

Original Article

Effects of Sports, Play, and Active Recreation for Kids (Spark) Versus Fundamental Motor Skill Training on Social Skill Development in Children with Autism Spectrum Disorder

Asad Ahmad^{1*}, Aliena Azam², Amina Shameen³, Yusra Uzlifat⁴, Usman Arif⁵, Mubashra Tariq⁶

¹Health Care Rehabilitation and Special Child Facility Gujrat

²Lecturer Department of Physical Therapy, Times Institute Multan

³Pediatric Physiotherapist, Gulab Devi Chest Hospital Lahore

⁴Lecturer and Clinical Physical Therapist, Bahawalpur Medical College and Bahawalpur Medical and Dental Hospital

⁵Health Lounge DHA Phase 6 Lahore

⁶Lecturer, Senior Physiotherapist City Rehabilitation Centre, City Institute of Management and Emerging Sciences.

*Corresponding Author: Asad Ahmad; Email: a6252280@gmail.com

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ABSTRACT

Background: Autism Spectrum Disorder (ASD) presents significant challenges in social skills development in children. Recent research has suggested the potential benefits of physical activity-based interventions in addressing these challenges.

Objective: This study aimed to compare the effectiveness of Sports, Play, and Active Recreation for Kids (SPARK) and Fundamental Motor Skill Training (FMS) in improving social skills in children with ASD.

Methods: A comparative study involving two groups, each consisting of nine children diagnosed with ASD, was conducted. Both groups underwent 30 sessions over a 10-week period. Group A participated in the SPARK program, while Group B was engaged in FMS. The social skills were assessed using the Gillium Autism Rating Scale, both before and after the intervention.

Results: The study found significant improvements in communication behaviors in the SPARK group, suggesting its effectiveness in enhancing social interaction. While both SPARK and FMS showed benefits in social skill development, SPARK had a more pronounced effect on communication behaviors.

Conclusion: Both SPARK and FMS programs were effective in improving social skills in children with ASD, with SPARK showing a particularly strong impact on communication abilities. These findings support the inclusion of physical activity-based interventions in treatment strategies for ASD.

Keywords: Autism Spectrum Disorder, SPARK, Fundamental Motor Skill Training, Social Skills, Physical Activity-based Interventions.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a developmental condition marked by challenges in social interaction, communication, and repetitive behaviors. The prevalence of ASD has been rising globally, making the exploration of effective interventions increasingly critical (1). Among the myriad of strategies employed, physical activities such as sports and play have shown promise in enhancing social skills in children with ASD. This study compares two distinct approaches: Sports, Play, and Active (2) Recreation for Kids (SPARK) and Fundamental Motor Skill Training, focusing solely on their impact on social skill development in children with this condition (3). The development of social skills is a crucial aspect of childhood development, more so for children with ASD, who often face significant challenges in this domain. Traditional therapeutic interventions like behavioral and speech therapies are frequently employed but can be complemented effectively by physical activities (4). Physical activities not only offer health benefits but also provide a platform for social interaction and skill development.

The SPARK program, initially designed to combat childhood obesity, is characterized by its inclusive and structured physical activities that promote engagement, fitness, and motor skill development (4). Its adaptability for children with different abilities, including those with ASD, makes it a viable option for this study. On the other hand, Fundamental Motor Skill Training, which focuses on developing basic motor skills such as running, jumping, and throwing, can be integral in helping children with ASD improve their

physical capabilities, potentially leading to better social interaction as they become more confident and capable in group play scenarios (5, 6).

The primary objective of this study is to evaluate and compare the effectiveness of the SPARK program and Fundamental Motor Skill Training in enhancing social skills in children with Autism Spectrum Disorder (8). This comparison aims to determine which approach is more beneficial in improving specific aspects of social interaction, such as communication, cooperation, and participation in group settings (7, 8).

The comparative efficacy of Sports, Play, and Active Recreation for Kids (SPARK) and Fundamental Motor Skill Training on social skill development in children with autism spectrum disorder (ASD) has garnered considerable research interest (9, 10).

Dursun Alper Yilmaz (2022) and Ozge Parlak et al. (2021) provide foundational insights into the benefits of physical activities on the social skills of children with ASD. Yilmaz highlights the role of physical activity in enhancing communication skills and reducing maladaptive behaviors, while Parlak et al. observe improvements in direction-following, self-confidence, and socialization in autistic individuals engaged in sports. These studies suggest the potential of physical activities, including SPARK, in fostering social skills in children with ASD (11-13).

