

The effectiveness of programs based on motor game activities in reducing self-harm behavior in children with autism spectrum disorder

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Abstract: The study aimed to identify the effectiveness of a program based on motor game activities in reducing self-harm behavior. The study sample consisted of 58 children, (42) males and (16) females, at the Shebin Autism Center in Erbil Governorate, aged between (6-9) years, suffering from mild autism. To achieve the study objectives, the researcher used the Self-Harm Scale, the validity and reliability of which were verified, as well as the training program based on motor activities. The study used a quasi-experimental two-group design, where participants were divided into two groups: experimental and control. The results indicated that there were statistically significant differences at the level of (0.05) between the average ranks of the scores of the children in the experimental group in the pre- and post-tests of the self-harm behavior scale in favor of the post-test, by measuring the effect size using (Cohen) with a value of (1.28). This value indicates the improvement and the large size of the effect that occurred in the experimental sample in the post-test as a result of the program based on motor game activities. The results indicate that the motor play activity program was effective in reducing self-harm behavior among children in the experimental group with autism spectrum disorder. The study recommended the importance of providing tools for using motor activity programs to modify undesirable behaviors in children with autism spectrum disorder.

Keywords: Children with autism spectrum disorder, Erbil, Motor game activities, Self-harm behavior.

1. Introduction

Autism spectrum disorder is one of the most widespread types of disabilities in recent times, as it is a complex developmental disorder that appears in the first years of a child's life and negatively affects all aspects of the child's development, making the child's adaptation process to his environment extremely difficult. The Fifth Diagnostic Manual indicated that the prevalence of autism spectrum disorder in America and a number of other countries has reached 1% of the total population [1].

Recently, the rapid spread of this disorder has been observed, necessitating the evaluation of young children and raising awareness among families. Families need to be educated about the characteristics of the disorder, the developmental requirements of young children, and how to encourage their growth and learning [2].

One of the defining characteristics of children with autism spectrum disorder is that they do not develop the types of social relationships typical of their age. Social impairments include difficulties using many nonverbal behaviors, such as eye contact, gestures, and facial expressions, used to organize various forms of social and communicative interactions. In addition, they have problems making friends or establishing and maintaining social relationships [1].

Communication disabilities in children with autism spectrum disorder affect both verbal and nonverbal skills. They are described as having a delay or complete deficiency in the development of spoken language. Children who do not speak have difficulty engaging in conversations with others. When speech does not develop, speech characteristics such as pitch, intonation, volume, rhythm, and tone are abnormal [2]. Grammatical language is characterized by the use of repetitive or stereotyped

language, such as the repetition of words or phrases related to meaning. Their language also has a peculiar peculiarity, as it only makes sense to children familiar with their communication style. Their language comprehension is also very delayed, and they are unable to understand simple questions and instructions. The social aspects of language are also affected, as they are unable to integrate words with gestures to understand speech. Imaginative play is also impaired, as children with autism spectrum disorder tend not to engage in imaginative play [1].

Children with autism spectrum disorders and other disorders exhibit unusual behavior patterns. For example, these children play with toys in a playful, toy-like manner. They play as part of the toy rather than for the rewards. They may be preoccupied with the car's wheels rather than pushing it forward or backward. In addition, they resist change in their environment and may respond to change with a variety of inappropriate behaviors, such as anger, agitation, or self-harm [3].

Children with autism spectrum disorder often spend hours engaging in stereotyped, ritualistic behaviors. These individuals are known to engage in repetitive actions such as waving their hands in front of their eyes or biting their hands. As we saw, Amy spent hours watching bandages fall to the floor. If they are prevented or interrupted from performing these rituals or stereotyped behaviors, they will exhibit tantrums [4].

Children with autism spectrum disorder exhibit sensory disturbances that may be due to stimuli-seeking or a tendency to eliminate internal sensory stimuli. This type of disturbance leads to significant challenges in processing sensory input. Such problems negatively impact social interactions, communication with others, and the ability to carry out various daily activities [5].

The behavioral characteristics of executive functioning in children with autism spectrum disorder are manifested in specific repetitive behaviors, stereotyped movements, self-harm behaviors, and an insistence on sameness. The biological characteristics of executive functioning in autism spectrum disorder include abnormal development in the frontal lobe and neural connections across multiple brain regions [6].

