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EVALUATING UGOPA TRAINING OUTCOMES ON GROSS MOTOR ABILITIES AND CLASSROOM BEHAVIOUR IN CHILDREN WITH AUTISM

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Abstract
Barriers to physical activity, and Classroom behaviour are mostly experienced by the children with autism spectrum disorder (ASD). It also affects the communal and educational developments of the children. The way the gross motor (GM) abilities, and behavioural outcomes of ASD children are improved by the impact of Unified Goal-Oriented Physical Activity (UGOPA) training are analyzed in this study. The experimental group (EG) and the control group (CG) are 2 groups that are formed using 18 boys with high-functioning autism, ages 7 to 11. For14-weeks, structured UGOPA program was received by the EG, and there was no specialized intervention received by the CG. For balance, Stork Balance Test, and for coordination, Plate Tapping Test, and for behavioural analysis, Autism Social Skills Profile-2 (ASSP-2) are the assessments that are used. From the outcomes, children who received UGOPA training has some remarkable developments in the balance, coordination, and social behaviours. A notable decrease in disruptive behaviours are also highlighted by the outcomes. There are non-significant changes in the CG. The motor abilities are improved by the UGOPA training, and the social functioning and classroom behaviour are also improved by this UGOPA training, as per the findings. Then, a potent, evidence-based intervention for children with ASD in their behavioural and physical development are facilitated by the UGOPA and other structured physical activity programs. The ASD affected children are greatly benefited from the structured physical exercise programs, and it is the main emphasis of the study. Thus, the significance of integrating such interventions within educational and therapeutic settings are also highlighted in this study.

Keywords: Autism, Gross Motor Skills, Classroom Behaviour, Unified Physical Activity, Goal Oriented Training.

1. Introduction

A neurodevelopmental disorder named ASD have the following features: repetitive habits, communication problems, and social interaction deficits [1]. In the classroom, the behavioural and motor coordination issues are mostly faced by the ASD affected children. This ASD also impacts the ASD affected children's overall social and academic development [3].

GM skills are crucial for performing daily activities like walking, running, and jumping. These GM skills are lacking in ASD affected children when compared to neurotypical peers [8]. Then, the academic and social interactions of the ASD affected children are greatly impacted by their behavioural issues in classroom activities like inattention, impulsivity, and difficulty in following instructions [2]. Several strategies are explored by the researchers for the purpose of enhancing motor development and classroom behaviour among children with ASD, and it also support in addressing those challenges. Integrating structured, goal-oriented unified physical activities has become an effective method. This effective method may facilitate the ASD affected children in improving their physical and behavioural activities.

Physical activity has a significant positive impact on the motor skills and behavioural outcomes of ASD affected children [4]. It is established that motor coordination, foster

engagement, motivation, and compliance are promoted by the goal-oriented activities structured exercises with clear objectives [11]. The general communication, teamwork, and shared experiences are facilitated by the unified physical activities, as it includes both ASD affected children and neuro typical peers [6]. The positive behavioural outcomes may result from these inclusive settings, and it will also promote cooperative play, social engagement, and improved emotional regulation [12]. Notwithstanding the possible advantages, little study has been done on how goal-oriented and integrated physical activities affect children with ASD's GM abilities and conduct in the classroom.

Numerous studies have demonstrated the beneficial effects of physical activity regarding the behavioural and cognitive outcomes of ASD affected children. As an illustration, [11] highlighted the role of structured exercise programs in enhancing motor skills, while [6] discussed the social benefits of inclusive physical activities. Furthermore, [4] offered proof of its beneficial effects on ASD affected children's mental health and self-regulation. Despite these findings, research gaps remain regarding the integration of goal-oriented and unified physical activities as a combined intervention. Most existing studies either focus solely on motor skill development or behavioural improvements, failing to investigate their interconnected effects comprehensively [7].

Lack of studies regarding impacts of improved GM skills in classroom behavior has become the major gap. For participating physical activities, enhanced motor function is crucial. But, no research has been done on enhanced motor functions impacts on attentional control, self-regulation, and classroom engagement [9]. Additionally, prior studies have mostly concentrated on short-term (ST) interventions, offering little understanding of how structured physical activities affect behavioural and motor outcomes over the long term (LT) [5]. The creation of focused therapies for children with ASD will be aided by addressing all these research gaps. A more thorough comprehension of the impacts of goal-oriented, coordinated physical activities will result from this [14].