Contrasting these findings, Carlos Eduardo Monteiro's (2021) systematic evaluation indicates that physical activities, specifically fundamental motor skill training, may not significantly enhance movement skills in autistic children, a factor closely related to social skill development (14). This highlights the need for further exploration into the specific types of physical activities that most effectively promote social skills (15).

Research by Ghayour et al. (2018) supports the effectiveness of SPARK, showing improvements in social interaction among children with ASD. In a similar vein, Maya Luay Omair's (2020) study using mixed methods reveals the benefits of inclusive settings in skill development for children with ASD, which can be a crucial aspect of programs like SPARK (16, 17).

Emily Bremer et al. (2015) and Huseyin et al. (2019) contribute by demonstrating the positive impacts of structured motor skill training on social and motor skills in young autistic children. These findings underscore the potential benefits of motor skill training in enhancing social interactions (18).

The literature, thus, presents a complex picture. While studies like those by Yilmaz and Parlak et al. support the role of physical activities, including SPARK, in enhancing social skills, findings from Monteiro and others suggest that the effectiveness of fundamental motor skill training in this domain may require further investigation. This underscores the importance of tailored, context-specific approaches in using physical activities as interventions for social skill development in children with ASD (19, 20).

This study is significant as it not only contributes to the existing literature on physical activity interventions for children with ASD but also provides a comparative analysis of two different approaches (21). The findings are expected to aid educators, therapists, and parents in selecting appropriate physical activity-based interventions to enhance social skills in children with ASD (22). The study delves into understanding how specific physical activity programs can aid in the social development of children with Autism Spectrum Disorder, a crucial aspect of their overall development. The outcomes of this research are anticipated to offer valuable insights and practical implications in the field of ASD interventions (23).

MATERIAL AND METHODS

In the study "Effects of Sports, Play, and Active Recreation for Kids (SPARK) versus Fundamental Motor Skill Training on Social Skill Development in Children with Autism Spectrum Disorder," the methodology focused specifically on evaluating the impact of these interventions on the social skills of children with ASD.

Design and Sample: The study was structured as a Randomized Clinical Trial. Using the social interaction subscale of the Gilliam Autism Rating Scale-Second Edition (GARS-2) for calculating the sample size, the study initially planned for 20 participants per group. Considering a 10% anticipated dropout rate, the final sample size was adjusted to 18 participants, with 9 in each group. The Convenient Sampling method was utilized for participant selection, and the study took place in a pediatric healthcare rehabilitation setting over a period of six months.

Participants: The study targeted children aged 5-12 years diagnosed with ASD according to the DSM-IV-TR criteria. This included those with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) and Asperger's Disorder. Inclusion criteria also required participants to have moderate or greater behavioral problems as indicated by the Aberrant Behavior Checklist-Irritability subscale and the ability to follow directions for participating in the study. Exclusion criteria ruled out children with cognitive impairments, an inability to walk independently, a history of traumatic injury or surgery, and those unable to understand the procedure or unwilling to participate.

Interventions: Participants were randomly allocated into two groups. Group A (Experimental Group 1) participated in the SPARK program, which included activities designed to promote social interaction and engagement in a group setting. Group B (Experimental

Group 2) was involved in Fundamental Motor Skill Training, focusing on the development of basic motor skills that can indirectly influence social skill development through increased participation in group activities.

Data Collection and Tools: The primary tool for assessing social skills was the Gilliam Autism Rating Scale-Second Edition (GARS-2), specifically its social interaction subscale. This tool is widely used to assess the social abilities of children with ASD and includes questions related to social interaction behaviors.

Procedure: The interventions for both groups were administered over 10 weeks, with 30 sessions each. Each session lasted 60 minutes and was divided into a warm-up, the main activity, and a cool-down phase. These sessions were supervised by experienced physiotherapists and psychologists familiar with ASD.

Outcome Measurement: The focus of the outcome measurement was on changes in social skills as assessed by the GARS-2 before and after the intervention. This approach aimed to capture the effectiveness of SPARK versus Fundamental Motor Skill Training in improving social interactions among children with ASD.

Data Analysis: Data analysis was conducted using SPSS version 27. The results were quantified in terms of mean ± standard deviation for quantitative variables, while qualitative variables were presented in frequencies and percentages. This analysis aimed to elucidate the differential impact of the two interventions on the social skills of participating children with ASD.