Self-injurious behaviors are more common in children with autism spectrum disorder than in other typically developing children and children with developmental disabilities. This underscores the importance of assessing these behaviors and using the best treatments [7].

Children with autism spectrum disorder exhibit various types of aggressive behaviors, such as aggression toward others or self-injury. These individuals may engage in biting, hitting, scratching, and other attempts to harm themselves or others [2]. These behaviors appear particularly when the child with autism spectrum disorder fails to develop appropriate social and communication skills, which leads to frustration and subsequent aggression, self-harm, and other behaviors [8].

Self-harm behavior in children with autism spectrum disorder is assessed using functional behavior analysis techniques. This procedure is based on observation and identification of the precursors and subsequent stimuli of the behavior, as well as the purpose of the behavior. These procedures enable us to identify the individual responsible for the behavior and the types of reinforcers needed to maintain it [9]. The process of identifying the function of self-harm behaviors in children with autism spectrum disorder involves operationally defining the behavior using clear language that specifies the target behavior in a measurable and directly observable manner. It also involves gathering precise information about how and when the behavior occurs, how long it lasts, the times it occurs, and the circumstances under which it occurs. The collected data is then analyzed, and explanatory hypotheses are developed regarding the relationships between environmental stimuli and the occurrence of the behavior [10].

Although children with autism spectrum disorder engage in a variety of physical activities, they also exhibit poor motor skills during physical activity. This may be primarily due to deficits in social interaction skills and limited communication experience. However, the main characteristic of this category of children is a noticeable deficit in appearance, social aspects, and language, which exacerbates their problems, including practicing motor activities [11].

Educational and psychological therapies are viewed as therapeutic alternatives that aim to impart targeted functional skills, particularly those skills that help develop abilities, thus helping achieve the best possible level of mental health and quality of life [12].

Structured games are a tool used for therapy and skill acquisition, particularly motor skills. A study by Wu et al. [13] indicated that games play a role in improving motor skills and object control. Programs based on sports activities are considered helpful in improving the level of general motor performance of children with autism spectrum disorder, and also in acquiring appropriate behaviors O'Connor et al. [14]. El-Zraigat [2] indicated that sports activities are an important activity in modifying the behavior of children with autism spectrum disorder. However, sports activities improve blood circulation and also help control unacceptable behaviors, including self-harming [2].

Many studies have indicated that this disorder lasts a lifetime, in which the child is deficient in social and communicative aspects, as well as exhibiting restricted attention and repetitive behavioral patterns Xie et al. [15]. El-Zraigat [2] indicated that this disorder appears through a number of clearly defined characteristics that include deficits in communication and social interaction, and repetitive behavioral patterns.

Self-harm is a form of aggressive behavior that an individual carries out, either towards themselves or towards others. The term self-harm refers to intentional behaviors that cause harm to oneself [16]. A study of Carroll et al. [17] identified subtypes of aggression in a sample of children with autism spectrum disorder and showed five subtypes of aggression, including self-injurious behavior. The study by Blanchard et al. [18] found that autism spectrum disorder was significantly associated with the odds of self-injurious behavior in children and adults, and concluded that there is an absolute need to increase access to health services in reducing self-harm in this population. Also, Boyd et al. [19] emphasized the importance of treating undesirable repetitive behaviors in people with autism, and a larger clinical trial is needed to prove these findings. While Lai et al. [20] pointed out that people with autism spectrum disorder suffer from a significant increase in incidents of self-harm in both genders, and recommended providing support with a special focus on combating mental illnesses and treating them in a timely manner.

Some studies have indicated that the researcher found a relationship between autism spectrum disorder and self-harm, and this is consistent with the results of a number of studies. For example, Malhi and Sankhyan [21] indicated that the prevalence of self-harm behavior reached 22.1%, and the most common forms of head banging were hitting the head and hitting oneself. This was attributed to several factors, including focusing on the age at diagnosis, teaching the mother about the presence of a specific medical condition, the presence of sensory processing abnormalities, and the severity of autism spectrum disorder. Furthermore, the results of Stark et al. [22] showed that people with autism spectrum disorder have an increased prevalence of psychological illnesses and incidences of autism and self-harm independently of comorbid conditions.

