning performance was also not significantly different at 20 weeks between groups (BRIEF GEC Mitii™ = 59.46 ± 13.80, WL = 63.79 ± 13.10, p = 0.13).

Conclusion:
There was no treatment effect of the multi-modal program Mitii™ on executive functioning in children with UCP.
Mitii™ did improve motor processing (James et al.) and physical capacity (Mitchell et al.) but not executing functioning at this dose in this approach.

Acknowledgements:
Queensland Government Department of Science, Information Technology, Innovation, Arts Co-investment Fund. Thank you to the families who participated.