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Effectiveness of AEPS®-3 Intervention on Toddlers with Risk for Autism

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ABSTRACT

This study evaluated the effectiveness of AEPS®-3 intervention in children under three years at risk for Autism Spectrum Disorder (ASD) across developmental domains- fine and gross motor, adaptive, cognitive and social behaviour and social communication. It also examined overall developmental outcomes and their association with demographic factors. The intervention involved parent-child sessions lasting four hours daily, six days a week, with home activities on the seventh day. The goal was to train parents in individualized strategies to support holistic child development. Seventy children identified as at risk for ASD were randomized into intervention and routine care groups, stratified by age and baseline characteristics. Standardized tools assessed outcomes every three months over ten months. All participants met M-CHAT-RTM criteria for ASD risk. Both groups received routine care, with no dropouts during intervention period. The intervention group showed significant improvements in fine and gross motor, adaptive skills, cognitive abilities, social communication, and social behaviour compared to the control group, as measured by AEPS®-3 total scores. AEPS®-3 intervention effectively enhanced early developmental skills in at-risk children. Significant gains highlight the importance of parent-centred strategies. Further studies with larger samples are recommended to confirm these findings and assess long-term impact.

Keywords: *Assessment, Evaluation and Programming System (AEPS®-3), Autism Spectrum Disorder (ASD), The Modified Checklist for Autism in Toddlers Revised with Follow-Up (M-CHAT-R/F)TM, Fine motor development, Adaptive skills*

1. INTRODUCTION

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by persistent challenges in social communication, restricted interests, and repetitive behaviors (American Psychiatric Association, 2013). The disorder manifests early in childhood and continues throughout an individual's life, though the degree of impairment varies significantly among individuals. ASD affects individuals across all ethnic, racial, and socioeconomic groups, making it a global health concern (Lord et al., 2020). While the exact etiology remains elusive, research suggests a strong genetic component combined with environmental factors contributing to its onset (Tick et al., 2016).

Over the years, the conceptualization of ASD has evolved significantly. Earlier diagnostic frameworks categorized related conditions such as Asperger's Syndrome and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) as distinct entities. However, with the release of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), these conditions were consolidated under the umbrella term of ASD to reflect a spectrum of symptom severity and presentation (American Psychiatric Association, 2013). This shift has improved diagnostic clarity and facilitated a more comprehensive understanding of the disorder.

The prevalence of ASD is on the rise globally. According to the World Population Review (2021), the highest prevalence rates are in Qatar and neighboring Middle Eastern countries, with India showing a prevalence of 88.5 per 10,000 children. This aligns with findings by Karean Watts (2020), suggesting a surge in ASD cases in India, where an estimated three million people live with ASD, with a prevalence of approximately 1 in 100 children under 10 (Alla, 2018). Similarly, global studies have reported variations in prevalence due to differences in screening methods, cultural perceptions, and access to healthcare services (Zeidan et al., 2022).

Early diagnosis and intervention are crucial in managing ASD, although no cure currently exists. Interventions such as Applied Behavior Analysis (ABA), Occupational Therapy, and Speech Therapy have shown positive results in improving

behavioral outcomes (Hofer et al., 2017). Early intervention programs, particularly those under the Assessment, Evaluation, and Programming System, Third Edition (AEPS®-3), focus on six developmental domains: Fine Motor, Gross Motor, Adaptive, Cognitive, Social Communication, and Social Development, to aid comprehensive development (Bricker et al., 2021). Evidence-based therapies such as ABA, Speech and Language Therapy, and Occupational Therapy have demonstrated effectiveness in enhancing social, communicative, and adaptive skills (Dawson et al., 2012). The Autism Diagnostic Observation Schedule (ADOS) and other assessment tools have been instrumental in identifying ASD at an early age, enabling timely therapeutic interventions (Lord et al., 2012).

