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## REVIEW ARTICLE

# OUTCOME OF BEHAVIORAL INTERVENTION IN CHILDREN WHO CHALLENGE INTELLECTUAL DISABILITY IN SOHAG GOVERNORATE

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### ABSTRACT

**Background:** Many different demands are present in people with intellectual disabilities, and the majority have behavioral issues. In the comprehensive rehabilitation of people with intellectual disability, controlling behavioral issues is a top priority. The main aim of this study was to study the outcome of behavioral intervention in children who struggle with intellectual disability as these studies are scarce in Egypt. It is a prospective outcome study done on 150 patients from Sohag Governorate with mild to moderate intellectual disability. Baseline assessment for children using the Stanford Binet test 5<sup>th</sup> edition and the Arabic version of Vineland Adaptive scale was done. The children offered the usual and common rehabilitation program used in Sohag in form of skills development, phoniatric and speech sessions for 6 months. Reassessment for children using the same tests was done. **Results:** The current study showed that 6 months after behavioral interventions, Stanford Binet intelligence scale scores show statistically significant increase than before behavioral interventions in children with intellectual disability. 6 months after behavioral interventions, Vineland Adaptive Behavior Scale scores show a statistically significant increase in overall adaptive scale, communication, daily living skills, and socialization scores than before behavioral interventions in children with intellectual disability. **Conclusions:** The findings of this study imply that children with intellectual disability can benefit from behavioral and skills intervention.

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## INTRODUCTION

When intellectual functioning is impaired globally and continues throughout development, it is referred to as intellectual disability (ID). ID is a descriptive diagnostic entity with numerous causes that have been found (1). According to the American Association on Intellectual and Developmental Disability (AAIDD), intellectual disability is a condition that manifests before the age of 18 and is characterized by significant limitations in both cognitive functioning (reasoning, learning, and problem-solving) and adaptive behavior (conceptual, social, and practical skills) (2). According to the severity of the disability, which should reflect a mix of IQ and level of adaptive functioning, the degree of ID is subclassified. The limits are merely guidelines and are not rigidly defined. IQs of 50 to 69 are connected with mild ID, 35 to 49 with moderate, 20 to 35 with severe, and 20 or lower with profound. Researchers, as opposed to doctors, frequently simply discriminate between two groups, known as mild (IQ 50-69) and severe ID (IQ less than 50) (2).

At a group level, adaptive function and IQ are somewhat correlated (3), but there are significant individual variances. A key concern in the total rehabilitation of patients with ID is managing behavioral issues. Regardless of the type of school (special or ordinary), behavioral management is provided to children with ID who attend (4). Studies that concentrate on behavioral therapies for children with ID who reside in low- and middle-income countries are still lacking in the field (5). Due to the dearth of such studies in Egypt, this effort examined the results of behavioral intervention in children who struggle with intellectual handicaps.

## METHODS

It is a prospective outcome study. A sample of children was taken from sohag governorate.

**Sample size and its characteristic:** 150 patients fulfilled inclusion criteria, most of them in special education center and others in school.

**Inclusion criteria:** Children with mild and moderate intellectual disability of both sexes and age: from 2-10 years.

**Exclusion criteria:** Children with severe ID as they have more severe behavioral issues, children with severe other disabilities (visual or auditory), and children with severe motor disabilities.

#### Procedure:

- We construct a semi-structured sheet to collect relevant information from patients and their families. We used the clinical sheet of the Psychiatry department of Sohag university.
- WE did the following steps:
- We did baseline assessment for children using the Stanford Binet test 5<sup>th</sup> edition and the Arabic version of Vineland Adaptive scale.
- We offer the children the usual and common rehabilitation program used in most centers for 6 months.
- We did reassessment for children using the same tests.
- Stanford Binet intelligence test 5<sup>th</sup> edition and the Arabic version of Vineland behavioral adaptive scale were applied by expert well trained psychologists.
- More than one psychologist took part in the assessment process for two years.
- Psychologists who did the first assessment were different from psychologists who did the second assessment.
- Psychologists did these assessments blindly in their routine work with hundreds of other children not included in the sample.