A review by Xing and Wu [23] found that physical activities help in improving motor development in children with autism spectrum disorder and have positive long-term effects. The results of Zhang et al. [24] study indicated that mini-basketball training activities reduced repetitive behaviors, self-injurious behavior, and restrictive behavior and were associated with changes in the dynamic connectivity of the triadic network. Furthermore, El-Zraigat [2] stressed that motor activities bring many benefits to children with autism spectrum disorder. Perhaps the most important of them is stimulating blood circulation, reducing repetitive behaviors, and acquiring functional behaviors in daily life. Zidan's [25] study indicated the effectiveness of a training program using play to develop basic motor skills and social skills in reducing the level of anxiety in a child with autism spectrum disorder. Hussein's [26] study showed the effect of motor games and music in attracting attention for autistic children. The results of Abdel Hamid [27] showed the effectiveness of training in self-management skills in reducing self-harm behavior and its impact on improving social behavior in children with autism spectrum disorder. The study by Hiyam and Omar [28] confirmed the effectiveness of using

small recreational games in developing motor skills in children with autism spectrum disorder and their impact on their functional skills related to daily life activities.

1.1. *The Importance of Study*

Autism spectrum disorder is one of the most common forms of behavioral and emotional disorders, as it affects all areas of an individual's life. Symptoms of the disorder appear at an early stage of life, in addition to the appearance of a number of behavioral disorders evident in the child, such as isolation, aggression, and self-harm, which lead to obstruction of the child's development and loss of health. Psychologically, this represents a great danger to the child, family, and society [29]. However, sports activities can help reduce self-injurious behavior in this group of children. The use of these physical activities improves psychosocial aspects, helps with sensory regulation, reduces impulsive behavior, and develops self-control skills, which positively reflect on reducing aggressive behavior, including self-harm behavior [2].

Having a child with autism spectrum disorder in a family poses numerous challenges due to the nature of their behaviors. The communication deficits, difficulty establishing social relationships, and repetitive behaviors exhibited by a child with the disorder present significant challenges for families. The challenges are compounded by the lack of knowledge about the procedures and methods for dealing with this type of child. Children with autism spectrum disorder exhibit some self-harming behaviors, including hitting their heads against the wall, slapping their faces, pulling their hair, and throwing things in front of them. Activities and games also contribute to modifying undesirable behaviors in a child with autism spectrum disorder [2].

In the city of Erbil, in the Kurdistan Region of Iraq, interest in children with autism spectrum disorder is still relatively new. Recently, there has been a noticeable increase in diagnosed cases of this disorder. Various efforts have been made to provide diagnostic and therapeutic services in specialized centers.

The research problem was crystallized in preparing a program based on motor games, rapid response to external stimuli, motor coordination, and body movements using large and fine movements, which led to modifying a number of inappropriate behaviors for a child with autism spectrum disorder, including self-harm behavior. Despite the fact that a large number of studies have been conducted on children with autism spectrum disorder and aimed to reduce self-harm behavior, the majority of these studies were psychological and counseling, with some being behavioral. Few studies, to the researcher's knowledge, addressed motor games as a therapeutic method to reduce self-harm behavior. This gap in the literature was a primary motivation for conducting this study. The researcher hopes that this research will benefit the families of children with autism spectrum disorder and those working in the field. In light of this, the research problem can be determined by answering the following question:

- Are there statistically significant differences between the average ranks of the experimental group's scores on the self-harm behavior scale in the pre- and post-measurements?
- Are there statistically significant differences between the average ranks of the control group's scores on the self-harm behavior scale in the pre- and post-measurements?
- Are there statistically significant differences between the average scores of children with autism disorder on the self-harm behavior scale in the post-application and their scores in the follow-up application four weeks after the end of the program?

The practical significance of the study lies in providing special education specialists and those working with children with autism spectrum disorder in Erbil with a program based on motor game activities to reduce self-harm behavior.

1.2. *Study Objectives*

The current study aimed to:

- Reduce self-harm behavior among children with autism spectrum disorder in Erbil.

- Develop a training program based on motor activities and investigate its effectiveness in reducing self-harm behavior.