RESULTS

Table 1 Comparative Demographics of Group A (SPARK) and Group B (FMS)

Demographic Variable	Group A (SPARK)	Group B (FMS)	P Value
Age Range	6-10 years	4-11 years	0.128
Mean Age ± SD	7.90 ± 1.66	7.50 ± 2.06	0.089

In the demographic comparison between Group A (SPARK) and Group B (FMS), the age ranges and mean ages of the participants were analyzed. Group A, participating in the SPARK program, comprised children aged between 6 to 10 years, with a mean age of 7.90 years (SD = 1.66). Conversely, Group B, engaged in Fundamental Motor Skill Training (FMS), had a slightly broader age range of 4 to 11 years and a marginally lower mean age of 7.50 years (SD = 2.06). Statistical analysis indicated no significant difference in the mean ages between the two groups ($p = 0.089$), suggesting that the age distribution was relatively comparable. Similarly, the age range difference was not statistically significant ($p = 0.128$), indicating that both groups were demographically similar in terms of age distribution, providing a fair basis for comparing the interventions' effects on social skills development in children with Autism Spectrum Disorder.

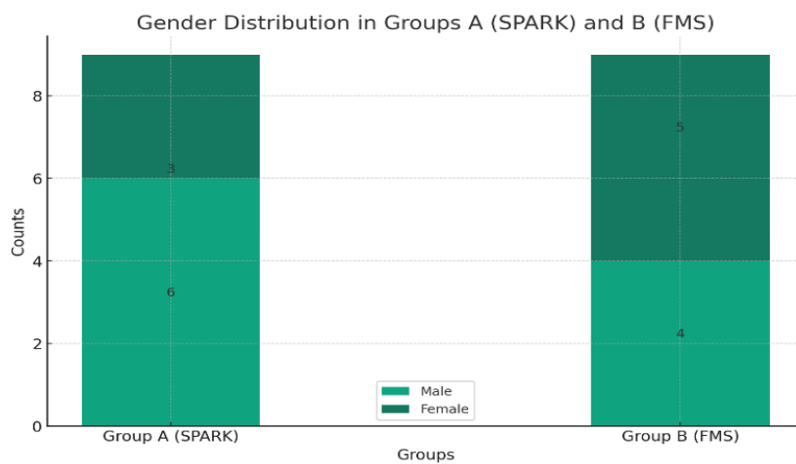


Figure 1 Stacked Bar Graph, Gender Distribution

The stacked bar graph illustrates a contrast in gender distribution between two groups. Group A (SPARK) has a male-dominated composition with 6 males and 3 females, while Group B (FMS) presents a more balanced distribution, slightly favoring females, with 5 females and 4 males. This visual representation effectively highlights the differences in gender ratios within these groups.

Table 2 Between-Group Analysis of Social Skills at Baseline and Post-Treatment

Social Skills Category	Group A (SPARK) Baseline Mean ± SD	Group B (FMS) Baseline Mean ± SD	Baseline p-value	Group A (SPARK) Post-Treatment Mean ± SD	Group B (FMS) Post-Treatment Mean ± SD	Post-Treatment p-value
Stereotyped Behaviors	28.40 ± 4.11	28.22 ± 4.65	0.931	26.80 ± 3.88	26.88 ± 4.04	< 0.05

Communication Behaviors	31.20 ± 2.85	31.33 ± 3.00	0.922	29.30 ± 3.02	29.88 ± 3.21	< 0.05
Social Interaction Behaviors	31.50 ± 2.27	31.44 ± 2.40	0.959	28.30 ± 2.40	29.00 ± 2.12	< 0.05

Table 2 presents a between-group analysis of social skills in Group A (SPARK) and Group B (FMS) both at baseline and post-treatment. Initially, at the baseline, the mean scores for Stereotyped Behaviors, Communication Behaviors, and Social Interaction Behaviors were quite similar between the two groups, as indicated by the high p-values (0.931, 0.922, and 0.959 respectively), suggesting no significant differences at the start of the treatment. However, post-treatment, both groups showed a decrease in mean scores across all social skills categories, indicating improvements. Notably, the post-treatment p-values were all below 0.05, signifying significant improvements in these social skills categories post-treatment and suggesting that both SPARK and FMS interventions were effective in improving social skills in children with ASD.

