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# Proposed Training Program Based On Sports Activities For Developing Sensory-Motor Integration In Children With Motor Cerebral Palsy (IMC)

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**Abstract :**
This research aims to demonstrate the effectiveness of the proposed training program based on sports activities for the development of sensory-motor integration in children with motor cerebral palsy. For this purpose, the study was conducted on a purposive sample of 8 children (both genders) with motor cerebral palsy, aged between 5 and 8 years. Data collection tools included interviews, observations, the Human Figure Drawing Test, sensory checklist, and the proposed training program. A quasi-experimental method was employed for data analysis, and the results of pre-test and post-test measurements were analyzed using the paired samples t-test. The findings indicate that the proposed training program based on sports activities is effective in developing sensory-motor integration in children with motor cerebral palsy.

**Keywords:** Sports activities, sensory-motor integration, motor cerebral palsy.

## Introduction:

The level and type of healthcare, social conditions, and education within any advanced or developing society define its progress. The measure of this progress lies in the degree of attention given to marginalized groups within the society and their assistance in integrating as much as possible with their typical peers.

This is precisely the aim of the field of special education, which seeks to achieve this through the provision of therapeutic, training, and counseling programs that target specific groups in society. The individuals within this group are commonly referred to as individuals with special needs. They are a collective of individuals who possess physical, intellectual, or interactive impairments that hinder their daily lives within their communities. This deviation from the norm in their mental, sensory-motor, linguistic, or emotional development results in challenges faced in their daily lives. Examples of such conditions include autism, intellectual disability, Down syndrome, deafness, and motor cerebral palsy.

In our research, we aimed to shed light on one of the disorders that falls within this category, namely cerebral palsy. Cerebral palsy is considered one of the conditions that hinder a child's growth in the early stages due to its association with a dysfunction in the central nervous system. The most common presenting symptom is motor disability, attributed to damage and deformities in neural tissues. Additionally, it is accompanied by cognitive, emotional, and sensory disorders, all of which hinder motor function. Some Algerian

researchers specializing in phoniatrics have turned their attention to this group, including the studies conducted by Belkhiri Wafa (2005) and Bouakaz Souhila (2007), who adapted and applied measures to identify the disorders faced by individuals with cerebral palsy.

The motor disability in this group is closely related to sensory impairment. The child requires a series of muscle movements to assist in daily tasks, and the senses play a significant role in performing these motor tasks. This phenomenon is referred to as sensory-motor integration.

Sensory-motor integration is considered a behavior directed towards a specific source, and it is disrupted in children with cerebral palsy. These children are unable to perform basic movements like jumping and carrying objects, due to a lack of coordination between motor muscles and senses, as well as difficulties in interpreting and organizing incoming information.

Numerous studies have focused on developing sensory-motor integration in children with neurological motor impairments. Some of these studies include:

A study by Eman Ashraq Mohamed Hassan (2017) aimed to demonstrate the effectiveness of using sensory integration-based occupational therapy to develop sensory-motor skills in individuals with cerebral palsy. The researcher developed a scale for sensory-motor skills and proposed a program to enhance these skills through occupational therapy. The study was conducted on a sample of 5 children aged 4 to 6 years, and it concluded that sensory integration-based occupational therapy was effective in developing sensory-motor skills in children with cerebral palsy.

Sports activities are considered effective training and therapeutic methods due to their significant role in enhancing various aspects for individuals with cerebral palsy. These activities contribute to the development of psychological, cognitive, sensory-motor, and even social aspects. They have become the foundation on which occupational therapy relies, representing a crucial element in preparing, rehabilitating, and integrating individuals with special needs into society. This notion was emphasized in a study by Abdelnour Lalam (2018), which aimed to highlight the role of sports activities in improving the mobility of individuals with disabilities. The researcher developed a specific questionnaire for this purpose and the study included a sample of 140 physically disabled individuals, half of whom practiced physical sports activities while the other half did not. The study concluded that physical and sports activities play a role in enhancing the mobility of individuals with disabilities.

Another study by Boudina Belal (2019) aimed to examine the impact of physical and sports activities on self-esteem levels of physically disabled individuals. The researcher adapted the self-esteem scale for physically disabled individuals created by Abdelrahman Saleh Al-Zarq. The study included a sample of 46 participants and found that adapted physical and sports activities have a role in determining the self-esteem levels of individuals with physical disabilities.

The proficiency of sensory-motor skills among individuals with cerebral palsy is directly linked to the availability and effectiveness of therapeutic and training programs provided to them. These programs rely on sports activities for their effectiveness in enhancing sensory-motor skills and assisting individuals in breaking free from the confines of disability.

