

INTRODUCTION

The term executive functions refers to a constellation of cognitive abilities enabling and driving adaptive, goal-oriented behavior which include updating and manipulating information mentally, inhibition of what is irrelevant to current goals, anticipation, goal selection, planning and organization, initiation of activity, self-regulation and monitoring, mental flexibility, attention deployment, working memory, problem solving and feedback utilization. Such capabilities are considered ‘executive’ because they are believed to subserve a supervisory role involving the integration of information stored elsewhere in the brain, and can have the potential to affect the processing of other cognitive domains: learning, memory, language, and visual perception.

The components of EFs are a family of three, interrelated core skills (inhibitory control, working memory, and cognitive flexibility. Higher-order EFs such as reasoning, problem-solving, and planning are formed from those. As these abilities are essential for continuing social and cognitive development and academic achievement, it is crucial to optimize methods for assessing these skills in children, and pinpointing potential deficits in order to design appropriate remediation measures. This highlights the need for a comprehensive Arabic tool to tackle more detailed parts of the executive function deficits.

AIM OF THE WORK

The aim of this work is to adapt and formulate an Arabic version of the Test of Problem Solving-3 Elementary (TOPS-3) to suit the Egyptian culture and to apply this test for assessing the Egyptian children’s problem-solving skills.

SUBJECTS AND METHODS

**SUBJECTS:** The Arabic version of the Test of Problem Solving-3 Elementary (TOPS-3) will be carried on two groups: **Group 1:** consists of seventy normal school age children of both sexes between the age of six and twelve years old who are used as control group **Group 2:** consists of seventy school age children of the same age group as group 1 who suffer from learning difficulty and attending the Unit of Phoniatics, in the outpatient clinic of Alexandria main university hospital.

**METHODS:** 1-Translation and adaptation of the Test of Problem Solving 3 Elementary (TOPS 3) to suit the Egyptian culture then application of the test.

2- Pilot study was applied on fourteen cases to make sure that the content of the test is appropriate and clear. Its aim was to ensure the suitability of the test elements before applying them to large numbers of pupils.

3- Protocol of assessment

**A- Elementary diagnostic procedures:** History taking and general examination

**B- Clinical diagnostic procedures:** psychometric evaluation, Arabic Dyslexia Assessment Test, evaluation of memory using Test of Memory and Learning second edition (TOMAL 2)

4- Application of the final form of the test (TOPS 3) on candidates.

RESULTS

The results indicated the satisfactory level of validity and internal consistency.

Validity of the test was measured by Content Validity Index, by computing a content validity Index, the results demonstrated that Arabic version of the test had an excellent degree of content validity index. For the overall reliability, the Cronbach’s alpha value was 0.942 (Excellent reliability) for the Arabic version of the TOPS-3.

By comparing the result of normal and affected groups, we concluded that the affected group (group 2) performed worse compared to normal group (group 1) regarding all subtests and total test scores of Arabic Version of The Test of problem solving 3 elementary. Group 2 had statistically significant lower Total raw score, age equivalent and percentile rank when compared to group 1. (Table 1, Figure 1).

Table 1: Comparison between the 2 groups regarding Total score

	Group		Mann-Whitney Test
	Group 1	Group 2	
<b>Total RS</b>			
- n	70	70	
- Min-Max	95.00-162.00	73.00-144.00	
- Mean ± Std. Deviation	145.80 ± 12.83	108.70 ± 16.76	
- 95% CI for mean	142.74 – 148.85	104.70 – 112.69	
- Median (IQR)	149.00 (139.00-155.00)	103.50 (96.00-119.00)	
- KS test of normality	D=0.152, p=0.000*	D=0.134, p=0.003*	
<b>Total AE</b>			
- n	70	67	
- Min-Max	6.40-13.00	6.00-10.10	
- Mean ± Std. Deviation	10.46 ± 1.68	7.20 ± 0.99	
- 95% CI for mean	10.05 – 10.86	6.95 – 7.44	
- Median (IQR)	10.80 (9.11-12.00)	6.90 (6.40-7.80)	
- KS test of normality	D=0.126, p=0.008*	D=0.140, p=0.002*	
<b>Total PR</b>			
- n	70	70	
- Min-Max	6.00-91.00	1.00-42.00	
- Mean ± Std. Deviation	65.56 ± 14.83	14.49 ± 11.79	
- 95% CI for mean	62.02 – 69.09	11.67 – 17.29	
- Median (IQR)	68.00 (56.00-76.00)	10.00 (5.00-21.00)	
- KS test of normality	D=0.115 p=0.022*	D=0.165, p=0.000*	

