

تأثير برنامج العلاج الطبيعي والوظيفي على المهارات
الأكاديمية لدى الأطفال ذوي الإعاقة الذهنية
فى المرحلة الابتدائية

*Effect of Physical and Occupational therapy program
on Academic skills in Primary school children with
Intellectual Disability*

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المخلص:

هدف البحث الحالى إلى تحديد مدى فاعلية برنامج العلاج الطبيعي والوظيفي في تحسين المهارات الأكاديمية لدى عينة من الأطفال ذوي الإعاقات الذهنية البسيطة. تكونت عينة البحث من عشرين طفلاً تراوحت أعمارهم بين (٨ - ١٠ سنوات) من ذوى الاعاقة الذهنية البسيطة. تم تقسيم الأطفال إلى مجموعتين (١٠) أطفال في المجموعة الضابطة و (١٠) أطفال في المجموعة التجريبية. تم تطبيق مقياس ستانفورد بينيه الصورة الخامسة، مقياس الفايولاند للسلوك التكيفي، ومقياس المهارات الأكاديمية للأطفال ذوي الإعاقات الذهنية البسيطة لتقييم مهارات القراءة والكتابة والحساب اعداد د/ عبدالعزیز الشخص، برنامج العلاج الطبيعي والوظيفي للأطفال ذوى الاعاقة الذهنية إعداد الباحثين. وأظهرت النتائج وجود فروق ذات دلالة إحصائية بين متوسطات رتب درجات المجموعة التجريبية في مهارات القياس القبلي والبعدي على مقياس المهارات الأكاديمية (القراءة والكتابة والحساب)، كما أظهرت النتائج وجود فروق ذات دلالة إحصائية بين متوسطات رتب درجات المجموعة التجريبية والضابطة على مقياس المهارات الأكاديمية لصالح المجموعة التجريبية. كما أوضحت النتائج عدم وجود فروق ذات دلالة إحصائية بين متوسطي درجات طلبة المجموعة التجريبية في القياس البعدي والتتبعي مما يوضح استمرار أثر البرنامج التدريبي.

Abstract

The study aimed to determine the effectiveness of a designed physical and occupational therapy program on improving academic skills in a sample of Egyptian children with mild intellectual disabilities. A group of twenty children whose ages ranged between (8 - 10 years) and suffered from mild intellectual disabilities participated in the study. Children were divided into two groups (10) children in the control group and (10) children in the experimental group. All children completed the Stanford-Binet Scale, the fifth edition to measure their intelligence and cognitive abilities, Vineland for adaptive behavior test And the Academic Skills Scale for Children with Mild Intellectual Disabilities to evaluate their reading, writing and arithmetic skills in pre, post and follow-up measurements, and The occupational therapy program for children with simple intellectual disabilities . The results showed statistically significant differences between the mean scores of the experimental group students in the pre, post and follow-up measurement of the test, reading, writing and arithmetic skills. Results also revealed that there were no statistically significant differences between the mean scores of the experimental group students in the post and follow-up measurements.

Key words: physical therapy, occupational therapy, academic skills, intellectual disabilities

Introduction

The Egyptian Presidential Declaration considered the year 2018 to be the year of the disabled child and the issuance of the Persons with Disabilities .Law No. 10 of 2018 emphasized non-discrimination on the grounds of disability, its type or gender, ensuring effective equality in the enjoyment of all human rights and fundamental freedoms in all fields, and removing all obstacles prevents them from enjoying these rights and respecting their freedom to exercise their choices by themselves and of their own independent will. Governmental efforts also continued, including the implementation of the “Integration... Empowerment... Participation” initiative, launched by President Abdel Fattah El-Sisi to support and empower persons with disabilities, with the aim of adapting the communications and information technology sector to provide them with educational and health services easily.

Since the interest in the school integration process is one of the most important areas for integrating children with special needs in general and those with intellectual disabilities in particular, due to the importance of the education process for these children. A child with intellectual disabilities has the ability to learn, which does not mean a lack of intelligence, so it is necessary to pay attention to the academic skills of children with intellectual disabilities (Farhat, 2001). There were many studies that dealt with the concept of academic skills for children with intellectual disabilities, including a summary of the approaches and a number of recommendations for teaching intellectually challenged children in a school setting (Algahtani , 2017) and other important finding was related to the appropriate teaching methods for students with intellectual disabilities and recommended that both teachers and parents of the intellectual disabilities students should cooperate in order to develop the students adaptive and functional academic skills (Tahan, 2022). So, the current research investigates the effect of a physical and occupational therapy program on academic skills in a sample of Egyptian children with intellectual disability.