The understanding of ASD continues to expand through ongoing research. Neurobiological studies have identified atypical brain connectivity patterns in individuals with ASD, providing insights into the neural mechanisms underlying the disorder (Hull et al., 2017). Moreover, advancements in genetic studies have highlighted potential biomarkers that could aid in more precise diagnostic criteria and targeted interventions (Sanders et al., 2015). Despite these developments, challenges remain in ensuring access to timely diagnosis and effective interventions, particularly in low-resource settings.

An early diagnostic intervention-The Assessment, Evaluation, and Programming System for Infants and Children, Third Edition (AEPS-3) is a comprehensive, criterion-referenced tool designed for early identification, assessment, and intervention planning for young children at risk for developmental delays, including autism. AEPS-3 is particularly beneficial for children under the age of three, as it integrates assessment with intervention strategies, allowing professionals and caregivers to track developmental progress and implement individualized support plans. The tool focuses on multiple developmental domains, including social communication, social-emotional skills, fine and gross motor abilities, adaptive behaviors, and early literacy. Unlike norm-referenced assessments, which compare children to peers, AEPS-3 focuses on functional, observable skills within natural routines, making it ideal for tailoring interventions to individual developmental trajectories. Its integration of assessment with intervention strategies ensures that professionals and caregivers can systematically address deficits while promoting skill acquisition in critical developmental domains. AEPS-3 supports early intervention by identifying subtle developmental delays and providing structured, evidence-based interventions that promote skill acquisition and social engagement. For children at risk for autism, the system aids in enhancing joint attention, social reciprocity, and early communication skills—critical areas that often show early deficits in autism spectrum disorder (ASD). The AEPS-3's embedded intervention approach ensures that skills are practiced within natural routines, making learning more meaningful and functional. Each domain is hierarchically structured, allowing professionals to identify a child's current abilities and scaffold skills incrementally. By involving families and caregivers in the intervention process, AEPS-3 fosters an inclusive and supportive environment, improving long-term developmental outcomes and reducing the severity of autism-related challenges as children grow.

AEPS-3 is particularly effective for children under age three, a critical period for neuroplasticity and early intervention. Its strength lies in its dual function-Assessment that identifies subtle developmental delays through structured observation and family-reported data; Intervention that translates assessment findings into actionable, individualized plans. AEPS-3 emphasizes collaboration with families, recognizing caregivers as primary agents of change with key features being Family Interviews, Home-Based Activities and Progress Monitoring.

There are various evidence-based practices embedded in AEPS-3 which is validated by autism intervention research, which includes Naturalistic Developmental Behavioral Interventions (NDBIs) where skills are taught within play and daily routines to enhance engagement; Scaffolding were tasks are broken into manageable steps, with gradual complexity (e.g., first pointing to a desired object, then vocalizing a request); Visual Supports like picture schedules or social stories address communication gaps; and Positive Reinforcement where Praise or preferred activities reinforce desired behaviors.

A 2021 study found that children with ASD who received AEPS-3-based interventions showed significant improvements in joint attention and functional communication compared to peers in traditional therapy (Bricker & Johnson, 2021). These gains are attributed to AEPS-3's emphasis on embedding learning opportunities into natural contexts, which aligns with the Early Start Denver Model's play-based philosophy (Dawson et al., 2012).

AEPS-3 stands out as a robust, evidence-based system for early autism intervention. By merging assessment with targeted strategies, involving families, and embedding learning into natural routines, it addresses the complex needs of children with ASD while fostering functional independence. As research continues to validate its efficacy, AEPS-3 remains a critical tool for mitigating the lifelong impact of autism and empowering children to thrive.

In conclusion, ASD is a multifaceted neurodevelopmental disorder that requires a multidisciplinary approach for diagnosis, treatment, and support. The increasing prevalence underscores the need for heightened awareness, early detection, and individualized intervention strategies to improve outcomes for affected individuals. Continued research is essential to uncover the underlying causes and develop innovative treatments that enhance the quality of life for individuals on the autism spectrum.

