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The effectiveness of using motor games in developing fine motor skills in children with moderate intellectual disabilities – a field study conducted at the Psycho-Pedagogical Center for Children with Intellectual Disabilities in Bouhadjar

فعالية توظيف الألعاب الحركية في تنمية الحركة الدقيقة لدى الطفل المعاق ذهنيا - درجة متوسطة – الدراسة ميدانية بالمركز النفسي البيداغوجي للأطفال المعوقين ذهنيا ببوحجار

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Abstract:

This study aimed to investigate the effectiveness of using motor games in developing fine motor skills among children with moderate intellectual disabilities at the Psycho-Pedagogical Center for Children with Intellectual Disabilities in Bouhadjar, El Tarf Province. The study population consisted of (65) children, including (11) children with Autism Spectrum Disorder and (54) children with intellectual disabilities of different levels (mild, moderate, and severe).

The study adopted a quasi-experimental method using a one-group pre-test/post-test design. The exploratory sample included (10) children, while the main sample consisted of (3) children (one female and two males) with moderate intellectual disabilities.

A training program based on motor games was implemented to develop fine motor skills and improve motor performance among

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the participants. The results showed a noticeable improvement in fine motor skills after applying the program, confirming the effectiveness of motor games in enhancing these skills in children with intellectual disabilities.
The study also highlighted the importance of play as an educational and psychological tool that contributes to the development of motor, cognitive, and social abilities in children with special needs.
Keywords: Moderate intellectual disability, motor games, fine motor skills.

ملخـص :
هدفت هذه الدراسة إلى التعرف على فعالية توظيف الألعاب الحركية في تنمية مهارات الحركة الدقيقة لدى الأطفال المعاقين الدرجة المتوسطة بالمركز النفسي البيداغوجي للأطفال المعوقين ذهنياً ببوحجار، ولاية الطارف. وقد بلغ مجتمع الدراسة ذهنياً من (65) طفلاً، من بينهم (11) طفلاً مصاباً باضطراب طيف التوحد و(54) طفلاً من ذوي الإعاقة الذهنية بمختلف درجاتها (البسيطة، المتوسطة، والشديدة) اعتمدت الدراسة على المنهج شبه التجريبي باستخدام تصميم المجموعة الواحدة ذات القياس القبلي والبعدي. وتكونت العينة الاستطلاعية من (10) أطفال، بينما تكونت العينة الأساسية من (3) أطفال (أنثى وذكران) من ذوي الإعاقة الذهنية المتوسطة. وتم تطبيق برنامج تدريبي قائم على الألعاب الحركية بهدف تنمية مهارات الحركة الدقيقة وتحسين الأداء الحركي لدى أفراد العينة أظهرت النتائج وجود تحسن ملحوظ في مستوى الحركة الدقيقة بعد تطبيق البرنامج التدريبي، مما يؤكد فعالية الألعاب الحركية في تنمية المهارات الحركية الدقيقة لدى الأطفال المعاقين ذهنياً. كما أبرزت الدراسة أهمية اللعب كوسيلة تربوية ونفسية تسهم في تنمية القدرات الحركية والمعرفية والاجتماعية للأطفال ذوي الاحتياجات الخاصة
الكلمات المفتاحية : ا لإعاقة الذهنية، درجة متوسطة، الألعاب الحركية، الحركة الدقيقة

1. Introduction:

Children with special needs are among the groups that require specialized care and services, particularly children with intellectual disabilities, due to the learning difficulties and

challenges they face in acquiring various skills. In this context, the present study aimed to examine the effectiveness of using motor games in developing fine motor skills among children with intellectual disabilities at the Psycho-Pedagogical Center for Children with Intellectual Disabilities in Bouhadjar. Motor games are considered an educational tool that helps improve children's motor abilities and reduce manifestations of motor deficiencies.

2. Problematic:

Psychopedagogical centers aim to develop the abilities of children with intellectual disabilities through a variety of educational and therapeutic programs. However, fine motor skill disorders remain one of the most significant difficulties faced by this group, due to their impact on learning and daily performance.

