

Executive Functions among Adolescents with neurodevelopmental disabilities: establishing discriminate validity and concurrent validity for the Children Cooking Task (CCT) tool

By: Renana Hirsh

Supervised by: Prof. Sara Rosenblum

ABSTRACT

Executive Functions (EF) are critical for every person's ability to perform and effectively participate in all occupational areas in one's life. EFs develop from infancy throughout adulthood. An impairment of EFs inhibits and prevents normal functioning. and may increase with age. One population which has been shown to exhibit impaired EFs is adolescents with complex neurodevelopmental disabilities like Attention Deficit Hyperactive Disorders (ADHD), Specific Learning Disabilities (SLD) and Developmental Coordination Disorders (DCD). Due to functional impairment, those adolescents are often referred to evaluation through occupational therapy. Performance- based assessment tools are recognized as having ecological validity and therefore are the preferred diagnostic method for EF evaluation. Currently, there are only a limited number of ecological assessment tools available for performing ecological functional evaluations on this population.

The aim of the current study is to establish a discriminate and concurrent validity for the Children Cooking Task (CCT) tool (Chevignard, Servant, Mariller, Abada, Pradat-Diehl & Laurent-Vannier, 2009) in order to adapt it to Israeli adolescents with complex neurodevelopmental disabilities, by comparing the functioning of the research group (adolescents with neurodevelopment difficulties) to the functioning of the control group (typical adolescents).

Hypotheses

1. Significant differences in EF will be found between the research groups and the control group with:

a. Results of the WebNeuro assessment in areas of memory, attention and EF.

Among the research group:

b. CCT assessments (Chevignard et al., 2009): (1) Total number of errors, types of errors and task duration; (2) Quantitative analysis (Goal achievement, Dangerous behaviors and required adult Intervention).

2. Significant positive correlation will be found between the total number of errors, types of errors and task duration of the CCT assessment and Results of the WebNeuro assessment in areas of memory, attention and EF.

3. Significant positive correlation will be found between the total number of errors, types of errors and task duration of the CCT assessment and the index and composed scales at the BRIEF.

Method: Participants: A convenience sample of eighty Hebrew-speaking adolescents, aged 10-18, with normal intelligence, studying in a conventional education framework. The research Group (n=40) consists of adolescents with complex neurodevelopmental disabilities. The inclusion criteria for the research group was a deficiency in EF according to the adolescent parent's report at the BRIEF (Score deficiency of 65 and above on one of the two major index scales: Behavioral Regulation Index (BRI) or the Metacognition Index (MI)). A control group (n=40) of typical adolescents, comparable in age and gender was also included. The participants in this group had normal EF according to the adolescent parent's Report at the BRIEF (Score deficiency of under 65 on the two major index scales: Behavioral Regulation Index (BRI) and the Metacognition Index (MI)).

Instruments that were utilized in the study include the Behavior Rating Inventory of Executive Function (BRIEF) (Gioia, Isquith, Guy, & Kenworthy, 2000) and a demographic questionnaire completed by the parents. In addition, Two parts of the Wechsler Intelligence Scale for Children- III (WISC-R, Hebrew version; Wechsler, 1976): Vocabulary and Block Design ,the WebNeuro tool (Gioia, Isquith, Guy, & Kenworthy, 2000) and the Children Cooking Task (CCT) assessment (Chevignard, Servant, Mariller, Abada, Pradat-Diehl & Laurent-Vannier, 2009) performed by the

adolescents were used. The CCT assessment is a performance-based ecological assessment that evaluates EFs in a natural environment. The task entailed preparing a chocolate cake and fruit juice in the clinic or a home kitchen, as described below.

The necessary ingredients and utensils were placed on a table along with an instruction sheet and a cookbook. The examiner only intervened when he or she thought it was necessary in order to prevent the participant to be in danger. The analysis of the performance in the CCT is composed of two parts: **1)** Quantitative analysis of the task (task duration and measurement of the number of errors through classification into descriptive assessment followed by Neuropsychological analysis. **2)** Qualitative analysis of the task (Goal achievement, Dangerous behaviors and required adult Intervention). The method of encoding and types of errors is described in appendix 1.

Research Process: This research is part of a doctoral research project that is examining the effectiveness of intervention. In the present study, the data was collected from the initial estimate aggregated before the intervention process. After receiving approval from the Haifa University ethics committee (appendix 2), information about the study was published and those interested in participating (i.e. a convenience sample) received forms used to establish their suitability for the study (the BRIEF and demographic questionnaire). If they were found suitable for the study, they signed informed consent forms.

Data processing with SPSS-21: The comparison tests performed were the Mann-Whitney, MANOVA and the t-test for testing discriminate validity and Spearman- Correlation for testing concurrent validity.

Results: It was found that the research group exhibited a lack of EF compared to the control group according to the WebNeuro assessment and the CCT (duration and number of errors) tool.

Significant differences were found between the two groups despite the fact that the level of interest and previous experience in cooking and baking was the same for both groups. Likewise, medium to low-level partial correlations were found between the number of errors in the CCT and some of the

index and composed scales in the BRIEF. Additionally, medium to low-level partial correlations were found between the number of errors in the CCT and some of the WebNeuro results.

Conclusion: The research findings indicate that adolescents with neurodevelopmental disabilities exhibit impaired EFs. The findings also indicate high discriminate validity, meaning that the CCT assessment can reliably distinguish between the adolescents with neurodevelopmental disabilities and typical adolescents. That being said, according to the research results, the concurrent validity of the CCT assessment versus other EF assessments is not high and there is a need to continue to establish the validity of the tool with a larger sample size and against other EF assessments.