The benefit of neurocognitive training in an ongoing therapeutic program for memory/neuropsychological deficits in children

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Fisher BC, Szokola D. The benefit of neurocognitive training in an ongoing therapeutic program for memory/neuropsychological deficits in children. J Clin Psychiatr Neurosci December-2018;1(3):25-26.

This is an ongoing study published earlier this year (Fisher and Szokola, May 2018) addressing therapeutic intervention for memory and executive reasoning deficits in children. There have been a number of re-evaluations sufficient to yield a new data set of pre and post-intervention effects. Children and adolescents are seen two times per week for treatment which consists of cognitive behavioral therapy addressing emotions, social development and social skills as well as the neurocognitive training program. The neurocognitive program consists of over 200 games and activities that are used to create an individualized protocol that is patient specific based upon neuropsychological evaluation, presenting complaint, parent interview and self-report questionnaires. Re-evaluation occurs from six months to one year. Positive results continue to be seen from this therapeutic program provided in an outpatient treatment setting that provides individual therapy and neurocognitive enhancement. Parental feedback is quite positive with regard to improved behavior at home and in school.

Key Words: Neuropsychological testing; neurocognitive intervention; children and adolescents.

INTRODUCTION

A research review was completed in the earlier article this year. The goal of the current study is to provide additional data to determine the benefit of a neurocognitive treatment program designed to address identified deficits seen in neuropsychological evaluation using a patient specific individualized program. Neurocognitive treatment is provided in the context of a therapy session with a therapist to address the neurocognitive and memory deficits as well as related behavioral and emotional issues that typically accompany these deficits. Children are seen in an outpatient treatment program that has been ongoing for over fifteen years with data provided for thirteen years.

METHODS

Children are typically referred by their treating pediatrician or primary care physician to address behavioral complaints, unresolved attention issues and/or ongoing academic difficulties. Evaluation is completed initially addressing the treatment complaint followed by additional testing based upon issues that were apparent from the initial assessment. Children receiving this treatment program were found to have additional deficits typically involving memory and executive reasoning. They were placed in a treatment program to address behavioral as well as neurocognitive deficits, ages are 5 to 16 years, n=39. Children are seen twice per week for a therapeutic session for approximately one hour consisting of cognitive behavioral intervention and the neurocognitive training program. Training programs are provided for home use.

The Wide Range Assessment of Memory and Learning (WRAML-2) and Cognitive Assessment System (CAS-2) were two of the common neuropsychological test measures utilized to assess areas of functioning prior to and following participation in a therapeutic treatment program. Comparison of initial and repeated evaluation over time intervals was assessed.

The range of neurocognitive deficits is mild to severe with possible causal factors related to either neurological disease, sleep disorders, brain injury, birth issues and/or unknown causal factors. All of the children were diagnosed with memory deficits. Slightly more than half (i.e., 56%) were diagnosed with memory, executive reasoning and attention deficits, 7% were diagnosed with memory, executive reasoning, attention deficits and sleep apnea, 3% were diagnosed with attention and executive reasoning deficits, 7% were diagnosed with a TBI, 12% were diagnosed with memory and executive reasoning deficits and 15% were diagnosed with memory and attention deficits. The majority (i.e., 59%) of the children evaluated was not taking any medication at the time of evaluation, 21% were taking psychotropic medications and 20% were taking a stimulant medication.

Children are re-evaluated and compared to baseline testing. In the use of pre and post-testing, children and adolescents provide their own control. Testing is completed at the same time of day, medication is typically held constant (if tested initially on medication, the child was re-evaluated while on medication).

RESULTS

Findings revealed statistically significant differences in scores for initial and re-evaluation testing following treatment. Paired samples t-tests revealed significant differences between initial and re-evaluation scores on the WRAML-2 (Table 1) for verbal memory (p=0.039), visual memory (p=0.014), (Table 2) screening memory (p=0.001), (Table 3) general memory (p=0.003), (Table 4) visual recognition (p=0.020) (Table 5) and general recognition (p=0.036) (Table 6). Significant findings also occurred on the CAS-2 for attention functioning (p=0.017), (Table 7) as well as overall functioning (p=0.013) (Table 8).

Table 1: Effect of cognitive training on verbal memory performance

WRAML-2 Verbal Memory		Pre-Testing	Post-Testing
	Mean	94.76	98.7
	± ΣΔ	10.97	16.81

Table 2: Effect of cognitive training on visual memory performance

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Received: October 25, 2018, Accepted: October 30, 2018, Published: November 07, 2018

WRAML-2 Visual Memory		Pre-Testing	Post-Testing
	Mean	95.31	103.18
	± ΣΔ	14.89	21.34

Table 3: Effect of cognitive training on screening memory performance

WRAML-2 Screening Memory		Pre-Testing	Post-Testing
	Mean	94.2	104.46
	± ΣΔ	3.57	5.49

Table 4: Effect of cognitive training on general memory functioning

WRAML-2 General Memory		Pre-Testing	Post-Testing
	Mean	93.31	102.18
	± ΣΔ	14.59	20.3

Table 5: Effect of cognitive training on visual recognition functioning

WRAML-2 Visual Recognition		Pre-Testing	Post-Testing
	Mean	96.35	102.58
	± ΣΔ	14.64	16.48

Table 6: Effect of cognitive training on general recognition functioning

WRAML-2 General Recognition		Pre-Testing	Post-Testing
	Mean	94.64	99.58
	± ΣΔ	15.17	16.35

Table 7: Effect of cognitive training on attention functioning

CAS-2 Attention Functioning		Pre-Testing	Post-Testing
	Mean	9.31	14.8
	± ΣΔ	1.98	3.15

Table 8: Effect of cognitive training on overall cognitive functioning

CAS-2 Overall Functioning		Pre-Testing	Post-Testing
	Mean	91.36	96.13
	± ΣΔ	12.74	10.17

CONCLUSION

Efficacy was demonstrated in this continuing study of using a neurocognitive program within a therapeutic session to address neuropsychological and behavioral/emotional issues for children and adolescents suffering from memory and executive reasoning deficits. Findings indicate that therapeutic intervention has been beneficial in recovering a range of memory and executive functioning in a clinic population of children with deficits documented on neuropsychological evaluation. Improvements in the areas of overall memory, visual, verbal and recognition memory, as well as attention and overall cognitive functioning were seen between six months and one year of treatment.

LIMITATIONS OF THE STUDY

This study lacks a matched patient control group. This is a clinical study completed in an outpatient setting using a clinical population. Six months is the general rule with regard to practice effects although familiarity with the test measure providing an additive impact cannot be ruled out. Medication was not tracked given that there is not a specific medication for memory and executive deficits; medication when present was typically to address attention and/or emotional deficits; the impact of medication cannot be ruled out. A total of 41% of the children evaluated were taking medication. Information from the school setting was not obtained as part of the follow up testing due to reevaluation being done at different times of the year including the summer.

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