

Feasibility and effectiveness of Cognitive Orientation to daily Occupational Performance (CO-OP) with children with executive functions deficits following acquired brain injury: a single case experimental design

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Introduction

Executive functions (EF) deficits are frequently observed following childhood acquired brain injury (ABI). These deficits have a strong impact on everyday life and occupational performance (the ability to choose, organize and perform meaningful activities providing satisfaction). CO-OP (Cognitive Orientation to daily Occupational Performance) is a cognitive approach for problem solving, that consists in guiding the individual towards discovery of efficient strategies, in order to improve their performance in daily life activities. CO-OP has rarely been used in childhood ABI.

Aims

- To explore if the use of CO-OP with children with EF deficits following ABI could improve their occupational performance and their everyday executive functioning.
- To evaluate if the OThope French pilot tool (Outil Thérapeutique pour l'autodétermination d'Objectifs Pédiatriques en Ergothérapie [therapeutic tool for self-determination of pediatric goals in occupational therapy]) can facilitate the determination by the child of his/her problematic occupations.

Methods

Participants

Two children, at least 7 months post-severe ABI (an 9-year old boy who sustained severe traumatic brain injury and a 11-year old girl who sustained severe arterial ischemic stroke).

Study design

Single case experimental design with multiple baselines across individuals and behaviours (and associated measures).

Outcomes measures

Measures	Aims
COPM (Canadian Occupational Performance Measure)	To determinate goals and to measure performance and satisfaction
OThope (therapeutic tool for self-determination of pediatric goals in OT)	To help children identify their problematic occupations
GAS (Goal Attainment Scale)	- To formalize the expected results for each goal - To assess whether the control goal has remained stable, to demonstrate the specificity of the intervention - Use as repeated criterion measure (SCED)
BADS-C subtests (Behavioural Assessment of the Dysexecutive Syndrome for Children)	To measure EF deficits by neuropsychological tests
BRIEF (Behavior Rating Inventory of EF)	To measure the impact of EF deficits in everyday life, in family and school contexts
CCT (Children's Cooking Task)	To assess EF in an ecological standardized task



Intervention

Included within the child's conventional rehabilitation program, following the key principles described in the original CO-OP protocol, with some adjustments to adapt it to the childhood ABI population (e.g. 2 rather than 3 goals; 14 rather than 10 sessions, over 7 weeks given the relatively severe impairments). Among the 3 problematic occupations identified during baseline, the first 2 were used as target goals during sessions, and the third served as a control goal.

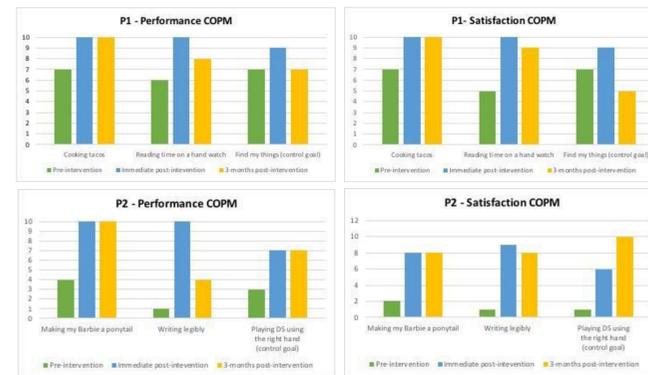
Data analysis

Visual analysis by Dual Criteria Method, statistical analysis by Non-overlapping of All Pairs (NAP) and Baseline Corrected Tau.