To reduce these difficulties, motor games have been used as an effective educational tool for developing motor skills. Previous studies have highlighted their importance: (Abou Turki, 2018) confirmed the role of motor games in developing children's skills; (Shehab & Oweid, 2024) demonstrated their effectiveness in improving sensorimotor perception in children with learning difficulties; and (Abou El-Fotouh & Lamia, 2023) showed their positive impact on improving the performance of children with Attention Deficit Hyperactivity Disorder (ADHD). Based on this, the present study seeks to investigate the effectiveness of using motor games in developing fine motor skills among children with moderate intellectual disabilities.

Research question:

- What is the effectiveness of motor games in developing fine motor skills in children with intellectual disabilities?

Hypothesis:

• Motor games play an effective role in developing fine motor skills in children with intellectual disabilities.

3- Significance of the study:

The importance of this study stems from field observations at the Psycho-Pedagogical Center for Children with Intellectual Disabilities in Bouhadjar, which revealed a high prevalence of fine motor skill disorders among children, particularly in hand and finger movements. These difficulties significantly hinder their ability to perform daily and learning activities.

In addition, observations made by members of the multidisciplinary team at the center emphasize that fine motor skill impairments represent one of the main factors affecting the educational and academic progress of children with intellectual disabilities

Study Objectives:

This study aims to identify the educational methods used at the Psycho-Pedagogical Center for Children with Intellectual Disabilities in Bouhadjar, and to design a field-based experiment that can be applied within parental guidance workshops to support the care of children with intellectual disabilities.

Theoretical Framework

First: Definition of study concepts

1. Intellectual Disability:

Intellectual disability refers to a condition of intellectual impairment that is often accompanied by disturbances in overall personality development, including behavioral, emotional, social, and educational aspects. The diagnosis is primarily made by a specialist in child psychiatry (pedopsychiatrist), followed by clinical classification into mild, moderate, severe, or profound intellectual disability.

2. Motor Games:

Motor games are considered an effective educational tool used either in psychomotor rooms or open spaces. They aim to develop the child's motivation and self-development through interaction with the environment. These activities include various motor exercises such as jumping, running, throwing balls, balancing, and crawling. Studies (Al-Ouqbi, 2024) have confirmed the positive role of motor games in developing motor abilities.

3. Fine Motor Disorder:

Fine motor disorder refers to a weakness in the control of small muscles responsible for precise movements. It appears in poor eye-hand coordination, limited finger control, and reduced flexibility and speed. In cases such as Down syndrome (Trisomy 21), early intervention is required due to certain physical characteristics. Motor games such as LEGO activities, sponge play, and sand play contribute significantly to the development of the child's motor skills.

4.Theoretical Framework (continued)

1. Definition of Intellectual Disability:

1.1 Medical Definition:

Intellectual disability is defined as a condition of arrested or incomplete mental development that affects cognitive, linguistic, motor, and social abilities (Institutional Care Guide, 2015). Its causes are attributed to various genetic and environmental factors. It is classified according to intelligence levels into mild, moderate, severe, and profound disabilities (Al-Hafni, 2005).

4. Classification of Intellectual Disability Based on Intelligence Level

4.1. Mild Intellectual Disability:

(Intelligence quotient ranges from 50–55 to 70)

4.2. Moderate Intellectual Disability:

This category represents approximately 10% of children with intellectual disabilities. The IQ range for this group is between 35–40 and 50–55.

4.3. Severe Intellectual Disability:

The IQ of individuals in this category ranges from 20–25 to 35–40. Their mental age generally does not exceed three years.

4.4.Profound Intellectual Disability:

Individuals in this group have an IQ below 20, with a mental age of approximately two years. This category represents a very small percentage, not exceeding 3% among individuals with intellectual disabilities (Al-Imam & Al-Jawalda, 2010).

1.Definition of Play:

Play is defined by "Hamed Zahran" as behavior performed by the individual without a predetermined practical goal. It is considered one of the means through which the child expresses himself (Irwiw Hahn, 1990).

2.Importance of Play

Motor games facilitate the acquisition of knowledge through practice and the use of play energy in learning. They enhance linguistic communication through peer interaction, develop sensory perception, observation skills, and experiential learning. They also help the child explore his environment, organize space, and understand roles during play (M. Rachid, 1991).