Acquisition of academic skills is one of the most challenges facing teachers and children with intellectual disabilities, as it includes a number of skills such as reading, writing, arithmetic, and cognitive skills that include understanding, discrimination, comprehension, comparison, generalization, problem solving, and general science skills (Yahya & Obeid, 2005). Therefore, mentally handicapped children find it very difficult to acquire these skills, and this is indicated by a study which aimed to compare the level of academic achievement of the mentally handicapped, those with learning difficulties, and those with low achievement, which showed that the mentally handicapped are lower in the level of academic achievement (Gresham & Eilliot, 1990). Other study indicated that the mentally handicapped suffer from impairments in reading, writing, spelling and mathematics (Kirk, 2002). Also, children with mild intellectual disabilities suffer from a decrease in the ability to achieve academic achievement, and they progress slowly in the regular academic programs (Nasrallah, 2002). Later, other study indicated that the mentally handicapped suffer from reading problems (Van den Bos et al., 2007). In addition to many studies and research that confirmed that the mentally handicapped students to a slight degree suffer from a low level of academic achievement (Dandashi et al., 2015).

Occupational therapy is defined by the World Federation of Occupational Therapists (WFOT) as a profession that takes on the promotion of health and well-being by means of occupation. Occupational therapists endeavor to achieve this goal helping the patient reach optimal capacity to participate in these activities, and/or by modifying the environment so that it is easier for his participation to take place (WFOT, 2019). Children with ID are characterized by impeded social participation and productivity resulting from cognitive deficits, global developmental delay, sensorimotor difficulties, and perceptual dysfunction (Hogan, Rogers, & Msall, 2000), so they are often referred to occupational therapists (OT) for assessment, treatment and consultation (Wuang et al., 2013).

Recently, research has focused mainly on the use of various training and educational methods and means aimed at improving all aspects of deficiencies in children with intellectual disabilities.

This includes (1) *Gaming* as the first and maybe the most important way of helping children to learn while they are growing up, it is a form of playing, used as an entertaining method of learning, (2) *structured learning* which offer simplified and recurrent possibilities of learning some things which practiced and mastered when they occur in daily contexts, (3) *Teaching and learning methods* as reading books ,modeling, imitation and building/ construction to show children how to make some things, (4) *Practice* as learning involves being a novice and making mistakes, being able to fulfill the task successfully only by thinking and making efforts, and then mastering the task by practicing it until it becomes easy and quick to do it, and (5) *Atomization* through practice makes the skills not only to be acquired mentally but also to be learnt and easy to access. Automatization is important because the automatized skills become quickly available in supporting more complex activities (Mara &Mara, 2011). Multiple pediatric occupational therapy interventions exist to address children's specific goals. In partnership with parents, it is the therapist's role to choose and tailor the intervention choices to match the child and parent's goals, preferences and potential for improvement based upon their diagnosis (Novak &Honan, 2019).

Low levels of health-related physical fitness have been found in children and adolescents with intellectual disability (ID) (Wouters et al., 2020; Hartman et al.,2015; Slevin et al., 2014; Izquierdo-Gomez et al., 2013; Salaun & Berthouze-Aranda, 2012; Golubovic et al., 2012). These low levels are alarming since children and adolescents with ID already start off with more health problems than typically developing (TD) children (Oeseburg et al., 2011) and poor physical fitness is a risk factor for cardiovascular diseases, diabetes mellitus, and poor mental health (Ortega et al., 2018; Hurtig-Wennlof et al., 2007; Ortega et al., 2007; Anderssen et al., 2007). Furthermore, persons with ID experience more musculoskeletal problems than the general population; cerebral palsy, congenital deviation of feet and hip, hypotonia, and scoliosis are more likely to occur (Wouters et al., 2020; Schrojenstein Lantman-de Valk et al., 2007; Bilo et al., 2007; Vonken et al., 2006). These conditions have an effect on the physical ability to perform tasks, but also on the potential to become

physically active and fit, and develop motor skills. Other conditions like epilepsy (Schrojenstei Lantman-de Valk et al., 2007), respiratory problems (Seddon & Khan, 2003), and sensorimotor dysfunction (Wuang et al., 2008) can potentially limit these possibilities as well. In clinical practice, caregivers and parents often attribute the low levels of physical fitness, activity and motor skills to the cognitive and physical disabilities of the child or adolescent, and thereby underestimate the potential these youngsters have. Previous research has shown that improving the physical fitness, activity, and motor skills in children and adolescents with ID is possible (Wouters et al., 2020; Frey et al., 2017; Hocking et al., 2016; Houwen et al., 2014; Shin & Park, 2012; Dodd & Shields, 2005).

Research aims:

The current research aims to Develop and improve the academic skills among children with mild intellectual disabilities.

Research importance:

The importance of the research was to:

- 1) Provide a program based on physical and therapy activities and techniques, which aims to develop children's basic abilities through play to make learning more enjoyable.
- 3) Emphasis on the idea of individualizing learning according to the abilities of children with intellectual disabilities and preparing individual programs that contribute to developing their strengths and improving their shortcomings.