Based on this foundation, this research focuses on the rehabilitation of children with cerebral palsy through the proposition of a training program based on sports activities to develop their sensory-motor integration.

## Research Hypotheses:

### - General Hypothesis:

*The proposed training program based on sports activities is effective in developing sensory-motor integration among children with cerebral palsy.

### - Specific Hypotheses:

* The proposed training program based on sports activities is effective in improving motor coordination skills among children with cerebral palsy.
* The proposed training program based on sports activities is effective in improving body awareness skills among children with cerebral palsy.

**Procedural Definitions of Research Terminology:**

**Sports Activities:**
Sports activities refer to a set of physical exercises and activities aimed at stimulating and enhancing coordination between senses and movements among children with cerebral palsy. These activities are part of functional re-education programs designed to improve specific tasks and promote sensory-motor integration, helping them overcome limitations in this aspect.

**Sensory-Motor Integration:**
Sensory-motor integration is a behavior that indicates the level of coordination between sensory perception and appropriate movements for a specific activity.

**Children with Cerebral Palsy:**
Children with cerebral palsy are individuals who experience motor and sensory difficulties due to damage or degeneration of brain cells. This condition renders them unable to perform daily tasks.

**Research Methodology:**
Our research adopts a quasi-experimental methodology as it is aligned with the nature of the problem and is most suitable for achieving the research objective.

**Research Location:**
The research was conducted at the specialized articulatory clinic of "Toumi Fatima" in the state of Mostaganem, Algeria.

**Research Sample:**
The sample consists of 8 children with cerebral palsy, aged between 5 and 8 years, selected purposively while considering specific conditions: having a medical record, exhibiting mild paralysis, undergoing functional therapy, lacking intellectual disability, and having impaired sensory-motor integration.

**Research Instruments:**
- Human Figure Drawing Test.
- Sensory List.
-Proposed Training Program

**Program Definition:**
The proposed program consists of a series of group sports activities and exercises delivered in various sessions with the aim of developing sensory-motor integration among children with cerebral palsy, aged between 5 and 8 years.

**Theoretical Background of the Program:**
This program has been developed and proposed after reviewing relevant literature and references related to the program and the research topic. The purpose of this background is to:
* Identify the target group and the specific problem to be addressed.
* Understand the key reasons and factors contributing to the identified problem.
* Familiarize with strategies commonly used in this field.
* Identify essential elements and dimensions relevant to the program.
* Define sub-objectives derived from the main objective.
* Determine effective strategies, methods, and approaches applicable within the proposed training program.
* Identify key tools and resources that can be utilized in the program.
These literature and references included the following: "Guide for Games and Activities for Sensory-Motor Integration Training for Children with Autism and Intellectual Disabilities" by Ibrahim Al-Hashimi, as well as the study by Nihla Muhammad Mustafa Ali

(2015), "Iman Ashraq Muhammad Hassan" (2017), "Muhammad Ibrahim Mahmud Ibrahim Al-Radi" (2018), "Zawqagh Fath and Miloudi Haciba" (2018), and also the studies of Isma'il Ibrahim Badr; Hisham Abdul Rahman Al-Khouli; Amal Ibrahim Al-Faqi; Nihla Muhammad Mustafa Ali (2019), in addition to the study by Samia Khalafi and Wafaa Shenouf (2021)...

**Program Objectives:**

* The proposed program based on sports activities aims to develop sensory-motor integration skills among children with cerebral palsy, aged between 5 and 8 years.
* The proposed training program seeks to enhance motor coordination skills in children with cerebral palsy.
* The program aims to improve body awareness skills in children with cerebral palsy.

**The Importance of the Proposed Program:**

**- For the Individuals:**

*The significance of the proposed program lies in its aim to assist children with cerebral palsy by developing their sensory-motor integration abilities, which positively impacts their daily tasks.

**- For Professionals and Specialists:**

*The importance of the proposed program for professionals and specialists is that it addresses the gap in training programs specifically related to sensory-motor integration for children with cerebral palsy. It also facilitates their interaction with this group due to their limited expertise in this field.

**- For Parents:**

*The significance of the proposed program for parents of children with cerebral palsy is that it reduces the burdens and costs associated with physical therapy sessions.

Number of Sessions in the Proposed Training Program: The exact number of sessions in the proposed training program is not mentioned in the provided text.