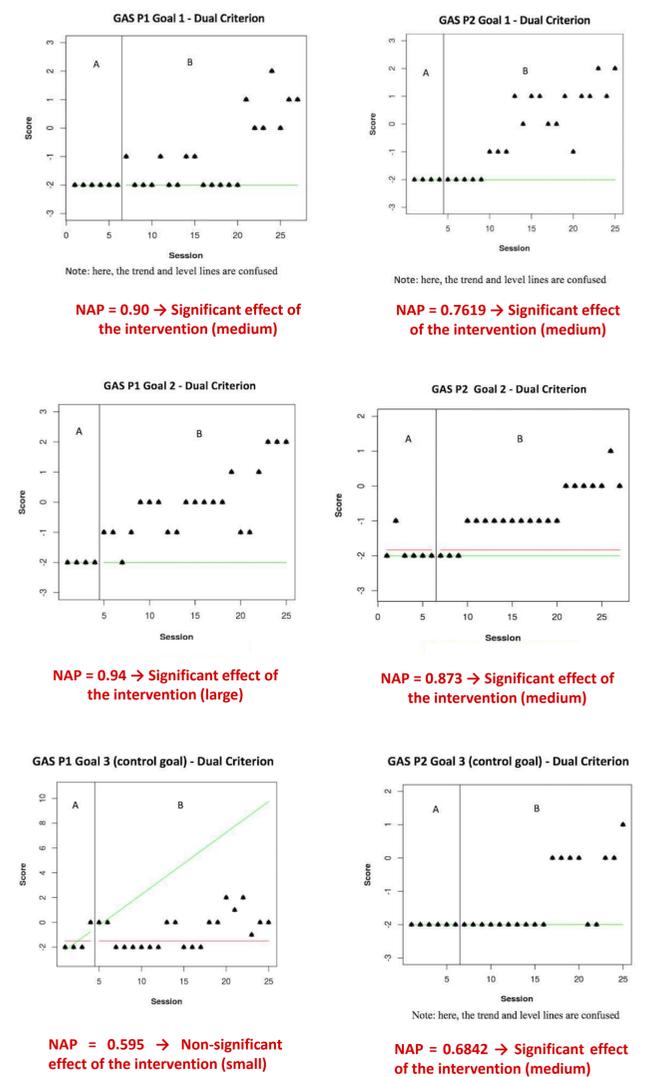
Results



↑ Data collected following the use of OThope

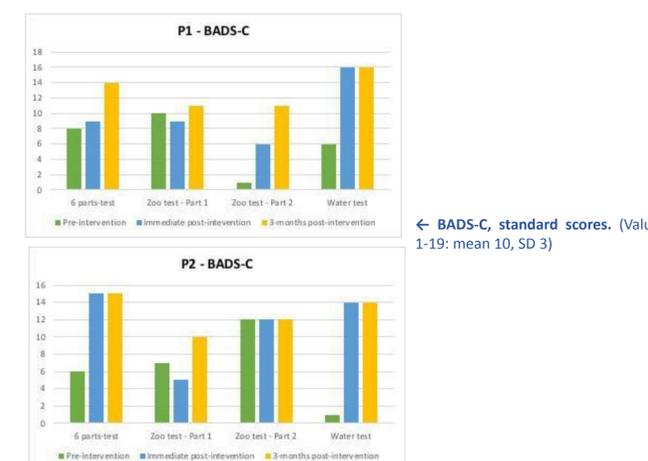


↑ Child-chosen COPM goals and pre/post-test outcomes – self-ratings. Performance and Satisfaction rated on a 1-10 scale (1=not at all able to perform the activity (performance)/not at all satisfied with the way the activity is performed (satisfaction); 10=perfectly able to perform the activity/perfectly satisfied with the way the activity is performed). A difference of 2 points between pre/post-intervention is statistically significant.

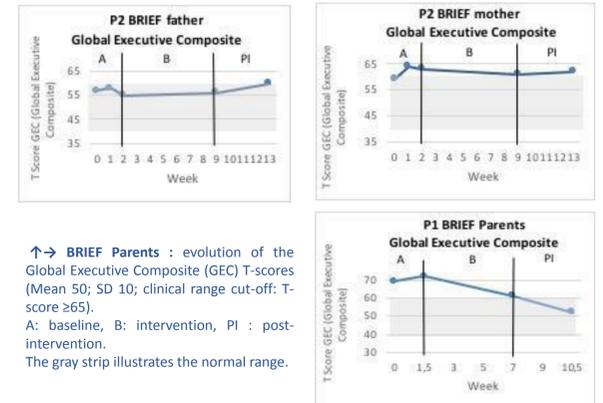


↑ Repeated judgment criteria : GAS scores, analysis by Dual Criteria Method.