Investigating the effects of goal-oriented, integrated physical activities on the GM abilities and classroom behaviour of ASD affected children has become the main focus of this study [15]. Specifically, the study seeks to examine whether participation in structured goal-oriented unified physical activities leads to improvements in GM skills among ASD affected children, evaluate the effects of these activities on classroom behaviour, including attention, self-regulation, and social engagement, assess the relationship between motor skill development and classroom behaviour to determine whether improvements in motor function translate to better academic and social outcomes. This study offers empirical support for the advantages of including structured physical activities in intervention programs for ASD affected children, which can be used by educators, therapists, and policymakers [16]. This study intends to fill up the current research gaps and provide important new information about how physical activity supports the overall development of children having ASD by addressing these goals.

2. Methods

2.1 Participation and Procedures

Purposive random sampling (RS)was used for selecting nine typically developed children and eighteen high functioning boy autistic children (N=18) in order to fulfil the study's objectives. The age range of this subject was 7–11 years old. Goal Oriented Physical Activity is independent Variable and Fundamental movements of gross motor skills such as Balance was measured by Stroke Balance Test and coordination was measured Plate Tapping Test, Classroom Behaviour (Social/Emotional Reciprocity and Social Participation/Avoidance

(SER/SPA), and Detrimental Social Behaviour (DSB)) was measured by Autism Social Skill Profile (Scott Bellini, 2006) are the dependent Variable. In this study, 18 autistic children were chosen using the purposive RS technique method after completing a pre-test (the researcher measured the motor test and the class teacher filled out the questionnaire). They were then arbitrarily allocated to one of 2 groups: The UGOPA Group (UGOPA=9), which participated in UGOPA activities like partner minor games on Mon, Wed, and Fri, and team minor games on Tue, Thu, and Sat. No specialised training was given to the CG for 14 weeks (6 days a week, 45 minutes a day).

No particular skill test was administered to typically developed children. The significant variance among the pre and post-tests are effectively determined via the application of t-ratio. A post-test was administered 14 weeks into the training period [17].

2.2 Measures

Standing barefoot on one leg and balancing on the ball of the foot for as long as feasible is how the Stork Balance Test assesses general body balance. The participant exerts pressure on the inner knee of the supporting leg with the non-supporting foot during this assessment after removing their shoes and placing their hands on their hips. While keeping their balance on the ball of their foot, the test-taker raises their heel, the stopwatch begins to record [18]. The timer stops if the bearing foot skips or leaps, the raised foot fall out the knee, the heel touches the floor, or the hands are removed from the hips. The time, measured in seconds (s), is recorded, and the best of three trials is used as the final score. Excellent (>50 s), Good (40–50 s), Average (25–39 s), Fair (10–24 s), or Poor (<10 s) are the four performance-based ratings for balance ability.

Quick, alternating taps to assess hand-eye coordination, quickness, and upper body reaction time are used by the Plate Tapping Test, sometimes referred to as the Reaction Tap Test. Its objective is to assess limb movement coordination and speed. A rectangle (30 x 20 cm), two yellow discs (20 cm in diameter), a table (ideally adaptable), and a stopwatch are needed for the test. Before starting, the subject is briefed on the procedure, informed consent is obtained, and key personal details like age, height, weight, and gender are recorded [19]. During the test, the table is adjusted for comfort, and the two discs are placed 60 cm apart with the rectangle centred between them. Using their dominant hand, the participant alternately taps each disc over the stationary hand for 25 complete cycles (50 taps) while placing their non-dominant hand on the rectangle. The final score is determined by measuring the amount of time needed to finish the task and recording the best of two trials.

The ASSP-2 is a tool employed for assessing social skills in individuals with ASD by analysing behaviours in three key areas: social/emotional reciprocity SER, social participation/avoidance SPA, and detrimental social behaviours DSB. The SER subscale examines how well an individual engages in reciprocal social interactions, including their ability to initiate and respond to social cues [20]. The SPA subscale assesses the individual's willingness to take part in or avoid social situations, while the DSB subscale focuses on behaviours that may hinder social interaction, such as impulsivity, aggression, or misunderstanding social cues. Raw scores are computed for each subscale and the overall profile after each behaviour is rated on a 4-point Likert scale (Never, Sometimes, Often, Very Often). These raw scores can then be converted into standard scores (mean (M) of 100, standard deviation (SD) of 15) for comparison with normative data. Higher scores in SER and SPA reflect stronger social abilities, with ranges between 118–144 indicating minimal deficits and 36–63 pointing to significant challenges. In contrast, lower scores in the DSB subscale represent fewer disruptive behaviours, with scores between 13–23 suggesting minimal issues

and 43–52 indicating more severe deficits. The total score provides a comprehensive view of an individual's social functioning, and the profile is instrumental in identifying areas needing targeted intervention to improve social skills.

3. Results

The training impact was examined using the t ratio. It shows how the pretest and posttest differ significantly. To evaluate the importance of the generated results, the alpha level was set at the 0.05 level of confidence.

To determine whether training had a significant impact on both groups, the "t" ratio was used. Table 1 presented it.