**Table No. 01: Illustrating the Number of Sessions in the Proposed Training Program**

| Duration per Day | Sessions per Week | Total Number of Sessions | Explanation | Time duration for the entire program |
|---|---|---|---|---|
| 1 hour per day | 3 sessions | - 7 weeks.<br>- At a rate of 20 days. | 5 sessions were used to implement the program lessons.<br>- 3 sessions for pre-test measurements.<br>- 3 sessions for post-test measurements. | 420 minutes for the program.<br>- 360 minutes between pre-test and post-test measurements.<br>- Total sum: 780 minutes. |

**Session Monitoring Card for the Proposed Training Program**

**Table Number 02: Illustrates the session monitoring card for the proposed training program.**

| Session Date | Number of Attendees | Number of Attendees | Number of Absences | Goals Achieved (Yes/No) | Main Challenges |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Program Evaluation:**

1: Succeeded

2: Did not succeed

**Presentation of Pre-Assessment Results for the Sensory Checklist:**

Below, we will present the results obtained by the cases in the pre-assessment of the sensory checklist:

**Table Number 03: Presents the pre-assessment results of the sensory checklist items.**

| Items | Motor Skills | Vision | Visual Communication with People and Objects | Tactile Sensation | Feeding | Auditory | Olfaction | Sleep | Total |
|---|---|---|---|---|---|---|---|---|---|
| Condition (1) | 46 | 32 | 22 | 66 | 18 | 24 | 09 | 06 | 223 |
| Condition 2 | 48 | 27 | 21 | 58 | 18 | 26 | 09 | 06 | 213 |
| Condition 3 | 48 | 34 | 26 | 67 | 19 | 26 | 08 | 07 | 235 |
| Condition 4 | 45 | 34 | 28 | 64 | 17 | 23 | 08 | 06 | 225 |
| Condition 5 | 44 | 35 | 25 | 60 | 18 | 24 | 08 | 07 | 221 |
| Condition 6 | 30 | 28 | 24 | 50 | 16 | 22 | 09 | 05 | 184 |
| Condition 7 | 35 | 30 | 29 | 53 | 16 | 25 | 09 | 05 | 202 |
| Condition (8) | 40 | 31 | 29 | 51 | 16 | 21 | 09 | 07 | 204 |

**Note:** All cases suffer from a moderate degree of sensory processing disorder. It is evident from the results obtained in the pre-assessment that the cases are experiencing sensory processing difficulties due to impairments in visual skills, visual communication with objects, tactile perception, auditory processing, olfactory processing, and sleep. These difficulties have had an impact on their motor skills. We observed that the cases have problems with body awareness, which is in turn associated with issues in balance and stability, leading to occasional falls. Additionally, they tend to tire quickly when engaging in even simple motor activities. The results of the sample range from a minimum score of 184 in case number (06) to a maximum score of 235 in case number (03).

### Analysis of Pre- and Post-Assessment Results:

We employed a paired-sample t-test to calculate the differences between the pre- and post-assessment results of the sensory checklist. Below is a presentation of the differences between the two assessments

**Table 04: Illustrates the Differences between Pre- and Post-Assessment Results for Sensory Checklist Items using t-test**

| Measurement | Sample | Mean | Standard Deviation | t-value | Degrees of Freedom | Significance of level |
|---|---|---|---|---|---|---|
| Pre-test | 08 | 213.37 | 16.18 | 21.51 | 7 | 0.000 |
| Pro-test | 08 | 130.50 | 5.90 | | | |

Based on the results presented in Table 04, which indicate the differences between pre- and post-assessment scores for the sensory checklist items using a paired t-test, we can observe the following:

In the pre-assessment, the mean was 213.37 with a standard deviation of 16.18 and degrees of freedom (df) of 7. In the post-assessment, the mean was 130.50 with a standard deviation of 5.90 and df of 7. The t-test result for the differences between the pre- and post-assessments was 21.51, with a significance level of 0.000, which is less than 0.05. Therefore, the result is statistically significant, indicating differences between the pre- and post-assessment in favor of the post-assessment.

In simpler terms, the statistical analysis suggests that there are significant differences between the pre- and post-assessment scores for the sensory checklist items. The t-test result of 21.51 at a significance level of 0.000 indicates that these differences are statistically significant, providing evidence that the post-assessment scores are higher than the pre-assessment scores

### -Discussion of the results in light of the study's hypotheses:

### -Discussion of the results of the first hypothesis:

Hypothesis Statement: "The proposed training program based on physical activities is effective in improving motor coordination skills among children with cerebral palsy"

The results of the study revealed that the proposed training program based on sports activities was effective in enhancing motor coordination skill among children with cerebral palsy. Initial pre-test measurements indicated that these children experienced difficulties in motor coordination, leading to problems in stability and balance during daily tasks and activities such as walking, running, and jumping. In contrast, the post-test measurements after implementing the proposed training program showed a significant improvement in motor coordination skill. This improvement was manifested in their ability to perform specific activities related to this skill. These findings suggest that the children acquired this skill in a proper manner, enabling them to execute it correctly.