**Operational definition of Usual Rehabilitation program:** The usual rehabilitation program used for children with ID in most of the centers in Sohag putting in mind the shortage of training in this field in Egypt. The usual rehabilitation program includes sessions for skills development, phoniatric sessions, and physiotherapy sessions to those with mild motor problems. The frequency of sessions was two to three times weekly all through 6 months. Sessions were offered free of charge to patients. There were few cases of dropouts excluded from all statistics. We define dropout as “drop out of phoniatric and skills development sessions for more than two weeks”

#### Tools

**Children were subjected to the following: Stanford Binet intelligence scale 5<sup>th</sup> edition:** The fifth edition of the Stanford-Binet Intellect Scales (SB5) is used to measure intelligence and cognitive skills. Ages 2 years, 0 months to 89 years, 11 months can take this test. The scale offers five-factor scores, a Full-Scale IQ (FSIQ), nonverbal (NV), and verbal (V) domain scores. (6);

**Arabic version of Vineland Adaptive Behavior Scale:** The Vineland is intended to gauge an individual's adaptive behavior from birth to age 90. Communication, socialization, daily living skills, and motor skills are the four subdomains included in this test. The VABSA provides the data necessary for evaluating a number of disabilities, including functional skill impairment, learning disability, and developmental delays. According to the Arabic translation, the VABSA's mean total score was divided into four categories: poor adapted behavior, below average (70–84), average (85–115), above average (116–130), and high adaptive behaviour (7).

**Ethical issues:** All procedures were reviewed and approved by the Ethical Committee of Sohag University. Informed written consent was taken from the caregivers of the children after discussing with them the aim of the study and methods.

**Statistical analysis design:** Data collected were reviewed and coding of the collected data was done manually. These numerical codes were fed to the computer where statistical analysis was done using the Statistic Package for Social Science Version 22 (SPSS 22) for windows. Chi square-test ( $X^2$ ): for comparison of qualitative data. Student's "t"- test for comparison of quantitative data of 2 independent samples.

Mann Whitney test for comparison of quantitative data of 2 independent samples with not normally distributed variable. A study of the relationship between variables was done using the correlation coefficient “Pearson correlation”.

## RESULTS

**Table 1. Clinical characteristics of children with ID**

		No.= 150
Age (years)	Mean $\pm$ SD	4.90 $\pm$ 1.80
	Median [IQR]	5 [3]
	Range	2 - 10
Age distribution	<5years	73 (48.7%)
	$\geq$ 5years	77 (51.3%)
Sex	Male	99 (66%)
	Female	51 (34%)
Consanguinity	No	100 (66.7%)
	Yes	50 (33.3%)
Mode of delivery	NVD	96 (64%)
	CS	54 (36%)

Among our studied children with ID, their ages ranged between 2-10 years with a mean value of  $4.90 \pm 1.80$ ; 51.3% of them were  $\geq 5$  years. They were 66% male and 34% female, and 33.5% has a history of consanguinity. Most of them 64% were born via NVD.

**Table 2. Number of speech & skills and physiotherapy intervention sessions in children with ID**

		No.= 150
Speech & skills sessions	Mean $\pm$ SD	53.24 $\pm$ 9.20
	Median [IQR]	94 [13]
	Range	40 - 80
Physiotherapy intervention	NO	122 (81.3%)
	Yes	28 (18.7%)
Physiotherapy session	Mean $\pm$ SD	29.39 $\pm$ 9.63
	Median [IQR]	32 [20]
	Range	20 - 43

Among our studied children with ID, all of them need speech & skills sessions that ranged between 40 – 80 sessions with a mean value of  $53.24 \pm 9.20$ . Only 18.7% of them need physiotherapy intervention. Physiotherapy sessions ranged from 20 – 43 sessions with a mean value of  $29.39 \pm 9.63$ . 6 months after behavioral interventions, Stanford Binet intelligence scale scores show a statistically significant increase than before behavioral interventions in children with ID. 6 months after behavioral interventions, Vineland's Adaptive Behavior Scale scores show a statistically significant increase in overall adaptive scale, communication, daily living skills, and socialization scores than before behavioral interventions in children with ID. Score differences in overall IQ scale, quantitative reasoning, and Visio-spatial orientation scores have a statistically significant positive correlation with age. While score difference in quantitating reasoning scores has a statistically significant negative correlation with the number of skills sessions. Also score differences in non-verbal, knowledge, and Visio-spatial orientation scores have a statistically significant negative correlation with the number of physiotherapy sessions. Daily living skills, motor skills, maladaptive behavior scores, and age have a statistically significant negative connection. While the sociability score and the number of skills sessions have a statistically significant positive link.