Furthermore, play is a source of cognitive and language learning and a means of activating cognitive processes such as thinking and attention, while improving performance through feedback mechanisms (Toni & Mohamed, 2024).

3.Types of Play:

Play can be categorized into educational, therapeutic, and motor types. It aims to develop psychomotor and perceptual skills and improve neuromuscular coordination (Hammadi, 2001; Faraj, 2002).

Games such as running, jumping, throwing, and passing/catching a ball may appear simple and familiar to typically developing children, but they are considered structured educational activities aimed at comprehensive child development, particularly physical and motor skills. These activities may also be integrated with methods such as the Séguin method and the "center of interest" approach (Institutional Care Guide, 2015).

4.Objectives of Play: Play has multiple objectives, including:

1.4 Psychomotor Objectives:

Psychomotor activities aim to develop basic movements, motor and perceptual skills, and achieve neuromuscular coordination, which contributes to the child's psychological, emotional, cognitive, and social development, as well as improving their ability to adapt to the environment (Faraj, 2002).

2.4.Cognitive Objectives:

Play is characterized as a well-structured educational tool and an effective means for developing observation, memory, thinking, creative imagination, and attention in children. Thus, play becomes an important medium for understanding reality and promoting personality development (Jallab & Baiairi, 2021).

5. The Role of Play in Child Development:

Play allows the child to express emotions such as aggression and anxiety, and helps in releasing psychological tension. It also contributes to personality building, particularly in its social dimension.

6. Theories of Play:

Several theories have explained the importance of play and its role in child development. The behavioral theory considers play a means of releasing excess energy, acquiring skills, and

achieving relaxation. The modern theory of Carr emphasizes its role in stimulating brain centers and supporting nervous system development.

Freud viewed play as a way of satisfying psychological drives and desires, while Piaget considered it an indicator of cognitive development and a means of adaptation to the environment and cognitive growth. He classified play into functional, symbolic, constructive, and rule-based play (Jallab & Baiairi, 2021).

7. Definition of Fine Motor Skills:

Fine motor skills are controlled by small muscles and appear in activities such as grasping, arm movement, transferring objects, drawing, coloring, cutting, and pasting. These skills depend on neuromuscular coordination, and their impairment is often observed through poor eye-hand coordination (Al-Musharafi, 2013).

These skills develop gradually from gross to fine movements, enabling coordination between vision and finger movement and improving control over small muscles, with a natural tendency toward play-based activities.

8. Fine Motor Difficulties in Children with Intellectual Disability:

Deficits in fine motor skills in children with intellectual disabilities are mainly related to impairments in the nervous system and muscular control. These difficulties are clearly observed in hand function and visuomotor coordination, leading to inability or difficulty in performing tasks requiring precise motor skills such as linking or manipulation. This reflects a dysfunction in hand physiology (Affred, Francios, Branur, p. 208).

9. Psychomotor Maturity in Children with Intellectual Disability:

Neurological maturity in children with intellectual disabilities is reflected in motor tone control (hyperactivity) and the

emergence of lateralization (right or left dominance), according to Henri Wallon

Here, the biological factor plays a key role in the maturation of the central nervous system, along with the social factor that regulates the interaction between the child and the environment. According to (Institutional Care Guide, 2015), five stages of development are identified, which do not separate the emotional aspect from the cognitive one: the stage of impulsivity, followed by the emotional stage, then the sensorimotor stage, followed by the projection stage, and finally the stage of personality acquisition.

Pedagogical Care Process:

The pedagogical care process is defined by the methodological counselor (2013) as a set of educational activities that include self-awareness and body awareness, temporal structuring, cognitive activities, psychomotor and manual activities, expressive activities, and free activities. The aim of this study is to highlight the effectiveness of motor games as an educational tool in reducing motor disorders and improving fine motor skills in children with intellectual disabilities.

