



Executive Functions in Primary School Children

Thesis Submitted by

Amira Mohamed Dabour

For fulfillment of PhD degree in childhood studies (special need section)

Under Supervision of

Prof. Dr. SamiaSamy Aziz

Professor of Child Mental Health

Medical Studies Department

Faculty of Postgraduate Childhood Studies

Ain Shams University

Dr. Hassnaa Othman Mohammed

Lecturer of Phoniatics

Medical Studies Department

College of Postgraduate Childhood Studies

Ain Shams University

Contents

Item	Page
Acknowledgement	2
List of Abbreviation	3
List of Tables	4
List of Figures	9
Introduction	10
Aim of the Work	13
Review of Literature	
Chapter 1:	14
Chapter 2:	28
Chapter 3	46
Chapter 4:	51
	54
Subjects and Methods	
	59
Results	
	98
Discussion	
Study Limitation	107
Recommendation	108
Summary	110
Arabic Summary	129
References	113

Acknowledgements

Firstly, I would like to express my sincere gratitude to my advisor Prof. Dr. Samia Samy Aziz for the continuous support of my PhD study and thesis, for her patience, motivation and immense knowledge. Her guidance helped me in all the time of research and writing this thesis. I could not have imagined having a better advisor and mentor for my PhD study.

I would like to thank Dr. Hassnaa Othman for her insightful comments, encouragement, and research suggestions helped me take my study to the next level.

Last but not the least; I would like to thank my family for supporting me spiritually throughout writing this thesis and my life in general.

Finally, I would like to dedicate this dissertation to the children and the teachers who were eager to help me in my research.

Abbreviations

Abbreviations	Meaning
1. ACC	Anterior Cingulate Cortex.
2. ADHD	Attention Deficit Hyperactivity Disorder.
3. BADS	Behavioral Assessment of Dysexecutive Syndrome.
4. BRIEF	Behavior Rating Inventory of Executive Functions.
5. CBT	Cognitive Behavioral Therapy
6. CEFI	Comprehensive Executive Functions Inventory.
7. DLPFC	Dorso-lateral Prefrontal Cortex
8. DSM	Diagnostic and Statistical Manual
9. EF	Executive Functions
10.IQ	Intelligent Quotient
11.LD	Learning Disability
12.OFC	Orbito-Frontal Cortex
13.RTI	Response to Intervention
14.SAS	Supervisory Attentional System
15.SLD	Specific Learning Disorder

List of Tables

Table	Page
Table (1): Mean Age of the Females and the Males in the Study	59
Table (2): Sex Distribution in the Study	60
Table (3): Socio-Demographic Data of the Study	61
Table (4): Number of ADHD and SLD in the Study	62
Table (5): Sex Distribution in Children with SLD and ADHD	62
Table (6): CEFI Rating in the Study	63
Table (7): CEFI Rating According to Sex distribution in the Study	64
Table (8): Rating of the CEFI in the Control Group:	65

Table (9): CEFI Rating in the Cases:	65
Table (10): CEFI Rating among Children with ADHD	65
Table (11):The Rating of CEFI among Children with SLD	67
Table (12): Standard Score of the Executive Functions in the Study	68
Table (13): Detailed Illustration of Each Executive Function Scoring in the control group	69
Table (14): Numerical Values of Children Scoring in Different Executive Function's Scale Compared to 25 th and 75 th percentile in the Control Group	72
Table (15): Numerical Values of Cases Standard Scoring (case group) in Different Executive Functions Scale Compared to 25 th and 75 th Percentile in the Normal Sample	74
Table (16): Standard Score of the Executive Functions in the Children	75

with Specific Learning Disorder	
Table (17): Standard Score of the Executive Functions in the Children with ADHD	76
Table (18): The Rating of the CEFI in the Study	77
Table (19): The Descriptive Rating of the Attention Scale in the Study	77
Table (20): The Descriptive Rating of the Emotion Regulation Scale in the Study	78
Table (21): The Descriptive Rating of the Flexibility Scale in the study	79
Table (22): The Descriptive Rating of the Inhibition Control Scale in the Study	80
Table (23): The Descriptive Rating of the Initiation Scale in the Study	81
Table (24): The Descriptive Rating of the Organization Scale in the Study	82
Table (25): The Descriptive Rating of the Planning Scale in the Study	83

