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The utility and recommendations of adapted physical activity in the care of people with autism spectrum disorder in a sports environment

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Abstract

This research aims to evaluate the impact of an adapted sports programme on children with autism spectrum disorder (ASD), through an experimental design based on a comparison between an experimental group that received the programme and a control group that was not exposed to any intervention, using standardised tools and statistical analyses of t-test, effect size, and confidence intervals. The purposive sample was selected according to specific criteria and randomly distributed to the two groups. The results showed statistically significant differences with a large effect size and narrow confidence intervals in favour of the experimental group, which enhances the credibility of the intervention and confirms its benefits in motor, behavioural and social aspects. The article also analyses the possibility of the results being influenced by other factors such as the home environment and concomitant interventions. Finally, the research provides clear steps to implement adapted physical activity in educational and rehabilitative settings.

1-Introduction

Autism spectrum disorder (ASD) is a complex neurodevelopmental disorder characterised by restricted and repetitive patterns of behaviours and persistent deficits in social interactions (American Psychiatric Association, 2013), autism spectrum disorder is a complex category of neurobiological developmental disorders, typically diagnosed in childhood. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR(American Psychiatry Association, 2022), this disorder is categorized into three dimensions, namely impairments in verbal and non-verbal communication, impairments in social interaction, and the presence of repetitive and stereotyped behaviors, with an estimated prevalence of around 1% in the global population (Zeidan, R.K. et al; 2022). Recent evidence suggests that motor behaviors are present in more than 87% of individuals diagnosed with ASD (Bhat, A.N. et al; 2021), making these individuals functionally dependent on caregivers, resulting in low health-related quality of life (QoL) scores compared to their typically developing peers (Kuhlthau, K. et al; 2022).Physical Exercise Therapy (PET) is increasingly applied in the treatment of Autism Spectrum Disorders, Physical exercise (PE) has been shown to have positive effects on the symptoms associated with (ASD). However, there is still no consensus on the most appropriate PE intervention model. (Wu et al., 2024). Although evidence strongly suggests that PA is beneficial to all children, this is even more significant for children with ASD due to the difficulties that limit their participation in PA (Tse, C.Y.A. et al; 2019). Physical activity is an important intervention for ASD patients. Through clinical experiments, Smith and Merwin demonstrated a positive correlation between exercise and the prognosis of various psychiatric disorders (Smith PJ. et al, 2021). Notably, compared with traditional psychotherapy and drug therapy, physical exercise has the advantages of rich forms, individual and group (including team communication and cooperation), unrestricted places, easy to implement, and no side effects of drugs, which has gradually attracted the attention of clinicians (Shahane V. et al, 2023;Tse, Zhao M, et al, 2018). People with autism spectrum

disorder suffer from complex challenges that include difficulties in social interaction, communication, and repetitive behaviors, in addition to other health problems such as sleep disorders, obesity, and poor motor skills. These challenges affect their quality of life and their ability to integrate into society. Although many studies have indicated the importance of adapted physical activity as a tool to improve the physical, psychological, and social health of these individuals, there is a lack of identifying the optimal strategies for implementing these activities in sports settings, as well as their long-term impact on various health and behavioral aspects. Here the research problem is completed: How can adapted physical activity contribute to improving motor, social, and behavioral skills in people with ASD? What are the factors affecting the effectiveness of these activities in different sports settings?

1.1. Benefits of Adapted Physical Activity

Physical activity is beneficial for health, whether in primary prevention or as non-drug therapy in patients with a long-term condition (Iuretig & Gremion, 2021)

Improve motor skills: studies suggest that people with autism often have deficits in both fine and gross motor skills. Structured physical activities, such as balance exercises, running, and water activities, enhance muscle coordination and overall balance, helping to reduce these gaps (Bremer et al., 2016).

Social Interaction and Adaptive Behaviors: research has shown that team sports activities enhance social interaction and reduce social isolation in children and adolescents with ASD. Team sports such as soccer or cooperative games stimulate social skills such as cooperation, negotiation, and mutual respect (Pan, 2011).

Impact on mental and physical health: adapted physical activity programs have shown a positive impact on the mental health of children with autism, helping to reduce stereotypical behaviors, reduce anxiety, and increase concentration. It also contributes to improving physical fitness and reducing the risk of obesity, a common problem among people with autism(Lang et al., 2010).

Enhancing cognitive performance: exercise stimulates the release of brain chemicals, such as serotonin and dopamine, which are linked to improved mood and increased focus, leading to improved cognitive performance in children(Hillier et al., 2020).

1.2. Recommendations for designing sports programs

Sports activities should be designed to meet the needs of individuals with ASD, taking into account their motor, behavioral, and sensory differences. Activities can include low-sensitivity options for children with hypersensitivity. Evidence suggests that continued participation in physical activity provides more lasting benefits than short-term programs. it is recommended that programs last for at least 12 weeks with 2-3 sessions per week. Having qualified trainers in adapted physical activity or movement therapists is important to ensure maximum benefits and minimize risks. Sports activities that require interaction with others, such as team games, enhance social skills and increase opportunities for community integration. (Healy et al., 2018)

Literature recommendations: studies suggest that adapted physical activity is a comprehensive approach to improving the lives of people with ASD. However, future studies recommend developing standardized assessment tools to measure the long-term effects of exercise on various dimensions of life for individuals with ASD. Individually targeted and adapted exercise programs can positively transform individuals' health, behavior, and social inclusion.