Research problem:

What is the effect of a physical and occupational therapy program in improving academic skills (reading - writing - arithmetic) in a sample of children with mild intellectual disabilities?

Research questions:

- What is the effect of a physical and occupational therapy program in improving reading skills of children with mild intellectual disability?

- What is the effect of a physical and occupational therapy program in improving the writing skills of children with mild intellectual disability?
- What is the effect of a physical and occupational therapy program in improving the arithmetic skills of children with mild intellectual disability?

Research hypotheses:

1. There are no statistically significant differences between the mean scores of the children of the experimental and control group in the tribal measurement on the academic skills scale for children with mental disabilities and its sub-components.
2. There are statistically significant differences between the mean scores of the children of the experimental group in the pre and post measurements on the academic skills scale for children with mental disabilities and its sub-components in favor of the post measurement.
3. There are statistically significant differences between the mean scores of the children of the experimental group in the pre and post measurements on the sub-scale of reading and writing skills for children with mental disabilities in favor of the post measurement.
4. There are statistically significant differences between the mean scores of the children of the experimental group in the pre and post measurements on the subscale of arithmetic skills for children with mental disabilities in favor of the post measurement.
5. There are no statistically significant differences between the mean scores of the children of the experimental group in the post and follow-up measurements on the academic skills scale for children with mental disabilities and its sub-components.

Research Methodology:

The quasi-experimental method will be used to suit the research requirements.

The research sample:

The research sample consisted of twenty children (12 boys, 8 girls), whose ages ranged between (8 - 10 years) with an average age of (113) months, and a standard deviation (0.34), of children with mild intellectual disabilities, their intelligence coefficients ranged between (50 -73) on the Stanford Intermediate Scale for the fifth picture with mean intelligence (63) degree and standard deviation (5.71), the sample members were divided into two groups (10) children in the control group and (10) children in the experimental group.

Inclusive criteria

The child should be between 8 and 10 years of age of both sexes.

The child should be of mild intellectual disabilities according to Stanford Binet scale 5th edition.

The child should not be suffering from any apparent physical deformity in upper limbs, lower limbs or spine

The child should not suffer from any visual or auditory disorder.

Exclusive criteria

Children out of age range

Children with moderate or severe intellectual disabilities

Children with physical deformities in upper limb, lower limb or spine

Children suffering from visual or auditory disorders.

Methods

For Evaluation

The Academic Skills Scale for Children with Mild Intellectual Disabilities.

This scale aims at examining the basic skills of reading, writing and arithmetic for children with mild intellectual disabilities in the age range (9-12 years). The scale consists of 10 subscales (reading and writing words, reading and writing simple sentences, knowledge of reading phenomena, comprehension., Reading, reading expression, reading and writing numbers and numbers, order and sequence,

classification, relationships, arithmetic operations) (Abdulaziz Al-Alshakhs et al., 2017)

The Stanford-Binet Scale, the fifth edition

The Stanford-Binet Scale, the fifth edition, aims to measure intelligence and cognitive abilities in humans, in the age range of (2-85 years). and it should be noted that it is known that the scale is named after "Alfred Binet," the author of the first edition, and to Stanford University in which the scale was developed, i.e., the Stanford-Binet Intelligence Scale Fifth Edition. The scale developed at Stanford University (5th ed.) (Al-Rashidi, 2001).

The Intervention

Physical and Occupational therapy program for children with mild intellectual disability

The validation of the current research hypotheses required the preparation and design of a program based on physical and occupational therapy techniques aimed at improving the academic skills of children with intellectual disabilities. With the aim of developing these abilities for children with intellectual disabilities and to identify the impact of those abilities on the child's acquisition of academic skills.

Program Goals.

The suggested study Physical and Occupational therapy program aims to use activities and techniques through seven main areas: Core strength (bilateral coordination), Visual Skills: includes (visual perception skills - and the visual motor skills), Body awareness, Motor skills: includes (Gross Motors Skills, Fine motors skills), Outdoors / sensory activities, Vestibular equilibrium field, Pre-writing skills

During the preparation of the program, the researchers consulted physiotherapists and occupational therapy specialists, in addition to reviewing the theoretical framework, research and previous studies that dealt with the preparation and implementation of occupational therapy programs, as well as a set of programs and standards that are used with children with special needs in general and children

with intellectual disabilities in particular, including Test of Visual Perceptual Skills 4th edition (TVPS-4; Martin, 2017) , Dynamic Occupational Therapy Cognitive assessment for Children (DOTCA-CH; Katz et al., 2004) , Sensory Profile (Larkey, 2007), Buktenica developmental test of visual-motor integration (BuktenicaVMI; Beery&Beery, 2010), Extensive Assessment of Memory and Learning, WRAML2 (Sheslow & Adams, 2003), Miller Functions and Balance (MfunPS) (Miller, 2006), Bruinkinks-Oseretsky Test of Motor Proficiency (BOTMP; Bruinkinks& Bruinkinks, 2005), Sensory Processing Measure (SPM-2) (Parham et al., 2013), Occupational therapy program for cerebral palsy category prepared by Dr. Mostafa Abdel Moneim, Association of Occupational Therapists in Egypt)

Components of the training program.