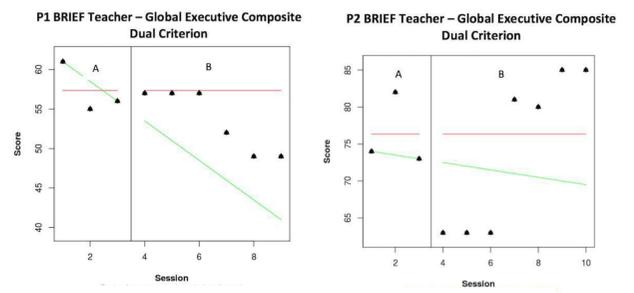
A: baseline, B: intervention. The green line represents the trend line of baseline, the red line represents the level line (=average) of the baseline. These 2 lines, projected in the intervention phase, allow to visualize the Dual Criterion: here, the more points above these 2 lines in the intervention phase, the more pronounced the effect of the intervention. NAP = Non-overlapping of All Pairs. 0-0.65: small effect; 0.66-0.92: medium effect; 0.93-1: large effect.



← BADS-C, standard scores. (Values 1-19: mean 10, SD 3)



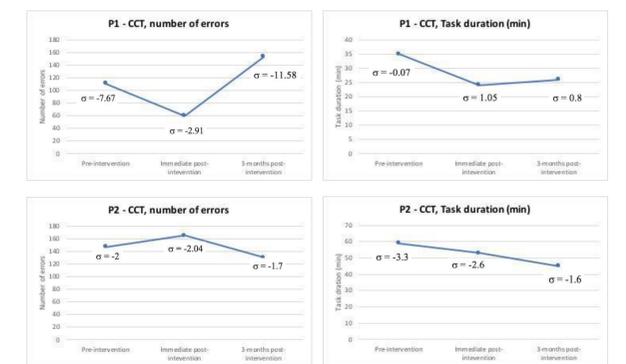
↑ BRIEF Parents : evolution of the Global Executive Composite (GEC) T-scores (Mean 50; SD 10; clinical range cut-off: T-score ≥65). A: baseline, B: intervention, PI: post-intervention. The gray strip illustrates the normal range.



Tau=0.679, SE=0.313, p=0.018 → Significant effect of the intervention

NAP = 0.47 → Non-significant effect of the intervention (small)

↑ BRIEF Teacher : evolution of GEC T-score (Mean 50; SD 10; clinical range cut-off: T-score ≥65). A: baseline, B: intervention, PI: post-intervention. (Baseline Corrected) Tau: significant if Tau +/- SE (Standard Error) ≠ 0 and/or if p<0.05. NAP = Non-overlapping of All Pairs. 0-0.65: small effect; 0.66-0.92: medium effect; 0.93-1: large effect.



↑ Children's Cooking Task (CCT) : number of errors and task duration.

Discussion

Both children were receptive to how to approach problematic situations through CO-OP. They were able to achieve the goals they had set and their occupational performance improved significantly.

The effect of the CO-OP intervention on the goals, measured by repeated judgment criteria was consistent and significant.

The neuropsychological test results improved.

For P1, according to the BRIEF, parents and teacher ratings tended to be congruent at the end of the follow-up phase, with scores within age-expected norms, and significant progress displayed by statistical analysis. P2's teacher, although she reported more difficulties than parents, qualitatively perceived positive changes, especially at the beginning of the intervention.

The performance in a ecological complex cooking task improved for P1 in immediate post-intervention (number of errors) and the task duration decreases for both patients.

OThope was very useful in defining the goals, especially for P1.

Conclusion

These results are encouraging and suggest the effectiveness of CO-OP with children with executive functions deficits following acquired brain injury. They should be replicated in a larger number of cases, in order to refine the application of CO-OP to this population.