Table (26): The Descriptive Rating of the Self-Monitoring Scale in the Study	84
Table (27): The Descriptive Rating of the Working Memory Scale in the Study	85
Table (28): The Comparison of the Mean Value of CEFI standard score and Each Scale Score of the CEFI Scales in Study	86
Table (29): Rating of the CEFI according to Sex in the Study Group	88
Table (30): Rating of the Attention Scale according to Sex in the Study	88
Table (31): Rating of the Emotion Regulation Scale according to Sex in the Study	89
Table (32): Rating of the Flexibility Scale according to Sex in the Study	90
Table (33): Rating of the Inhibition Control Scale according to Sex in the Study	90

Table (34): Rating of the Initiation Scale according to Sex in the Study	91
Table (35): Rating of the Organization Scale according to Sex in the Study	92
Table (36): Rating of the Planning Scale according to Sex in the Study	93
Table (37): Rating of the Self-Monitoring Scale according to Sex in the Study	94
Table (38): Rating of the Working Memory Scale according to Sex in the Study	95
Table (39): Comparing Mean Standard score of the CEFI Scales according to sex distribution in the Study	96

List of Figures

Figure	Page
Figure (1): Side view of the brain, illustrating dorsolateral prefrontal and orbitofrontal cortex.	16
Figure (2): Sex distribution of the Study Group	60
Figure (3): Number of Children According to the CEFI Rating	63
Figure (4): CEFI Rating According to Sex in the Study Group	64
Figure (5): The Rating of CEFI among Children with SLD	67

Abstract:

Introduction:Executive functions are an umbrella term for management (regulation and control) of cognitive processes including working memory, task flexibility, emotion regulation, initiation, inhibition and planning and organization. This study aims to assess executive functions among primary school children.

Subject and Method: Ninety participants were collected according to the random sample technique. They were subjected to assessment protocol. Accordingly, they were classified further into 2-groups: Group (1): the case group which contained the children who exhibit signs of ADHD and SLD. Group (2): the control group which are the children who are free from any disorders. Children underwent “Draw a man Test” and their pictures were manually scored. The children who exhibited signs of ADHD and/or specific learning disorder were further studied by using questionnaires for ADHD and SLD. A checklist of Comprehensive Executive Function inventory (CEFI) was given to the teacher to be completed.

Results:In the males, the number of males who scored average in the CEFI was 25 (39.7%), low average 7 (53.8%) below was 2 (40.0%). One child scored high average and superior in the CEFI. In the females, the highest number scored average 38 (60.3%), followed by high average and low average 7 and 6 respectively. Three females scored below. No female scored superior in the CEFI. The highest scores were seen in the flexibility scale, While the lowest score was seen in working memory scale.

Conclusion:The highest scores were seen in the flexibility scale, which indicates that the Egyptian environment might positively affect the children's. While the lowest score was seen in working memory scale. Which indicates that the learning by rote might affect the children's executive functions.

Key Words

Executive functions, ADHD, and specific learning disorder (SLD).

Introduction

Executive functions are an umbrella for the regulation and control of the cognitive and intellectual processes including working memory, reasoning, task flexibility, and problem solving as well as planning and execution(Chan et al., 2008). The term “Executive Functions” is the higher-level cognitive skills to control and coordinate other cognitive (intellectual) abilities and behaviors (McCloskey, 2009).

Executive functions are divided into organizational and regulatory abilities. The organization component includes gathering various information and then structuring it for proper evaluation. Regulation involves evaluating the available information and modulating the responses to the environment (Vaughan et al., 2010).