- n : Number of patients    - Min-Max: Minimum - Maximum    - CI: Confidence interval  
- IQR: interquartile range    - df: Degree of freedom    - \*: Statistically significant (p<0.05)  
- NS: Statistically not significant (p≥0.05)    - MW: Mann-Whitney Test

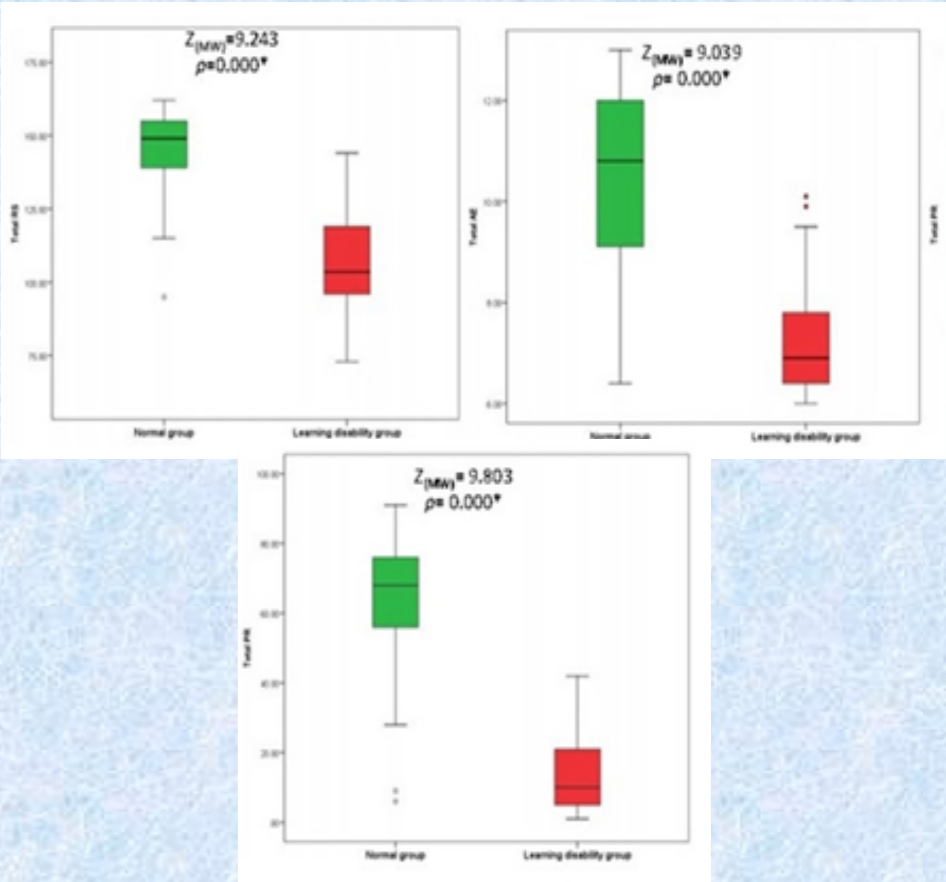


Figure 1: Box and whisker graph of Total test score in the studied groups.

CONCLUSION

The Arabic version of the Test of Problem Solving-3 Elementary is valid and reliable diagnostic tool for children with problem solving and executive functions deficits.