The occupational therapy program for children with simple intellectual disabilities (M. Saada,2018) from (8-10) years consists of seven basic units that include (70) training objectives graded according to the level of difficulty. Successful times out of three times in which the goal is presented to the child or asked to implement the goal, the training program also includes a number of activities that are used to implement the training goals. The program includes approximately 105 activities aimed at achieving the goals of the program.

The Physical and Occupational therapy program

The current program was implemented for a period of three months at a rate of two sessions per week, where each child received (24) training sessions in addition to the pre and post assessment sessions, at Effective Learning foundation center.

Table (1)
the distribution of objectives, activities, and number of sessions in
the training program

Evaluation session	Pre- test	The Academic Skills Scale for Children with Mild Intellectual Disabilities	1 session
	1-Core strength and bilateral coordination	- Child will participate in push pull activities such "row-row-your boat" demonstrating increased upper limb strength, core muscle strength and mature vestibular system. - Child will improve his dynamic balance by walking over a variety of textured and uneven surfaces.	4 sessions
	2- Visual Skills	- Child will throw and catch a playground ball using correct throwing and catching method of looking at target and ball utilizing visual motor skills and correct hand placement of hands being prepared to receive ball rather than trapping ball against his body.	4 sessions
	3- Body awareness	-Child will be able to successfully identify on herself the following body parts; head, tummy, eyes, ears, nose, mouth, arms, hands, legs and feet. - The child can follow directions in a certain path with obstacles such as using pillows, tapes, collars, boxes and tunnels	3 sessions
	4- Motor skills	- The child will be able to press with hand to squeeze 10 large pegs, placing them precisely on the inside of the pre-selected holes to improve motor skills	4 sessions

Evaluation session	Pre- test	The Academic Skills Scale for Children with Mild Intellectual Disabilities	1 session
	5- Outdoors / sensory activities	-The child will be able to identify five objects through touch, such as a spoon and a ball hidden inside a bag, using only the sense of touch.	3 sessions
	6- Vestibular and balance skills	The child will be able to engage in scooter board activities for 2 minutes to mature his vestibular process	3 sessions
	7- Pre-writing skills	The child will be able to independently draw vertical and horizontal lines giving one verbal instruction to do so using her finger in a variety of media.	3 sessions
Evaluation session	Post- Test	The Academic Skills Scale for Children with Mild Intellectual Disabilities	1 session

participation

The research sample consisted of twenty children (12 boys, 8 girls), whose ages ranged between (8 - 10 years) with an average age of (113) months, and a standard deviation (0.34)(figure 1), of children with mild intellectual disabilities, their intelligence coefficients ranged between (50 -73) on the Stanford Intermediate Scale for the fifth picture with mean intelligence (63) degree and standard deviation (5.71) .

Procedures:

1. Selecting a sample of those examined at Effective Learning Foundation Center for the Care and Rehabilitation of People with Intellectual Disabilities from children with mild intellectual disabilities, whose ages range between (8-10) years.

2. Preparing and legalizing a program based on occupational therapy techniques for children with mild intellectual disabilities.
3. Applying the Stanford Scale, the fifth picture, to verify the children's intelligence rates between (50-70) degrees.
4. Applying the Vineland Consensual Behavior Scale to fulfill the criteria for diagnosing intellectual disability, which were mentioned in the Fifth Diagnostic Statistical Manual (DSM5)
5. The tribal application of the Academic Skills Scale for Children with Intellectual Disabilities, prepared by (Abdulaziz Al-shakhs et al., 2017)
6. Implementation of the training program based on physical and occupational therapy techniques for children with mild intellectual disabilities
7. The post application of the Academic Skills Scale for Children with Intellectual Disabilities Prepared by (Abdulaziz Al-shakhs et al., 2017)
8. Comparing the results of the children's performance on the academic skills scale for children with intellectual disabilities before and after the performance of the program.