## DISCUSSION

A key concern in the total rehabilitation of patients with ID is managing behavioral issues. Studies on behavioral therapies for children with ID who reside in low- and middle-income nations are still lacking. For instance, it is unknown which IDs are more benefited by behavioral interventions or whether an ID child's IQ and the behavioral changes they experience as a result of an intervention are related (8).

**Table 3. Comparison of Stanford Binet intelligence scale scores before and after 6 months of behavioral interventions in children with ID**

		Before interventions No.= 150	After interventions No.= 150	t	P-value
Overall IQ scale	Mean ± SD	67.507± 10.295	73.053± 9.725	-4.797	<0.0001
Nonverbal	Mean ± SD	68.547± 11.528	75.347± 9.594	-5.553	<0.0001
Verbal	Mean ± SD	67.560± 9.512	71.507± 9.972	-3.507	0.001
Fluid Reasoning	Mean ± SD	74.527± 8.952	78.453± 8.879	-3.814	<0.0001
Knowledge	Mean ± SD	64.580± 12.865	70.767± 11.803	-4.340	<0.0001
Quantitate reasoning	Mean ± SD	68.713± 11.486	73.227± 9.837	-3.655	<0.0001
Visio-spatial orientation	Mean ± SD	71.187± 9.914	78.227± 9.090	-6.410	<0.0001
Working memory	Mean ± SD	66.160± 11.906	70.680± 10.761	-3.449	0.001

P-value >0.05: Nonsignificant (NS); P-value <0.05: Significant (S); P-value< 0.01: highly significant (HS)  
 •independent student t-test

**Table 4. Comparison of Vineland Adaptive Behavior Scale scores before and after 6 months of behavioral interventions in children with ID**

		Before interventions No.= 150	After interventions No.= 150	t	P-value
Overall adaptive scale	Mean ± SD	36.819± 16.165	49.260± 17.499	-6.396	<0.0001
Communication	Mean ± SD	37.507± 24.453	53.267± 24.583	-5.567	<0.0001
Daily living skills	Mean ± SD	62.920± 24.147	72.160± 18.012	-3.757	<0.0001
Socialization	Mean ± SD	62.153± 23.072	77.920± 13.554	-7.217	<0.0001
Motor skills	Mean ± SD	32.833± 37.756	35.253± 40.180	-0.538†	0.591
Maladaptive Behavior	Mean ± SD	35.000± 46.490	40.087± 44.472	-0.968†	0.334

P-value >0.05: Nonsignificant (NS); P-value <0.05: Significant (S); P-value< 0.01: highly significant (HS); • independent student t-test, †Mann Whitney test

**Table 5. Correlation between the age, the number of skills & physiotherapy session and the scores of Stanford Binet scale**

Variables		Age		number of the skills session		number of physiotherapy sessions	
		r	P-value	r	P-value	r	P-value
after intervention	Overall IQ scale	-0.160	0.050	-0.103	0.211	0.528	0.004
	Non-verbal	-0.209	0.010	-0.068	0.409	0.487	0.009
	Verbal	-0.107	0.192	-0.131	0.111	0.556	0.002
	Fluid Reasoning	-0.189	0.020	-0.104	0.204	0.579	0.001
	Knowledge	0.120	0.143	-0.019	0.820	0.554	0.002
	Quantitate reasoning	-0.388	<0.0001	-0.188	0.021	0.417	0.027
	Visio-spatial orientation	-0.247	0.002	-0.124	0.132	0.464	0.013
Score differences	Working memory	-0.096	0.243	-0.065	0.430	0.514	0.005
	Overall IQ scale	0.317	<0.0001	-0.043	0.603	-0.337	0.079
	Non-verbal	0.123	0.133	0.041	0.617	-0.545	0.003
	Verbal	0.435	<0.0001	-0.137	0.094	0.048	0.810
	Fluid Reasoning	0.345	<0.0001	-0.008	0.923	0.087	0.661
	Knowledge	0.135	0.100	0.050	0.544	-0.388	0.041
	Quantitate reasoning	0.321	<0.0001	-0.178	0.029	-0.223	0.253
Score differences	Visio-spatial orientation	0.229	0.005	0.006	0.943	-0.515	0.005
	Working memory	0.159	0.052	-0.014	0.864	-0.145	0.461