1. Organization component: attention (all types of attention), strategic planning, sequencing of actions and events, problem solving novel situations, working memory, intellectual flexibility, abstract thinking, various information acquisition, and modulation of relevant sensory information.
2. Regulation: the initiation of various actions, controlling of self, adequate emotional regulation, monitoring of the internal and the external stimuli, initiating and inhibiting specific behavior, cultural and moral reasoning, and decision-making (McCloskey, 2017).

Symptoms of Executive Functions Impairment:

Executive functioning malfunction cause a wide range of manifest symptoms. Depending on which skills any child struggles with the most, and the particular task. The American Psychiatric Association (2013) determined the following signs of executive functions dysfunction:

- Finding it really hard to figure out how to start any task.
- Focusing on minute details or the overall picture, but not both on the same time.
- Having trouble estimating how much time a task requires.
- Doing things either hastily/messily or slowly/incompletely.
- Finding it really hard to incorporate feedback into work or an activity.
- Sticking to a set plan, even though it isn't working.
- Having trouble in paying attention and is easily distracted.
- Losing a train of the logical thought when interrupted.

- Needs to be told the directions several times.
- Having trouble in making decisions (Greenhill, 2006).
- Having a really tough time in switching gears from one activity to another.
- Doesn't always have the right words to explain something in detail.
- Needs help in processing what something feels/sounds/looks like.
- Isn't able to think clearly about or do more than one thing at a given time.
- Remembering information by using cues, abbreviations or acronyms only. (McCloskey, 2009).

Learning difficulty:

Learning difficulty is difficulties in obtaining knowledge and/or skills to the normal level expected of those of the same age. It includes several aspects of functioning in which the child exhibits a difficulty in learning in a typical manner. This does not exclude the ability to learn in a different manner. The cognitive ability appears to be within an average or above average based on standardized intelligence tests. However, the child does not accomplish at expected achievement levels when exposed to conventional teaching methods in academic concepts in general. The child scores indicate inconsistency and/or a great variability between his expectancy and his performance (Thomson, 2008).

Pennington (2009) illustrated two different types of learning difficulty:

The first is called "Specific Learning Disorder (SLD)". It is defined as a disorder in one or more of the basic psychological processes involved in acquiring and/or in using language, spoken and written, that may manifest itself in a defective ability to listen, think, speak, read, write, spell and/or to do mathematical calculations. The term (SLD) does not involve the learning problems that are stem from the impairment of the individual anatomical and functional sensory systems, for example, the visual, the hearing and/or motor disabilities, mental retardation, emotional disturbance, or of environmental, cultural or economic disadvantage. It includes reading (dyslexia), mathematics (dyscalculia) and writing (dysgraphia)(Kate, 2012).

The second is called the attention deficit hyperactivity disorder (ADHD). This disorder is manifested by a significant short attention span. Moreover, a difficulty in concentrating on one assignment for long, easily distractibility by irrelevant outside stimuli, disorganized in the usage of books and materials, unable to follow and/or understand class discussion. Moreover, the child appears to be inattentive, hyperactive and Impulsive. (Lange, 2010).

The children who exhibit signs of ADHD are likely manifesting a clear difficulties with social skills, especially the social interaction and forming and keeping friendships. This is seen for all subtypes of the ADHD children (Fayyad, 2007). More than half of the individuals who manifest signs of ADHD experience social rejection by their circle of peers compared to 10–15% of individuals without this disorder. Children with ADHD show attention deficits which cause a difficulty in the processing of the verbal and nonverbal language which can negatively affect social interaction. They also may be distracted during any conversations, and do not pay attention to any social cues. (Eysbouts, 2011)

Aim of the Study

This study aims at:

- 1- The first aim of the study is to assess the executive functions among children with learning difficulties
- 2- The second aim of the study is to compare the results to the typically developed children.