Results

Descriptive data of sample

The research sample consisted of twenty children (12 boys, 8 girls), whose ages ranged between (8 - 10 years) with an average age of (113) months, and a standard deviation (0.34)(figure 1), of children with mild intellectual disabilities, their intelligence coefficients ranged between (50 -73) on the Stanford Intermediate Scale for the fifth picture with mean intelligence (63) degree and standard deviation (5.71) (figure 2)

Figure (1): Sample age range distribution

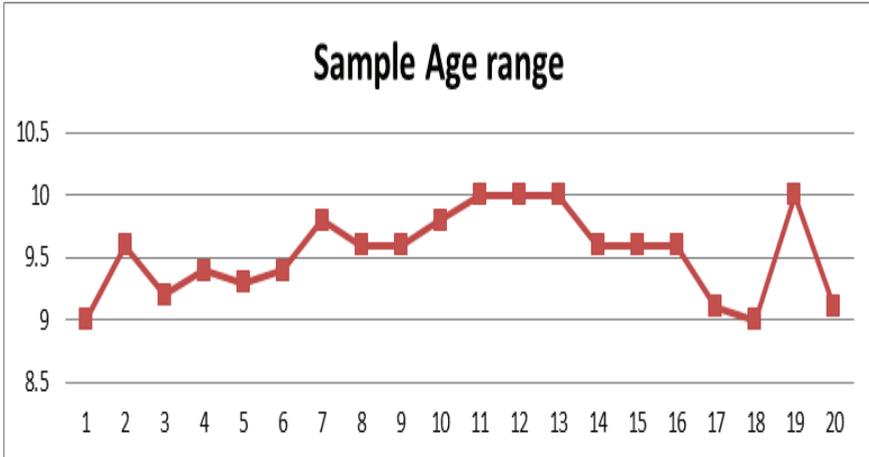


Figure (2): Sample intelligence coefficients distribution

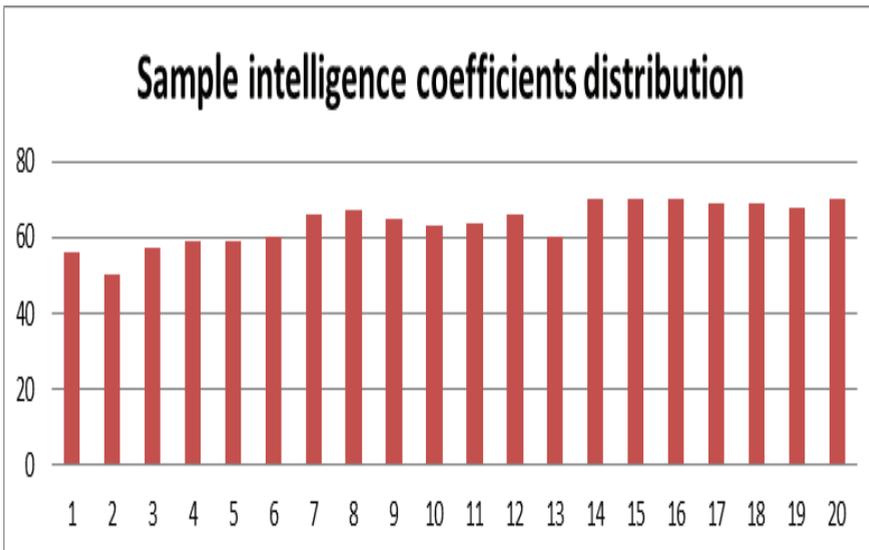


Table (2)

Mean scores of the control and experimental group in the pre administration of the test skills as a whole and in each separate skill

Skills	Groups	N	Mean rank	Sum rank	Critical value (Z)	Significance	
Reading and writing words	Control	10	10.80	108	0.240	0.810	Ns
	Experimental	10	10.20	102			
Reading and writing simple sentences	Control	10	9.95	99.50	0.440	0.660	Ns
	Experimental	10	11.05	110.5			
Knowledge of reading phenomena	Control	10	9.60	96	0.765	0.445	Ns
	Experimental	10	11.40	114			
Reading comprehension	Control	10	10.50	105	0.000	1.00	Ns
	Experimental	10	10.50	105			
Arranging and copying	Control	10	10.40	104	0.108	0.914	Ns
	Experimental	10	10.60	106			
Total Reading Skills	Control	10	9.90	99	0.459	0.646	Ns
	Experimental	10	11.10	111			
Reading and writing numbers	Control	10	11.15	111.5	0.516	0.606	Ns
	Experimental	10	9.85	98.5			
Sequencing and arranging	Control	10	10	100	0.445	0.656	Ns
	Experimental	10	11	110			
Category	Control	10	10	100	0.503	0.615	Ns
	Experimental	10	11	110			
Relations	Control	10	10.15	101.5	0.350	0.726	Ns
	Experimental	10	10.85	108.5			
Mathematical operations	Control	10	12.50	125	1.74	0.081	Ns
	Experimental	10	8.50	85			
Total Arithmetic skills	Control	10	11.45	114.5	0.73	0.465	Ns
	Experimental	10	9.55	95.5			
Total skills	Control	10	10.60	106	0.076	0.939	Ns
	Experimental	10	10.40	104			

It is clear from the previous table that there were no statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students and the control group students in the pre-measurement of the test as a whole, as the calculated (z) value of (0.076) is less than the tabular (Z) value of (2.58). Thus, the groups are equivalent in variance.