P-value >0.05: Nonsignificant (NS); P-value <0.05: Significant (S); P-value< 0.01: highly significant (HS)

**Table 6. Correlation between the age, the number of skills & physiotherapy sessions, and the scores onthe Vineland Adaptive Behavior Scale**

Variables		Age		number of the skills session		number of physiotherapy sessions	
		r	P-value	r	P-value	r	P-value
after intervention	Overall adaptive scale	0.088	0.285	-0.047	0.568	0.364	0.057
	Communication	-0.092	0.261	-0.074	0.371	0.128	0.515
	Daily living skills	-0.408	<0.0001	-0.165	0.044	0.304	0.116
	Socialization	-0.064	0.436	0.190	0.020	0.102	0.604
	Motor skills	-0.714	<0.0001	-0.012	0.888	0.228	0.244
	Maladaptive Behavior	0.751	<0.0001	0.036	0.664	-0.008	0.966
Score differences	Overall adaptive scale	0.137	0.093	0.039	0.638	0.288	0.137
	Communication	0.242	0.003	-0.064	0.438	-0.506	0.006
	Daily living skills	0.176	0.031	-0.125	0.127	-0.342	0.075
	Socialization	0.173	0.034	0.069	0.400	-0.338	0.079
	Motor skills	-0.133	0.105	0.194	0.017	0.101	0.609
Maladaptive Behavior	0.020	0.807	-0.186	0.022	-0.268	0.168	

P-value >0.05: Nonsignificant (NS); P-value <0.05: Significant (S); P-value< 0.01: highly significant (HS)

This prospective study was conducted in Sohag governorate. The study included 150 children with mild and moderate intellectual disabilities of both sexes. The duration of the study ranged from 6-12 months. Among our studied children with ID, their ages ranged between 2-10 years with a mean value of  $4.90 \pm 1.80$ ; 51.3% of them were  $\geq 5$  years. They were 66% male and 34% female, and 33.5% has a history of consanguinity. Most of them 64% were born via NVD.

Our results were supported by the study of Lakhan, (9) as they said that the research design used in this study is longitudinal. Children with IDs ranging in age from three to eighteen ( $9.57 \pm 3.57$ ) were included. The majority of them were males. In the study in our hands, among our studied children with ID, all of them need speech & skills sessions that ranged between 40 – 80 sessions with a mean value of  $53.24 \pm 9.20$ . Only 18.7% of them need physiotherapy intervention. Physiotherapy sessions ranged from 20 – 43 sessions with a mean value of  $29.39 \pm 9.63$ . However, in the study of Lakhan, (9) just 22.2 percent of study participants got behavioral intervention outside of a CBR environment, compared to 79.8 percent who did. McIntyre, (10) designed a 12-meeting intervention program for parents of kindergarteners with IDD ( $n=21$ ) that included lessons on behavior analysis, setting boundaries, reducing undesirable behaviors, and creating positive connections with the kids, particularly through a developmental match. The frequency and severity of behavioral issues decreased, and parent-child interactions significantly improved as a result of this approach. The present study showed that among our studied children with ID, the commonest underlying etiology for ID was autism in 12%, followed by Down syndrome in 10.7%, delayed developmental milestones in 6%, then motor disability in 5.3%, hearing impairment in 4.7%, hyperactive /inattentive in 3.3% and lastly metabolic disease in 1.3% while no abnormalities were detected in 56.7% of the studied children.