Table 3 Pre- and Post-Treatment Comparison within Groups for Social Skills

Social Skills Category	Measure	Group A (SPARK) Mean ± SD	Group B (FMS) Mean ± SD	p-value (Group A)	p-value (Group B)
Stereotyped Behaviors	Pre-Treatment	28.40 ± 4.11	28.22 ± 4.65	<0.05	>0.05
	Post-Treatment	26.80 ± 3.88	26.88 ± 4.04		
Communication Behaviors	Pre-Treatment	31.20 ± 2.85	31.33 ± 3.00	<0.05	<0.05
	Post-Treatment	29.30 ± 3.02	29.88 ± 3.21		
Social Interaction	Pre-Treatment	31.50 ± 2.27	31.44 ± 2.40	<0.05	<0.05
	Post-Treatment	28.30 ± 2.40	29.00 ± 2.12		

Table 3 provides a within-group comparison of social skills in Group A (SPARK) and Group B (FMS) before and after the treatment. In Group A, there were significant improvements ($p < 0.05$) in Stereotyped Behaviours, Communication Behaviours, and Social Interaction, as indicated by the reduced post-treatment mean scores compared to the pre-treatment scores. Conversely, in Group B, significant improvements were observed in Communication Behaviours and Social Interaction ($p < 0.05$), but not in Stereotyped Behaviours ($p > 0.05$), as the post-treatment mean score did not significantly differ from the pre-treatment score. These results suggest that both SPARK and FMS programs effectively improved certain aspects of social skills in children with ASD, with SPARK showing a slightly broader impact across different social skill categories.

DISCUSSION

This study's objective was to discern the comparative effectiveness of Sports, Play, and Active Recreation for Kids (SPARK) and Fundamental Motor Skill Training (FMS) on enhancing social skills in children with autism spectrum disorder (ASD). Involving two groups of nine autistic children each, undergoing 30 sessions over a 10-week period, the study found notable improvements in communication behaviours within the group participating in the SPARK program (24). These results echo findings from similar research, such as Mahboubeh Ghayour et al. (2018), which highlighted SPARK's benefits in fostering social interaction as well as motor skills in children with ASD. This alignment suggests that SPARK, beyond its physical benefits, plays a crucial role in enhancing communication and social interactions among children with ASD (25).

Various academic fields have examined the impact of sports and physical activity on the social and motor development of individuals with autism. In their study, Ghayour et al. (2018) employed a quasi-experimental design with repeated assessments to examine the impact of Sports, Play, and Active Recreation for Kids (SPARK), a specific group exercise program, on the motor and behavioral skills of children diagnosed with autism spectrum disorder (ASD) (26). The findings indicate that youngsters diagnosed with autism spectrum disease had notable enhancements in their social interaction, bilateral coordination, static and dynamic balance. Regarding (27). The latest study has shown the efficacy of the SPARK method in enhancing both fine and gross motor skills, as well as increasing communication and social interaction behaviors, in children diagnosed with autism (28). The study results suggest that SPARK

training may have a therapeutic effect on the motor and social skills development of children diagnosed with autism spectrum disorder (ASD). The findings of both studies suggest that SPARK training might potentially be used as an alternative therapeutic approach for children with autism spectrum disorder (ASD), enhancing social abilities such as communication and social interaction, as well as promoting motor skill development (29).

Moreover, the study's findings resonate with the work of Fahimeh Hassani et al. (2019), supporting the premise that interventions like SPARK and FMS can effectively improve motor skills alongside social skills in children with ASD (30). This is further corroborated by studies on combat sports, indicating that physical activity-based interventions, requiring focus and control, can significantly reduce stereotypical behaviours and enhance social interaction in children with ASD (31).

However, the study's scope, limited to a single-centre and focusing predominantly on the motor aspects of ASD, suggests a need for more comprehensive, randomized controlled trials in diverse settings. Such research would provide a more robust understanding of the long-term effects and broader applications of these programs. The study's reliance on short-term outcomes and a closed environment also underscores the necessity of exploring these interventions in more naturalistic settings to better gauge their effectiveness (32).

CONCLUSION

In conclusion, the study strongly suggests that both SPARK and FMS programs are beneficial in improving communication and social interaction skills in children with ASD. These findings hold substantial clinical implications, advocating for the incorporation of physical activity-based interventions in treatment plans for children with ASD. They highlight the multifaceted nature of interventions necessary for treating ASD and call for future research to explore the long-term impacts and broader applicability of these programs in varied settings.

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