As it is clear from the previous table that there were no statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students and the control group students in the tribal measurement of total reading skills, as the calculated (z) value of (0.459) is less than the tabular (Z) value of (2.58). Thus, it can be said that the groups are equivalent in terms of reading skills.

It is also clear from the previous table that there were no statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students and the control group students in the tribal measurement of total arithmetic skills, as the calculated (z) value of (0.73) is less than the tabular (Z) value of (2.58). Thus, it can be said that the groups are equivalent in variance.

Table (3) the results of the pre- and post-measurement of the experimental group students on the total academic skills

Academic Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	S
Total Skills	pre administration	10	19.40	4.69	2.82**	0.005
	post administration	10	42.70	3.26		

It is clear from the previous table that the designed physical and occupational therapy program was effective in developing academic skills, as there are statistically significant differences at the level of significance (0.05) between the mean scores of the experimental

group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the calculated (Z) value is (2.82) is greater than the tabular (z) value of (1.96).

Table (4) the results of the pre- and post-measurement of the experimental group students on the skill of reading skills

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	Significance
Reading skills	pre administration	10	10	2.70	2.84**	0.004
	post administration	10	22.70	1.63		

It is clear from the previous table that the functional remedial program is effective in developing reading skills, as there are statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the calculated (Z) value is (2.84) is greater than the tabular (z) value of (1.96).

Table (4-1) the results of the pre- and post-measurement of the experimental group students on the skills

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	S
Reading and Writing Words	Pre-administration	10	4.70	1.05	2.84**	0.005
	Post-administration	10	12.00	1.88		

It is clear from the previous table that the functional remedial program is effective in developing reading and writing words, as there are statistically significant differences at the level of significance (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the calculated (Z) value The value of (2.84) is greater than the tabular (z) value of (1.96).

Table (4-2) the results of the pre- and post-measurement of the experimental group students on the skill of reading and writing simple sentences.

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	Significance
Reading and writing simple sentences	pre administration	10	3.00	1.24	2.87**	0.004
	Post administration	10	4.50	0.84		

It is clear from the previous table that the functional remedial program is effective in developing reading and writing simple sentences, as there are statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the value of (Z) The calculated value of (2.87) is greater than the tabular (z) value of (1.96).

Table (4-3) the results of the pre- and post-measurement of the experimental group students on the skill of knowing the reading phenomena

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	Significance
Knowing the reading phenomena	pre administration	10	0.70	0.82	1.63	0.102
	post administration	10	1.10	0.87		

It is clear from the previous table that the designed physical and occupational therapy program is not effective in developing Knowing the reading phenomena, as there are no statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students in the pre and post measurement, as the calculated (Z) value of (2.84) is less than the tabular (z) value of (1.96).

Table (4-4) the results of the pre- and post-measurement of the experimental group students on the skill of reading comprehension

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	S
Reading comprehension	The pre administration	10	0.30	0.48	2.58**	0.10
	The post administration	10	1.50	0.52		

It is clear from the previous table that the functional remedial program is effective in developing reading comprehension, as there are statistically significant differences at the level of significance (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the calculated (Z) value is (2.58) is greater than the tabular (z) value of (1.96).

Table (4-5) the results of the pre- and post-measurement of the experimental group students on the skill of writing skill

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	S
Writing skill	pre administration	10	1.30	0.67	2.81**	0.005
	post administration	10	3.30	0.48		

It is clear from the previous table that the functional remedial program is effective in developing Writing comprehension, as there are statistically significant differences at the level of significance (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the calculated (Z) value is (2.81) is greater than the tabular (z) value of (1.96).

Table (5) the results of the pre- and post-measurement of the experimental group students on the skill of Arithmetic skills

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	Significance
Arithmetic skills	Pre-administration	10	9.40	2.31	2.81**	0.005
	Post-administration	10	20.30	1.82		

It is clear from the previous table that the functional remedial program is effective in developing computational skills, as there are statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students in the pre and post measurement of computational skills as a whole in favor of the post measurement, as the calculated (Z) value of (2.81) is greater than the tabular value of (z) of (1.96).

Table (5-1) the results of the pre- and post-measurement of the experimental group students on the skill of reading and writing numbers

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	Significance
Reading and Writing numbers	pre administration	10	2.60	1.34	2.82**	0.005
	post administration	10	7	1.05		

It is clear from the previous table that the functional remedial program is effective in developing reading and writing numbers, as there are statistically significant differences at the level of significance (0.05) between the mean scores of the experimental group students in the pre and post measurement in favor of the post measurement, as the calculated (Z) value of (2.82) is greater than the tabular (z) value of (1.96).

Table (5-2) the results of the pre- and post-measurement of the experimental group students on the skill of sequencing and arranging.

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	Significance
Sequencing and arranging	pre administration	10	2.40	0.96	2.84**	0.005
	post administration	10	4.90	0.99		

It is clear from the previous table that the functional remedial program is effective in developing the skills of arrangement and sequence, as there are statistically significant differences at the level of significance (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the calculated (Z) value The value of (2.84) is greater than the tabular (z) value of (1.96).