Table 1. Showing Obtained Mean Values for the Selected Variables

Factors	Variable	Group	Test	M	SD	SEM	T ratio
Motor Skills	Balance	Experimental	Pre test	9.00	0.866	0.289	**22.136***
			Post test	32.33	2.958	0.986	
		Control	Pre test	7.89	1.616	0.539	0.887
			Post test	8.44	1.236	0.412	
	Coordination	Experimental	Pre test	3.65	0.402	0.134	**9.584***
			Post test	2.33	0.509	0.169	
		Control	Pre test	3.75	0.394	0.131	2.228
			Post test	3.53	0.298	0.099	
Classroom Behaviour	Social/ Emotional Reciprocity (SER)&Social Participation/Avoidance(SPA)	Experimental	Pre test	42.22	2.863	0.954	**45.220***
			Post test	119.00	2.915	0.972	
		Control	Pre test	39.33	3.969	1.323	1.782
			Post test	50.44	1.590	0.530	
	Detrimental Social Behaviours (DSB)	Experimental	Pre test	57.00	4.243	1.414	**19.204***
			Post test	19.89	3.551	1.184	
		Control	Pre test	47.33	1.581	0.527	0.590
			Post test	46.67	3.775	1.258	

*Table value 2.306 Significant at 0.05 level of confidence 1and 8.

3.1 Analytical Discussion

Motor abnormalities are significantly more prevalent among individuals with ASD, with the risk being 22 times higher than in typically developing populations. This risk further increases by 5 to 5.7 times as repetitive behaviours and social impairments intensify [10]. Research suggests that autistic children often exhibit a delay in motor skills, trailing behind their peers by approximately one year [13]. In this context, the data demonstrates a compelling impact of the UGOPA training on both motor development and classroom behaviour in children within the experimental group than the control group.

3.1.1 Motor Skills

Balance

In terms of balance, from a pre-test mean of 9.00 to a post-test mean of 32.33, those who received the intervention showed a substantial increase. The dramatic improvement is statistically confirmed by a *t*-value of 22.136, well above the critical value of 2.306 at the 0.05 significance level. This sharp rise suggests that the intervention effectively enhanced postural control, dynamic stability, and motor planning, which are often areas of difficulty for ASD

children. In contrast, the CG exhibited only a marginal gain in balance (from 7.89 to 8.44), which was not statistically meaningful.

Coordination

A similar pattern was observed in coordination. Meanwhile, the coordination variable also showed marked progress. The decrease in the time (indicating improvement) from 3.65 to 2.33 in the experimental group indicates improved motor sequencing and hand-eye coordination, which are critical for performing everyday tasks such as writing, dressing, and object manipulation. The high *t*-value (9.584) validates this change as statistically significant. These outcomes are not mirrored in the CG, where the slight improvement (from 3.75 to 3.53) did not reach statistical significance. This disparity highlights that natural maturation or routine classroom activities alone are insufficient to bring about such developmental gains. The CG, however, exhibited minimal change with a non-significant improvement.

3.1.2. Classroom Behaviour

SER and SPA

In the domain of classroom behaviour, particularly the subscales of SER and SPA, children in the experimental group moved from a baseline of 42.22 to a post-intervention score of 119.0. The exceedingly high *t*-value of 45.220 illustrates that the changes were not only statistically significant but also practically meaningful. Such gains suggest that the program may have helped children to initiate and maintain peer interactions, respond appropriately to social cues, and reduce social withdrawal. Comparatively, the control group recorded a modest improvement, lacking statistical significance.

Detrimental Social Behaviours (DSB)

Regarding Detrimental Social Behaviours (DSB), the EG showed a remarkable reduction from M of 57.00 to 19.89, with a *t*-value of 19.204 suggesting a reduction in problematic behaviours post-intervention. This shift points to a reduction in behaviours such as aggression, tantrums, or self-injury, which are often challenging for caregivers and educators to manage. Then, the CG's scores remained nearly static (47.33 to 46.67), signifying that no meaningful behavioural improvement occurred in the absence of targeted intervention, implying no real impact from external factors.

The highly substantial *p*-values over all domains affirm the consistency and strength of these effects. These improvements may have a meaningful impact on the participants' overall development and integration in structured settings. Collectively, the EG outperformed the CG in all variables, and all improvements were statistically significant. The uniformity of positive outcomes across physical and behavioural domains suggests that the intervention was holistic in nature and targeted multiple developmental needs. The lack of significant gains in the CG confirms that the changes observed in the EG were a direct result of the intervention and not due to external variables or chance.