Our results were supported by the study of Lakhan, (9) 39 children were found to have Down syndrome, cerebral palsy, epilepsy, or another condition in addition to their intellectual handicap (37.5%). However, de Winter et al., (11) showed that problematic behavior is caused by a complex, multidimensional set of factors that should be addressed from a biopsychosocial standpoint. Genetic disorders linked to behavioral phenotypes, such as Prader-Willi syndrome and aggression or Lesch-Nyhan syndrome and severe self-injury, physical illnesses, such as epilepsy, and their accompanying symptoms like constipation, pain, urinary incontinence, and vision impairment, as well as drug side effects, such as those from antiepileptics, are among the biological factors that contribute to challenging behavior. The current study showed those 6 months after behavioral interventions, Stanford Binet intelligence scale scores show a statistically significant increase than before behavioral interventions in children with ID. 6 months after behavioral interventions, Vineland Adaptive Behavior Scale scores show a statistically significant increase in overall adaptive scale, communication, daily living skills, and socialization scores than before behavioral interventions in children with ID.

Our results showed that there is a statistically significant negative correlation between nonverbal, fluid reasoning; quantitate reasoning, Visio-spatial orientation scores, and age. Also, there is a statistically significant negative correlation between quantitate reasoning scores and the amount of skills sessions. While there is a statistically significant positive correlation between all Stanford Binet scale scores and the number of physiotherapy sessions. Score differences in overall IQ scale, quantitate reasoning, and Visio-spatial orientation scores have a statistically significant positive correlation with age. While score difference of quantitate reasoning scores have a statistically significant negative correlation with the amount of skills session. Also score differences in nonverbal, knowledge, and Visio-spatial orientation scores have a statistically significant negative correlation with the number of physiotherapy sessions. There is a statistically significant negative correlation between daily living skills, motor skills, maladaptive behavior scores, and age. While there is a statistically significant positive correlation between the socialization score and the number of skills sessions. Score differences in communication, daily living skills, and socialization scores have a statistically significant positive correlation with age.

While score difference of maladaptive Behavior has a statistically significant negative correlation with the number of skills sessions. Also, the score difference in communication scores has a statistically significant negative correlation with the number of physiotherapy sessions. However, in the study of Lory et al., (12), There were 27 different individuals, and neither age nor gender nor verbal ability moderated the intervention outcomes. Despite the fact that the individuals in this meta-analysis were described as having a wider variety of developmental impairments, Watkins et al (2013) (13) recent meta-analysis of interventions for students with ASD carried out in inclusive settings revealed that age, gender, and functional level did not distinguish the impact of interventions for students with ASD. According to the findings of two meta-analyses, therapies carried out in inclusive environments can help students with ASD or other developmental disorders, regardless of their age, gender, or verbal communication skills. Their results specifically demonstrate that problematic conduct can be successfully decreased independent of student age, gender, or verbal aptitude. The results of this behavioral management study indicate that children with ID may benefit from behavioral intervention.

## CONCLUSION

In the absence of concurrent mental illness, there is very little evidence to support the use of pharmacological treatments for individuals with challenging behavior and intellectual disability. However, when there is high arousal and extremely violent behavior, medication may be necessary. A growing number of people are interested in behavioral therapies for reducing problematic behavior, such as positive behavioral support, a values-driven, and person-centered strategy. According to the research evaluation, behavioral therapies show potential when used with young children who struggle with intellectual disabilities. However, research in this area is still lacking. The results of this behavioral management study indicate that children with ID may benefit from behavioral intervention.

### List of Abbreviations

**ID:** intellectual disabilities

**AAIDD:** Intellectual and Developmental Disability

**FSIQ:** Full-Scale IQ

### Declarations

**Ethics approval and consent to participate:** The procedure of the study and the design were accepted and validated by the ethical committee of the faculty of medicine, Sohag University, Egypt. Informed consent was given by the participants.

**Consent for publication:** The participants gave consent for using their data in the publication.

**Availability of data and material:** All data generated or analyzed during this study are included in this published article.

**Competing interests:** The authors declare that they have no competing interests.

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**Authors' contributions:** YA designed the work and reviewed the whole study findings. HA analyzed and interpreted the patient data regarding the dialysis. TA collected the data done to the patients and analyzed them. OA collected the data done to the patients and analyzed them. OM collected, analyzed, and interpreted the patient data and was a major contributor to writing the manuscript. All authors read and approved the final manuscript.

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