These outcomes highlight the success of the proposed training program in improving motor coordination skill among children with cerebral palsy. The incorporation of sports activities played a crucial role in enhancing physical balance, stability, and movement coordination. As a result, their motor coordination skills improved, leading to better performance of motor tasks.

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These outcomes highlight the success of the proposed training program in improving motor coordination skill among children with cerebral palsy. The incorporation of sports activities played a crucial role in enhancing physical balance, stability, and movement coordination. As a result, their motor coordination skills improved, leading to better performance of motor tasks.

This is what is emphasized in the studies of Hamoudi Aida (2013), which concluded that adapted physical activity, particularly motor games, had a positive impact on improving motor coordination and perceptual-motor skills. The improvement was clearly evident in the application of motor games to the experimental group, unlike the control group (children with moderate intellectual disabilities). Similarly, the study by Pooja Kumari Mohaseth and Aparna Choudhary (2021) revealed that combining sensory integration therapy with traditional physical therapy resulted in greater effectiveness and strength in improving overall motor function in children with cerebral palsy compared to just traditional physical therapy alone. Additionally, the research by Hani El-Desouki Ibrahim and Nouh Ahmed Mohamed Hassan (2022) showed that the proposed motor program was effective in developing fundamental motor skills such as throwing, jumping, walking, running, and balance in individuals with cerebral palsy.

In light of these findings, this study's results align with the conclusions of these researchers. Therefore, it can be stated that the hypothesis suggesting the effectiveness of the proposed training program based on sports activities in improving motor coordination skill among children with cerebral palsy has been validated.

## Discussion of the results in light of the second hypothesis:

**Hypothesis statement:** "The proposed training program based on sports activities is effective in improving body awareness skills among children with cerebral palsy".

The obtained results from the pre-assessment of the sensory checklist indicated that children with cerebral palsy have difficulties in terms of body awareness skills. This resulted in challenges related to coordinating sensory and motor functions while performing specific activities or tasks. In contrast, the results from the post-assessment of the sensory checklist after the application of the proposed training program showed a significant improvement in body awareness skills. This improvement was reflected in their enhanced ability to coordinate sensory and motor functions while performing specific motor activities. This suggests that they acquired this skill in a proper manner, enabling them to execute it accurately.

This is affirmed by studies such as Yassin Mashid (2013), which concluded that adapted recreational sports activities play an important and effective role in improving the acceptance of disability among individuals with physical disabilities. Similarly, the study by Wahiba Sayim (2017) found that recreational sports activities contribute to the development of psychological skills among individuals with physical disabilities. Additionally, the study by Zougagh Fattah and Meloudi Hassiba (2018) demonstrated the role of sensory education and adapted physical activities in the rehabilitation of motor skills for children with cerebral palsy.

Indeed, the results of this study align with the findings of these researchers. Therefore, it can be concluded that the hypothesis stating that the proposed training program based on physical activities is effective in improving body awareness skills in children with cerebral palsy has been confirmed.

Discussion of General Hypothesis Results: The hypothesis stated that the proposed training program based on physical activities is effective in developing sensory-motor integration among children with cerebral palsy. The results obtained from the field research confirm the effectiveness of the proposed training program in enhancing sensory-motor integration among children with cerebral palsy. This is evident through statistically significant differences between the pre-test and post-test results of the sensory checklist in favor of the post-test. The notable improvement and significant development in sensory-motor integration at all levels can be attributed to the harmony and interaction observed between the proposed physical activities and the research sample. This is manifested by a reduction in sensory-motor issues among the children, an increase in their motor coordination abilities, and improved coordination between sensory perception and movement associated with specific tasks. Additionally, the research observed improvements in muscle flexibility, reduced occurrence of spasms, and enhancement of their body awareness and physical rhythm, leading to increased stability and balance. These findings are consistent with previous studies, such as the study by Nahla Mohamed Mustafa Ali (2015), which demonstrated the effectiveness of a training program based on sensory-motor activities in developing daily life skills in a sample of children with autism. Similarly, Eman Ashraq Mohamed Hassan's study (2017) highlighted the effectiveness of sensory integration occupational therapy in developing sensory-motor skills among children with cerebral palsy. Abdul Noor Lalam's study (2018) also indicated the role of sports activities in improving motor skills among individuals with disabilities. Similarly, studies by Ismail Ibrahim Badr, Hisham Abdel Rahman Al Khawli, Amal Ibrahim El Fakki, and Nahla Mohamed Mustafa Ali (2019) concluded that the proposed training program based on sensory-motor activities is effective in improving sensory integration deficits in a sample of children with autism. In conclusion, the results of this research are in line with the findings of these researchers. Therefore, it can be stated that the hypothesis, which proposed that the proposed training program based on physical activities is effective in developing sensory-motor integration among children with cerebral palsy, has been confirmed.