Table (5-3) the results of the pre- and post-measurement of the experimental group students on the classification skill

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	Significance
Classification	pre administration	10	1.80	0.42	2.46*	0.014
	post administration	10	2.70	0.67		

It is clear from the previous table that the occupational remedial program is effective in developing the classification skill, as there are statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post-measurement, as the calculated (Z) value The value of (2.46) is greater than the tabular value of (z) of (1.96).

Table (5-4) the results of the pre- and post-measurement of the experimental group students on the skill of on the skill of perceiving relationships

Skills	The experimental group	N	Mean	Standard deviation	Critical value (Z)	Significance
Perceiving relationships	pre administration	10	1.30	0.48	2.58**	0.010
	post administration	10	2.90	0.87		

It is clear from the previous table that the functional remedial program is effective in developing the perception of relationships, as there are statistically significant differences at the level of significance (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the calculated (Z) value of (2.58) is greater than the tabular (z) value of (1.96).

Table (5-5) the results of the pre- and post-measurement of the experimental group students on the skill of performing mathematical operations

Skills	The experimental group	N	Mean	Standard deviation	Critical value(Z)	S
Performing mathematical operations	pre administration	10	1.30	0.48	2.87**	0.004
	Post administration	10	2.80	0.91		

It is clear from the previous table that the functional remedial program is effective in developing arithmetic operations, as there are statistically significant differences at the level of significance (0.05) between the mean scores of the experimental group students in the pre and post measurement of the test as a whole in favor of the post measurement, as the calculated (Z) value of (2.87) is greater than the tabular (z) value of (1.96).

Table (6) mean scores of the experimental group's children in the post and tracer measures on the academic skills scale for children with mental disabilities and its subcomponents

Skills	The experimental group	N	Mean rank	Sum rank	Critical value (Z)	Significance	
Reading and writing words	post administration	10	12	1.88	0.000	1.000	Ns
	tracer administration	10	12	1.76			
Reading and writing the simple sentences	post administration	10	4.50	0.84	2.41*	0.016	S
	tracer administration	10	5.80	0.78			
Knowledge of reading phenomena	post administration	10	1.10	0.87	1.73	0.083	Ns
	tracer administration	10	0.80	0.78			
Reading comprehension	post administration	10	1.50	0.52	0.816	0.414	Ns
	tracer administration	10	1.30	0.48			
Arranging and copying	post administration	10	3.30	0.48	1.89	0.059	Ns
	tracer administration	10	2.80	0.42			
Reading Skills	post administration	10	22.40	2.36	0.60	0.546	Ns
	tracer administration	10	22.70	1.63			
Reading and writing numbers	post administration	10	7	1.05	1.63	0.102	Ns
	tracer administration	10	7.40	1.07			
Sequencing and arranging	post administration	10	4.90	0.99	1.13	0.257	Ns
	tracer administration	10	4.60	0.84			
Categorizing	post administration	10	2.70	0.67	1.00	0.317	Ns
	tracer administration	10	2.50	0.52			
Relations	post administration	10	2.90	0.87	1.41	0.157	Ns
	tracer administration	10	3.30	0.48			

Skills	The experimental group	N	Mean rank	Sum rank	Critical value (Z)	Significance
Mathematical operations	post administration	10	2.80	0.91	1.13	0.257
	tracer administration	10	2.50	0.70		
Arithmetic skills	post administration	10	20.30	1.82	0.087	0.577
	tracer administration	10	20.30	2.11		
skills as a whole	post administration	10	42.70	3.26	0.931	0.564
	tracer administration	10	43.00	2.94		

It is clear from the previous table that there are no statistically significant differences at the significance level (0.05) between the mean scores of the experimental group students in the post and follow-up measurement of the test as a whole, as the calculated (Z) value of (0.931) is greater than the tabular (z) value of (1.96) ,and between the mean scores of the experimental group students in the post- and follow-up measurement of reading skills as a whole, as the calculated (Z) value of (0.60) is greater than the tabular (z) value of (1.96), and between the mean scores of the experimental group students in the post and follow-up measurement of arithmetic skills as a whole, as the value of The calculated (Z) of (0.087) is greater than the tabular (z) value of (1.96).

Discussion

The results of this study highlight the positive effects of the proposed physical and occupational therapy program on academic skills in school aged children with Intellectual disabilities. The importance of this research focuses on providing models of some games with rules that suit mentally disabled students when they study mathematics, providing models of some puzzles that fit mentally disabled students when studying mathematics, and the possibility of benefiting ordinary students from the proposed games and puzzles. The research sample was chosen from effective Learning Foundation

Center. The IQ of the research sample was between (50-70) degrees, the research experiment took the entire second semester of the academic year (2020-2021). The age of the selected sample ranges between 8 and 10 years. This age range was chosen partly because children rarely receive a formal diagnosis of ID before they reach school age (Rogers, 2005) and partly because adequate sensorimotor development during the primary school years is a prerequisite for learning (Losse et al., 2008; Wuang et al., 2013).