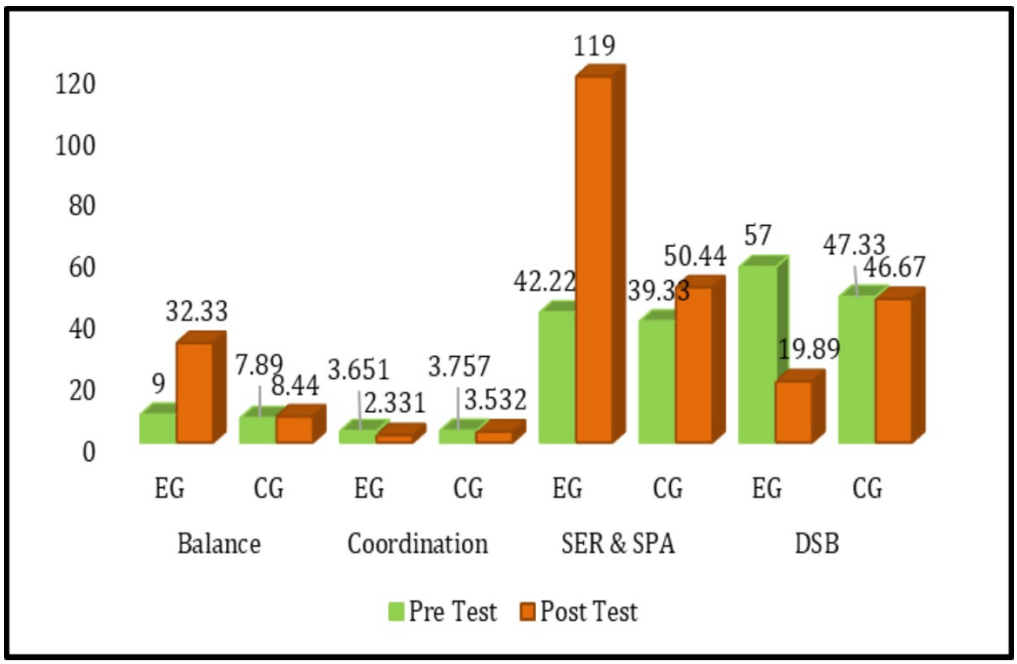

Figure 1. Graphical illustration shows the pre and post-test mean values of EG and CG

4. Conclusion

The findings underscore the effectiveness of the intervention program in enhancing motor functions and behavioural outcomes among children with autism. Substantial improvements were seen in balance and coordination in the experimental group, while negligible gains were found in the control group. It clearly establishes the efficacy of the UGOPA training in enhancing both motor and behavioural abilities in ASD affected children. Developments in balance and coordination suggest that the program successfully addressed core motor deficits commonly observed in this population. These physical enhancements are vital for promoting independence and participation in academic and daily activities. On the behavioural front, the significant rise in social engagement scores and the reduction in problematic behaviours underscore the program's ability to facilitate meaningful improvements in classroom functioning. Enhanced social reciprocity and reduced avoidance behaviour indicate better peer interaction and adaptability in structured settings. Likewise, a significant drop in detrimental behaviours suggests improved emotional regulation and reduced behavioural disruptions. Additionally, children who received the training demonstrated better social engagement and reduced negative behaviours in the classroom setting. The results provide robust evidence that targeted, structured training programs can have a profound effect not only on motor development but also on social-emotional outcomes. These benefits go beyond statistical significance; they translate into improved quality of life for the children and make classroom environments more inclusive and manageable. The contrast between the EG and CG reinforces the conclusion that such outcomes are not incidental but are the direct result of systematic intervention. Therefore, the study validates the integration of multi-domain intervention models within special education settings, reinforcing the importance of addressing both physical and behavioural aspects concurrently. The consistency in the experimental group's progress across all assessed variables supports the argument that when interventions are well-designed and implemented, they can significantly narrow developmental gaps in children with autism.

5. Recommendations

Training for Educators: Teachers and facilitators should be trained to deliver such interventions effectively to ensure consistent and optimal outcomes. Parental Involvement: Encouraging parent participation in the intervention process can reinforce the skills learned and ensure continuity beyond the classroom. Integration into Curricula: Schools and therapy centres should incorporate structured motor skill and behavioural training as part of their educational programs for children with autism. Extended Program Duration: Implementing the intervention over a longer period may yield even greater improvements in both physical coordination and behavioural adaptation. Further Research: The intervention's long-term effects, age-group variances, and effects when paired with other therapeutic modalities could all be investigated in future research.

Authors Contribution

P. Priyadharsni: Methodology, Data collection, Writing – original draft
S. Akilandeswari: Supervision, Data interpretation, Writing – review & editing
C. Sabarish: Data collection and analysis, Writing – review & editing

Ethical Clearance

Ethical clearance for this study was permitted by Avinashilingam Institute Human Ethical Committee, Coimbatore.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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