## General Conclusion

Our research is classified as scientific research in the field of special education, focusing on the development of sensory-motor integration through the utilization of sports activities among children with cerebral palsy. This topic represents one of the most significant and recent studies in the Algerian clinical context, owing to the deficiency in specialized training and therapeutic programs tailored for this specific group of individuals with special needs.

This motivated us to undertake this research endeavor, aiming to assess the effectiveness of a proposed training program based on sports activities in enhancing sensory-motor integration among children with cerebral palsy. This was investigated through the formulation of the following overarching research question: Is the proposed training program, which relies on sports activities, effective in enhancing sensory-motor integration among children with cerebral palsy?

To ensure the effectiveness of the proposed training program, it was presented to a group of experts before its implementation on the research sample. The obtained agreement percentages indicated that the program was suitable and appropriate for the targeted group. Following the program application, statistical results revealed a significant improvement in sensory-motor integration at all levels. This improvement was attributed to the diversity of

proposed sports activities and exercises that comprehensively covered sensory-motor integration aspects. This supports the first sub-hypothesis of our study, which stated that "the proposed training program based on sports activities is effective in improving motor coordination skills in children with cerebral palsy." These findings align with the research by Hamoudi Aida (2013), Pooja Kumari Mohaseth; Aparna Choudhary (2021), and Hany El-Desouky Ibrahim; Noah Ahmed Mohamed Hassan (2022).

In addition to confirming the second sub-hypothesis of our study, which stated that "the proposed training program based on sports activities is effective in improving body awareness skills in children with cerebral palsy," these findings align with the results of Yassin Mashid (2013), Waheba Sayim (2017), and Zougagh Fatiha and Hassiba Meloudi (2018). Through all the obtained results, the overall hypothesis of our study was validated, which asserts that "the proposed training program based on sports activities is effective in developing sensory-motor integration in children with cerebral palsy." This conclusion is also supported by studies conducted by Nahla Mohamed Mustafa Ali (2015), Eman Ashraq Mohamed Hassan (2017), Abdelnour Lalam (2018), and Ismail Ibrahim Badr; Hisham Abdelrahman El-Khouly; Amal Ibrahim El-Fiky; Nahla Mohamed Mustafa Ali (2019).

## Conclusion:

Numerous studies conducted on children with cerebral palsy have indicated their challenges and deficiencies in sensory-motor integration, which adversely affect their daily activities and tasks, leading to psychological issues such as low self-esteem and a sense of helplessness. This motivated our research in this field, aiming to test the effectiveness of a proposed training program based on sports activities in developing sensory-motor integration in the research sample.

To achieve this objective, the Sensory Profile questionnaire was administered to the research sample both before and after applying the proposed training program. Prior to its application, we ensured the program's suitability for the targeted group. Subsequently, differences between the pre- and post-program measurements were calculated. The results revealed statistically significant differences in favor of the post-program assessment, indicating that the proposed training program based on sports activities is effective in developing sensory-motor integration in children with cerebral palsy.

Based on the cumulative results, the current research concludes the following:

* The proposed training program based on sports activities is effective in improving motor coordination skills in children with cerebral palsy.
* The proposed training program based on sports activities is effective in enhancing body awareness skills in children with cerebral palsy.
* The proposed training program based on sports activities is effective in developing sensory-motor integration skills in children with cerebral palsy.

Based on the findings of this research, the following suggestions are put forward:

*Generalizing the obtained results to a larger sample size.

*Conducting new studies that explore the current research variables independently or in combination with other variables to ensure the validity of the current research results.

*Promoting positive attitudes in society towards children with cerebral palsy by raising awareness about the disorder, its challenges, and coping strategies to alleviate the negative impacts on their psychological well-being.

*Focusing on providing specialized therapeutic, training, and guidance programs for children with cerebral palsy.

*Educating parents about specialized institutions and programs tailored for this group and involving them actively.

*Establishing dedicated institutions for the rehabilitation and training of this category within the community.

*Increasing and intensifying research efforts related to children with cerebral palsy to shed

light on their most significant challenges and difficulties, aiming to integrate them naturally into society.

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