Second Axis: Methodological Procedures of the Field Study

1. Study Fields

1.1 Spatial Field:

The field study was conducted at the Psycho-Pedagogical Center for Children with Intellectual Disabilities in Bouhadjar, El Tarf Province. The study population included children aged between 3 and 18 years with different levels of intellectual disability (mild, moderate, and severe), of both genders (male and female).

1.2 Temporal Field:

The field study was carried out during November and December 2025.

1.3 Research Method:

The experimental method was adopted using a one-group pre-test/post-test design. A pre-test was conducted to determine the level of fine motor skills, followed by the implementation of a motor games program aimed at developing these skills. After that, a post-test was administered to measure the effect of the program.

2.Research Tools:

The tools used in this research included observation in its various forms (direct observation, participant observation, and indirect observation), as well as individual clinical interviews. The interviews also involved the main educator and the psychomotor specialist.

3.Study Population:

The study targeted children with moderate intellectual disability among those receiving care at the center, excluding children with autism spectrum disorder (11 children). The total number of children was 55, from which a sample of 10 children was selected, representing 18.18% of the population.

4.Study Sample

The sample was selected intentionally based on specific criteria: moderate level of disability, similar chronological age, and enrollment in the center during the same month. The final sample consisted of 3 children out of 10 (30%), distributed across groups as shown in the following table.

Criteria / Cases	Gender	**Age**	**Type and Degree of Disability**	**Disorders**	**Center**
Case 01	Female	13 years	Moderate intellectual disability	Weak concentration, memory difficulties, reduced flexibility, lack of coordination	Psycho-Pedagogical Center for Children with Intellectual

Case 02	Male	13 years	Moderate intellectual disability	between thumb and index finger, and poor visual-motor coordination	Disabilities, Bouhadjar – El Tarf

Table No. 01 represents the characteristics of the study sample.

1. Application Procedures:

The study was conducted on a sample of three children using an observation checklist to assess fine motor skills and to detect muscle tone (hypertonia or hypotonia). A free activity using salt dough was employed as a pre-test lasting 60 minutes. This session included introducing the material, preparing it with the participation of the children, and adding colors to it. The children were then asked to perform free activities with the dough without guidance in order to observe their natural performance.

1. Presentation and Discussion of Results:

Presentation of Motor Skill Results:

Case / Skill		Case01	Case02	Case03	Percentage of Each Skill
Concentration		0	1	1	33.33%
Flexibility		1	0	0	16.66%
Thumb–Index Finger Coordination		0	1	0	16.66%
Visual-Motor Coordination		0	0	1	16.66%
Total	Numerical value	1/8	2/8	2/8	
	Percentage	12.5%	25%	25%	

Table No. 02 represents the results of motor skills

Table key: Poor = 0, Average = 1, Good = 2

Commentary on motor skill results:

The results revealed variation among the study cases in fine motor skills. Case 01 scored (1/8) with a percentage of 12.5%, showing weakness in most skills except flexibility. Meanwhile, Cases 02 and 03 scored (2/8) with a percentage of 25%, showing differences in performance across concentration, thumb–index finger coordination, and visual-motor coordination.

Overall, the results indicate a clear weakness among the study sample in fine motor skills, reflecting difficulties in performance and motor control.

9.2 Pre-test of motor skills:

An interview-based assessment was conducted over four sessions to verify the general hypothesis regarding the effectiveness of motor games in developing fine motor skills in children with intellectual disabilities. Appropriate conditions were ensured, including establishing an educational relationship and selecting the afternoon period for implementation.

The interview relied on LEGO-based activities, where children were introduced to assembling and disassembling pieces and forming various shapes of different sizes. This aimed to strengthen finger and hand muscles and develop visual-motor coordination, thereby contributing to the improvement of their fine motor skills.