The content of the intervention included the following: motor skills training, handwriting training, activities of daily living (ADL) training, visual perceptual training, strength training, play therapy, and behavior modification. The key components of the program were a Performance-Based Instructional Model and materials for teaching skills in locomotion and rhythm, orientation, object-control, and personal-social participation (LOOP). Behavior modification techniques such as forward and backward chaining were used for ADL training. The visual-perceptual training program provided training in six domains of perceptual-motor activities: visual discrimination, visual-motor integration, figure-ground, form constancy, visual memory, and spatial-relationship (Wuang et al., 2013)

Selected activities in the strength training program included, but were not limited to, sit-ups and other exercises for enhancing muscle tone such as squatting or sitting without back support for varying durations. The play therapies were focused on developing personal and social skills, improving self-esteem, and improving sibling relationships and interactions with peers. The behavior modification program was based on principles and techniques used in behavior management (Miltenberger, 2015).

The results may be attributed to the effect of learning through play as a technique to improve child's participation through enjoyable goal-oriented tasks which proved its efficacy for typically developing children as well as children with intellectual disabilities. It comes in agreement with results of the study which encouraged focusing on occupational therapy for children with ID to enhance participation in school (Karhula et al., 2021).

It also comes in agreement with the importance of physical therapy services across the lifespan of people with ID including pain management, functional mobility or activity training, postural and respiratory support, secondary impairment prevention, assistive technology provision, and environmental modification (Friedman & Feldner, 2018). Physical therapy may also be useful in managing the impacts of aging with ID (Haveman et al., 2010). In complement with skilled physical therapy services, people with ID have also increasingly sought out lay recreation and fitness opportunities to improve their health, wellness, and participation (Friedman & Feldner, 2018; Heller et al., 2011).

The benefits of physical therapist intervention for individuals with ID have been broadly reported. For example, improvements in cardiovascular parameters, functional activity performance, cognitive performance, strength, and dynamic balance have been demonstrated in individuals with Down syndrome, cognitive impairments, and cerebral palsy who participated in aerobic, resistance, or combined training interventions (Friedman & Feldner, 2018; Andersson & Mattson, 2001; Andersson et al., 2003; Heyn et al., 2004; Rimmer et al., 2004; Tsimaras & Fotiadou, 2004; Barnhart & Connolly, 2007). Additional studies have examined the psychosocial benefits of physical therapist interventions for individuals with ID, identifying significant post-treatment changes in life satisfaction, exercise self-efficacy, positive attitudes toward exercise, and depression risk factors (Dixon et al., 2007; Temple & Walkley, 2007; Heller et al., 2004).

The present study results may also be attributed to the “Top-down approach” used in the training program which is characterized by (1) optimizing motivation during practice by focusing on child goals; (ii) optimizing the child’s learning and the variability of the practice through practice of real life activities in semi natural contexts ; (iii) activating plasticity through intense repetitions; and (iv) scaffolding practice to the ‘just right challenge’ to enable success under self-generated problem-solving conditions, to optimize enjoyment . This comes in agreement with the systematic review of effectiveness of different pediatric occupational therapy techniques for children with

disabilities, who focused on the bigger gains delivered by activities-based on 'top-down' interventions to improve motor, behavioral and functional outcomes. They stated that the greatest number of effective green light interventions was at the activity level of the ICF, indicating that daily life skills training using a 'top down' approach is a strength of the occupational therapy profession (Novak & Honan, 2019).

Results of the present study supports the effect of the interdisciplinary integrative approach used in designing and implementing the program including physical therapist, occupational therapist, developmental psychologist and teachers. This is supported by a scoping review on the recommended practices to organize and deliver school-based services for children with disabilities. They also stressed the integration of Various professionals were involved in providing services including teachers/special education teachers (64%), rehabilitation specialists (36%), and medical staff (7%) to optimize the outcomes of educational programs for children with cognitive/intellectual difficulties (12%) (Anaby et al., 2018).

Recommendations

- Preparing scales for assessing reading, writing and mathematical skills for children with intellectual disabilities.
- Preparing training programs to improve reading, writing and mathematic skills for children with intellectual disabilities.
- Training teachers on strategies for teaching academic skills to children with intellectual disabilities.

Suggestions

- research on the neurological bases of delayed academic skills for children with intellectual disabilities
- research a programs for developing academic skills for children with intellectual disabilities.
- descriptive research on the academic skills of children with intellectual disabilities.

- research on gross and fine motor skills and their impact on academic skills.
- comparative research on groups of children with developmental disorders.

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