1.3. Operational Terms and Definitions

- Children with autism spectrum disorder: Autism spectrum disorder (ASD) is a genetic neurodevelopmental disorder characterized by persistent deficits in social interaction and communication, repetitive behaviors, and restricted activities [1]. Operationally, the children with ASD in this study are children diagnosed with ASD, aged 6-9 years, and exhibiting self-harm behaviors in Erbil city, Kurdistan Region of Iraq.
- Self-harm behavior: This is a form of undesirable behavior exhibited by children with autism spectrum disorder. It is operationally defined as the sum of the children's scores on the self-harm behavior scale used in this study.
- A training program: operationally, it is a set of activities, training, instructions, and exercises based on motor activities and aimed at reducing self-harming behaviors among a sample of children diagnosed with autism spectrum disorder in the city of Erbil in the Kurdistan Region of Iraq.

2. Research Methodology

The quasi-experimental approach was used because it suits the nature of the research problem. A quasi-experimental design was also employed with two equal groups, incorporating pre- and post-tests as well as post-measurement. The participants were divided into two groups: the first being the experimental group and the second the control group. Participants in the experimental group received training on motor activities, while those in the control group did not receive any training. The self-harm behavior scale was administered to participants in both groups during the pre- and post-measurements.

2.1. Participants

The research population was chosen intentionally from children with mild to severe autism spectrum disorder, aged 6-9 years, in all autism centers in the Erbil Governorate Center for the academic session 2023-2024. Their number reached 58 children, including 42 boys and 16 girls. The research sample was selected based on a set of criteria:

- Children must be (6-9) years old.

The severity of their autism spectrum disorder should be mild.

- The children must not have any sensory disability.
- To determine that their behavior (self-harm) is high according to the teacher's observations.
- The parents must agree to conduct the experiment on their children.

2.2. Study Tools

Self-harm behavior scale: Al-Shatti [30] scale was used, which consists of 40 items in its final form. The Cronbach's alpha consistency coefficient was 0.89, which is a high indicator of the scale's stability, while the split-half reliability coefficient was 0.87, indicating that the scale has a high degree of reliability. Regarding validity, it was content validity, demonstrated by presenting the self-harm behavior scale to nine experts in measurement and evaluation to assess its validity for the intended purpose. After analyzing their responses, it was found to be suitable for achieving the study's objectives.

A program for motor games activities: the program was prepared by the researcher. The motor games activities were determined to suit the level of children with mild autism spectrum disorder, as they included a number of motor activities that work to reduce self-harm behavior, such as looking into

the researcher's eyes, looking in the mirror, performing movements in front of the mirror, paying attention to the source of the sound, controlling the hands in the case of self-harm behavior, jumping in front of obstacles, replacing kicking things with kicking the ball, kicking the ball with the head instead of kicking the head against the wall, etc.

The program activities were implemented individually, and some were carried out collectively. The duration of each training session was set at 30 minutes, based on experts' opinions and studies on reducing behavioral problems in children with autism spectrum disorder. The total number of sessions was 20, with each session lasting 30 minutes, totaling 150 minutes per week. In implementing the program, the researcher used methods such as reinforcement, modeling, repetition, homework, extinguishing, role-playing, and feedback.

Content validity of the program: The content validity of the program was verified through a presentation to nine specialized experts. The experts agreed that it was accurate, with an agreement rate of 100%.

3. The Results

This section presents the results of the study

Are there statistically significant differences between the average ranks of the experimental group's scores on the self-harm behavior scale in the pre- and post-measurements?

Table 1.

The difference between the average scores of the experimental group on the self-harm behavior scale in the pre- and post-measurements.

Scale	Measurement	Ranks for pre- and post-measurement	No.	means	S.D.	Average rank	Total ranks	Z	Sig.	Cohen
Self-harm behavior	Pre	Negative	4	102.2	2.98	2.50	10.0	-2.57	0.026	1.28
	Post	Positive	0	74.25	3.59	0.00	0.00			

It is clear from Table 1 that the calculated value of (z) was (-2.57) and with a probability (sig) of less than (0.05), which indicates that there are significant differences at the level of (0.05) between the average ranks of the scores of the children in the experimental group in the pre- and post-measurements of the scale. Self-harm behavior improved for the benefit of the posttest, and by measuring the effect size using (Cohen's d) with a value of (1.28), as this value indicates the improvement and a large effect size that occurred among the experimental sample in the posttest as a result of the program based on motor game activities.

Are there statistically significant differences between the average ranks of the control group's scores on the self-harm behavior scale in the pre- and post-measurements?

Table 2.