Presentation of Pre-test Results of Motor Skills

Sessions / Skills	Session 01			Session 02			Session 03			Session 04		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
Concentration	0	1	1	1	1	1	2	1	1	2	2	2
Flexibility	1	2	0	1	2	2	2	2	1	2	2	2
Thumb–Index Finger Coordination	1	1	1	1	1	2	2	1	2	2	2	2
Visual-Motor Coordination	0	1	1	1	1	1	0	1	1	2	2	1

Table 03: Results of the Pre-Test Skills Assessment

Table key: Poor = 0, Average = 1, Good = 2; H: Case

Results of the Pre-test of Motor Skills for Case1

Sessions / Skills	Session 01	Session 02	Session 03	Session 03	Session 04	Total Score	Percentage	Mean Percentage
Concentration	0	1	2	2	2	5/8	%62.5	%62.5
Flexibility	1	1	2	2	2	6/8	%75	
Thumb–Index Finger Coordination	1	1	2	2	2	6/8	%75	
Visual-Motor Coordination	0	1	0	0	2	3/8	%37.5	

Table No. 04 represents the pre-test results of motor skills for Case 1

Commentary on the results:

1.The results showed a gradual improvement in the flexibility skill, progressing from an average level in the first and second sessions (1/2) to a good level in the third and fourth sessions (2/2), reaching 75% (6/8).

2.Visual-motor coordination showed fluctuations between poor and average levels, with a decline in the third session due to the child's health condition, followed by an improvement in the fourth session to a good level, with a total score of 3/8 (37.5%).

3.Similarly, thumb–index finger coordination improved from an average level in the first and second sessions to a good level in the third and fourth sessions, achieving 6/8 (75%).

Pre-test results of motor skills for Case 2:

The presentation of the pre-test results for Case 2 is as follows:

Sessions / Skills	Session 01	Session 02	Session 03	Session 04	Total Score	Percentage	Mean Percentage
Concentration	1	1	1	1	4/8	%50	68.75%
Flexibility	2	2	2	2	8/8	%100	
Thumb–Index Finger Coordination	1	1	1	2	5/8	%62.5	
Visual-Motor Coordination	1	1	1	2	5/8	%62.5	

Table No. 05 represents the pre-test results of motor skills for Case 2

Commentary on the results:

The results presented in the table above indicate that the concentration level of Case 2 remained moderate across all sessions, with a score of (1/2), reaching a total of 4/8, c Flexibility was consistently rated as good across all sessions, with a score of (2/2), achieving a total of 8/8 (100%).
Regarding visual-motor coordination, the performance was moderate during the first three sessions (1/2) and improved to a good level in the fourth session (2/2), with a total score of 5/8 (62.5%).
As for thumb–index finger coordination, it was moderate in the first three sessions (1/2) and improved to a good level in the fourth session (2/2), also reaching a total of 5/8 (62.5%).
Finally, the overall average percentage of all skills was 68.75%. orresponding to 50%.

Pre-test results of motor skills for Case 3:

Sessions / Skills	Session 01	Session 02	Session 03	Session 04	Total Score	Percentage	Mean Percentage
Concentration	1	1	1	2	5/8	%62.5	65.62%
Flexibility	0	2	1	2	5/8	%62.5	
Thumb–Index Finger Coordination	1	2	2	2	7/8	%87.5	
Visual-Motor Coordination	1	1	1	1	4/8	%50	

The pre-test results for Case 3 are presented as follows:

Table No. 06 represents the pre-test results of motor skills for Case 3

Commentary on the results:

The results presented in the table above indicate that the concentration level of Case 3 was moderate during the first three sessions (1/2), and improved to a good level in the fourth session (2/2), reaching a total score of 5/8 (62.5%).

Flexibility was weak in the first session (0/2), then improved to a good level in the second session (2/2), declined to a moderate level in the third session (1/2), and returned to a good level in the fourth session (2/2), resulting in a total score of 5/8 (62.5%).
Regarding visual-motor coordination, performance remained moderate across all sessions (1/2), with a total score of 4/8 (50%).
Thumb–index finger coordination was moderate in the first session (1/2), then improved to a good level in the second, third, and fourth sessions (2/2), achieving a total score of 7/8 (87.5%).
Finally, the overall average percentage for all skills was 68.75%.