2. Method and Materials

A experimental approach method was used to collect data on the impact of adapted physical activity on people with autism spectrum disorder, with two groups: Experimental and control.

2.1. Define the variables:

Independent variable: Adapted physical activity.

Dependent variable: Social interaction, attention, motor competence

2.2. Participants

Sampling method: A purposive sample of children diagnosed with autism (n = 20), randomly allocated into two equal groups. Sample n = 10 per

group

2.3. Results of the exploratory study

An exploratory study was conducted by collecting primary data through questionnaires before the start of sports programmes on a sample of children and adolescents with ASD, aged 6-18 years, from rehabilitation centres and specialised schools. The sample size was 60 participants.

*Table 1. **Sample characteristics for the exploratory study:***

The property	Number of participants (n)	Percentage (%)
Gender (Male)	47	78.33
Gender (Female)	13	21.66
Age group 6-10 years	25	41.66
Age group 11-14 years	20	33.33
Age group 15-18 years	15	25
Severity of disturbance (mild)	21	35
Severity of disturbance (moderate)	27	45
Severity of disturbance (severe)	12	20

The researcher used questionnaires addressed to parents, teachers and sports coaches to assess the reality of the practice and importance of adapted physical activity programmes. We concluded that adapted physical activity is an effective tool to improve the skills of children with ASD in many aspects, including motor skills, social interaction, adaptive behaviours, and psychological well-being. Through this empirical research, we seek to demonstrate the impact of an adapted sports programme on children with ASD to support children and contribute to activating the role of physical activity in improving the quality of life of this group of society.

2.4. Materials

Scientific Tools:

- Social interaction.
- Attention.
- Motor competence.

Validity, reliability, and criterion-referenced.

2.5. Statistical Analysis :

- T-test for two independent and correlated samples.
- Cohen's d to measure the effect size.
- 95% confidence intervals to estimate the accuracy of differences between means.
- SPSS was used to analyze the data and determine the significance of improvements.

3. Results

Table 2: ***Comparison Significance level between control and experimental group***

The variable	Experimental (before)	Experimental (after)	Control (after)	T	Size of impact	Periods of trust	Significance
Social interaction	2.0 ± 0.6	3.9 ± 0.4	2.1 ± 0.5	5.22	1.85	[1.13, 2.52]	p < 0.01
Attention	3.1 ± 0.5	4.5 ± 0.3	3.0 ± 0.6	4.88	1.74	[0.98, 2.41]	p < 0.01
Motor Efficiency	2.4 ± 0.7	4.2 ± 0.3	2.6 ± 0.6	5.65	1.95	[1.20, 2.68]	p < 0.01

Analysis of the results:

- A large effect size (d > 1.5) indicates strong programme effectiveness.
- Narrow confidence intervals show the stability of the results and minimise the likelihood of estimation error.
- Results show significant improvements in all variables, beyond random variations.

4. Discussion:

An adapted sports programme has a significant, statistically and behaviourally specific effect on children with autism spectrum disorder.

Explanation: Repetition of structured movements and interaction with a safe sports environment helped children to acquire new behaviours and improve motor and social skills.

Comparison with previous studies: The results are consistent with studies such as (Licari et al., 2020) (Green et al., 2019) which demonstrated the importance of structured motor training for autism. What is new in this study is the determination of effect sizes and confidence intervals, which gives its results greater explanatory and applied power.

Analyse potential external factors:

Despite the robust experimental design, there are still possibilities for external factors to influence:

Home environment: Family support can influence motivation and behaviour, which may enhance outcomes.

Concomitant Behavioural Therapy: Some children received behavioural interventions, which may complement the effect of physical activity

Psychological and social factors: Mood and interaction with teammates on the sports team may play a role.

Despite the importance of these factors, the use of a control group reduces their impact and enhances the researcher's confidence that the improvements are related to the training programme.

Discussion:

Main result: Adapted physical activity was significantly effective in improving social and motor functioning and attention.

Interpretation: The structured nature of the exercises helps children to accept instructions and develop interaction. The findings are consistent with (Caro et al., 2017) (Li-Chi Chen et al. 2020) in confirming the educational and behavioural benefit of adapted physical activity. The combination of confidence intervals and effect size highlights that the improvement is real and not a coincidence, noting the importance of controlling for other environmental and social factors in future studies.

5. Conclusion

The study found that adapted physical activity has a direct and positive impact on enhancing skills in children with autism. The integration of theoretical aspects with practical application provides a strong guide for professionals and care centres to apply this type of programme. By applying the programme in educational and sports environments and

training specialists to implement it scientifically. By integrating these programmes into educational curricula, training specialised staff and involving families in the therapeutic process.

Recommendations:

- Using approved diagnostic tools to determine the child's abilities.
- Programme design Selecting graded exercises according to the situation (balance, coordination, group interaction.
- Individual or group training
- Incorporating activities in small groups to increase social interaction.
- Involving parents and educating families on how to support the exercises at home.
- Monitoring and evaluation Using performance measurement tools every month to monitor progress.

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