Shows the difference between the average scores of the control group on the self-harm behavior scale in the pre- and post-measurements.

Scale	Measurement	Ranks for pre- and post-measurement	No.	Means	S.D.	Average Rank	Total ranks	Z	Sig.	Cohen.
Self-harm behavior	Pre	Negative	3	104.7	3.59	2.83	8.50	-1.28	0.197	0.64
	Post	Positive	1	101.5	3.59	1.50	1.50			

The data presented in Table 2 indicate that the calculated value of (z) was (-1.28) and with a probability (sig) of greater than (0.05), which indicates that there are no significant differences at the level of (0.05) between the average ranks of the scores of the children of the control group in the two

measurements. Pre- and post-self-harm behavior scale, and by measuring the effect size using the Cohen test, which reached a value of 0.64.

Are there statistically significant differences between the average scores of children with autism disorder on the self-harm behavior scale in the post-application and their scores in the follow-up application on the same scale four weeks after the end of the program?

Table 3.

The difference between the average scores of the experimental group on the self-harm behavior scale in the post and follow-up measurements.

Scale	Measurement	Ranks for pre- and post-measurement	No.	Means	S.D.	Average rank	Total ranks	Z	Sig.
Self-Harm Behavior	Pre	Negative	1	74.25	3.593	2.50	2.50	-0.92	0.357
	Post	Positive	3	76.50	3.511	2.50	7.50		

As is clear in the table above, the calculated value of (z) reached (-0.92) and with a probability (sig) of greater than (0.05), which indicates that there are no significant differences at the level of (0.05) between the average ranks of the scores of the children of the experimental group in the two measurements. Post and follow-up of the self-harm behavior scale, as this result indicates the continued effect of the program based on motor game activities in reducing the level of self-harm behavior among children of the experimental sample.

3.1. Study Limitations

The study's limitations included the characteristics of the study population, namely, children with autism spectrum disorder (ASD), aged 6-9 years. The study was also limited by the time and region in which it was conducted. It also included the methodology used to answer the study questions, as well as the sample size.

4. Discussion of Results, Conclusions and Recommendations:

Physical activity is an essential part of developing abilities and acquiring basic skills, especially for children with autism spectrum disorder. Physical activities stimulate blood circulation, which helps provide the necessary warmth for learning. Furthermore, physical activities reduce aimless activities or inappropriate behaviors. Motor activities help reduce sensory arousal when it is high and also increase the level of sensory arousal when it is low [2].

The results indicated a decrease in the children's level of self-harm behavior in the experimental group and in favor of the post-measurement. The researcher attributes this to the program containing many techniques that helped make it successful, such as indoctrination, modeling, homework, and ignoring, as these contributed to increasing the participants' response to the researcher and interaction with him. The program also included purposeful and engaging activities, which increased the children's desire to learn, and the diversity of activities and tools used in the program contributed to this outcome. Additionally, the philosophy of the program considered individual differences among children, as the sessions at the beginning of the training were conducted individually for each child. The program was also characterized by its flexibility, as the researcher adapted some activities to suit the characteristics, level, and response degree of each child. The results of the study agreed with the results of other studies, Zidan [25], Hussein [26], Abdel Hamid [27], and Hiyam and Omar [28].

As a conclusion from the results of the study, the effectiveness of the motor game activities program was proven in reducing self-harm behavior among children in the experimental group with autism spectrum disorder. It was also evident that there was a very slight decrease in self-harm behavior among the children of the control group who applied the program followed at the center. The children of the experimental group outperformed the children of the control group in the post-measurement in reducing self-harm behavior. The results also indicated the continuity of the effect of the movement

activities program on the children of the experimental group in reducing self-harm behavior one month after the post-measurement.

Based on the results, the study recommends the following:

- The need to train families and teachers working in autism centers to use motor activities and provide them with various models of activities that help meet the child's individual needs, and then work to develop their deficiencies.
- Providing tools to carry out motor activities with children with autism disorder in institutions and centers that serve this category of children.
- The urgent need to implement behavior modification programs, and many of the practices used that are based on the principles of learning and applied behavioral analysis, because behaviors such as self-harm and outbursts of anger are high in children with autism spectrum disorder.
- Using motor activity programs to modify undesirable behaviors in children with autism spectrum disorder.
- Using the single-case study design to determine the nature of improvement with each single case.

Transparency:

The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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