Analysisof Pre-test Results of Motor Skills:

The initial pre-test results showed variation in the performance of the cases across sessions, with similarities observed in some cases and differences in others:

- Concentration performance ranged from weak to moderate in the first and second sessions (0/2, 1/2), improved to moderate to good in the third session (1/2, 2/2), and reached a good level in the fourth session (2/2) for all cases.
- Flexibility showed an overall progression from moderate to good levels across most cases and sessions (1/2, 2/2).
- Thumb–index finger coordination improved gradually from moderate to good levels in the first three sessions (1/2, 2/2), reaching a good level for all cases in the fourth session (2/2).
- Visual-motor coordination remained at a moderate level in the first three sessions (1/2), and improved to a good level in the fourth session (2/2) for all cases.

Post-test of motor skills:

In this test, the same pre-test was applied under the same conditions that were previously ensured**.**

Presentation of Post-test Results of Motor Skills:

Skills \ Cases		Case1	Case2	Case3	Skill Percentage
Concentration		1	2	2	83.33%
Flexibility		2	1	2	83.33%
Thumb–Index Finger Coordination		2	2	1	83.33%
Visual-Motor Coordination		2	2	2	%100
Total Score	7/8	7/8	7/8	7/8	
	%87.5	%87.5	%87.5	%87.5	

Table No. 07 represents the post-test results of motor skills

Table key: Poor = 0, Average = 1, Good = 2

Commentary on post-test motor skill results:

Case 1:

The results show that the child scored (2/2) in the following skills: flexibility, thumb–index finger coordination, and visual-motor coordination. However, in concentration, the score was (1/2). The total score was 7/8, corresponding to 87.5%.

Case 2:

The child achieved (2/2) in concentration, thumb–index finger coordination, and visual-motor coordination. However, flexibility was rated (1/2). The total score was 7/8, corresponding to 87.5%.

Case 3: The child obtained (2/2) in flexibility and visual-motor coordination, while concentration and thumb–index finger coordination scored (1/2). The total score was 7/8, corresponding to 87.5%.

Analysis of post-test motor skill results:

The results revealed clear differences between the pre-test and post-test assessments, with a noticeable improvement in fine motor skills among the study sample. This indicates the effectiveness of motor games in developing these skills.

These findings are consistent with previous studies such as (Cecilam, 1988), Seligman (1996), and Mohamed Al-Nayef (1999), which confirmed the role of play in developing the motor and cognitive abilities of children with intellectual disabilities. Accordingly, the research hypothesis was confirmed.

Presntation of pre-test and post-test results:

Cases / Results		Case1	Case2	Case3	**Percentage**
Pre-Test Skills Results	**Score**	1/8	2/8	2/8	
	Percentage	%12.5	%25	%25	%20.33
Post-Test Skills Results	**Score**	7/8	7/8	7/8	
	Percentage	% 87.5	87.5%	87.5%	%87.5

Table No. 08 represents the results of the pre-test and post-test of motor skills

Commentary on the results:

The comparison between the pre-test and post-test results shows a clear improvement in all three cases. The level of performance shifted from weak or moderate in the pre-test to good in most skills during the post-test.

The percentage of Case 1 increased from 12.5% to 87.5%, while Cases 2 and 3 increased from 25% to 87.5%.

The results also revealed significant improvement in concentration, flexibility, thumb–index finger coordination, and visual-motor coordination across all cases, reflecting the positive impact of motor games in developing fine motor skills.

Overall, the performance rate increased from 25% in the pre-test to 67.96% during the intervention phase, and then to 90.62% in the post-test. This confirms the effectiveness of motor games in developing fine motor skills among children with moderate intellectual disabilities, and validates the research hypothesis.

Conclusion:

Based on the results related to the indicators (concentration, flexibility, thumb–index finger coordination, and visual-motor coordination), it is evident that motor games play an effective role in developing fine motor skills and reducing their associated dsorders.

The study sample highlighted the importance of using purposeful educational play to improve motor deficits in children with intellectual disabilities.

Recommendations:

This study recommends increasing the use of the psychomotor room as an educational space for skill development, and employing LEGO-like activities to support fine motor skills. It also emphasizes strengthening communication between the educational team and families to ensure continuity of training.

Furthermore, it is recommended to select pedagogical games based on scientific principles to achieve educational objectives, and to expand future studies to include other categories of

children with special needs, especially children with autism spectrum disorder.

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