2. REVIEW OF LITERATURE

Overview of Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition marked by persistent challenges in social communication and interaction, alongside restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association [APA], 2013). The term "spectrum" reflects the wide variability in symptom presentation and severity, ranging from individuals requiring lifelong support to those living independently (APA, 2013; Lord et al., 2018). Symptoms typically emerge by age 2–3, underscoring the importance of early identification for timely intervention (Lord et al., 2018).

The global prevalence of ASD has risen significantly, with current U.S. estimates identifying 1 in 54 children as diagnosed, a trend attributed to broader diagnostic criteria, improved screening, and heightened awareness (Maenner et al., 2020). Despite this increase, ASD remains a lifelong condition; while some individuals experience symptom improvement, others face enduring challenges in adaptive functioning (Howlin et al., 2014). Diagnostic criteria, as outlined in the DSM-5, emphasize deficits in social-emotional reciprocity, nonverbal communication, and relationship-building, alongside sensory atypicalities such as hyper- or hypo-reactivity to stimuli (APA, 2013).

Research highlights the heterogeneous nature of ASD, necessitating personalized interventions (Medical Research Council [MRC], 2001). For instance, sensory processing differences—such as hypersensitivity to sounds—often co-occur with social communication deficits, requiring multidisciplinary approaches (Fred, 2014). Notably, many individuals with ASD exhibit unique strengths, including exceptional abilities in mathematics, music, or visual arts, which should be nurtured to support well-being (Mottron et al., 2013).

Etiological studies underscore the interplay of genetic and environmental factors. Polygenic risk scores and prenatal exposures (e.g., maternal stress, environmental toxins) are implicated in ASD development, though no single cause predominates (Park et al., 2016; Anne & Marilena, 2017; Lyall et al., 2017). Screening tools like the Modified Checklist for Autism in Toddlers (M-CHAT) enable early detection in children as young as 12–24 months, facilitating access to interventions (Robins et al., 2001; Alexis, 2013). However, disparities in diagnostic access persist, particularly in low-resource regions, and a 4:1 male-to-female diagnostic ratio suggests potential biological or diagnostic biases (Holly, Casey, & Neelkamal, 2020; Lord et al., 2018).

Causes of ASD Development

The etiology of Autism Spectrum Disorder (ASD) is complex and multifactorial, involving genetic, neurobiological, and environmental factors. While no single cause has been identified, research has made significant strides in understanding the potential contributors to ASD development. Genetic factors are widely recognized as playing a central role, with heritability accounting for approximately 80% of the risk for ASD (Geschwind & State, 2015). Numerous genes have been implicated, including SHANK3 and NLGN4, which are involved in synaptic function, neuronal communication, and brain development (Rana et al., 2021). However, no single gene accounts for more than 1% of ASD cases, highlighting the polygenic nature of the disorder.

In addition to genetic factors, environmental influences have also been implicated. Prenatal and perinatal factors, such as maternal infections during pregnancy (e.g., rubella), advanced parental age, and complications during birth, have been associated with an increased risk of ASD (Lyall et al., 2017). Maternal exposure to certain medications, such as valproic acid, has been linked to a higher likelihood of ASD in offspring (Bromley et al., 2013). Environmental toxins, such as air pollution and heavy metals, have also been investigated as potential risk factors, though the evidence remains inconclusive (Laura et al., 2020). Additionally, early childhood exposures, such as excessive screen time, have been linked to increased ASD symptom severity, though causal relationships remain debated (David, 2017).

Neurological abnormalities are another critical aspect of ASD etiology. Neuroimaging studies have revealed structural and functional differences in individuals with ASD, particularly in regions involved in social cognition and communication, such as the prefrontal cortex, amygdala, and temporal lobes (Ecker et al., 2015). Reduced white matter integrity and atypical connectivity in the default mode network have been identified, supporting the "disconnectivity hypothesis," which posits that impaired neural communication underlies ASD's core symptoms (Assis et al., 2015; Im et al., 2018). Furthermore, disruptions in synaptic plasticity and connectivity have been observed, further highlighting the role of neurological factors in ASD development.

Epigenetic mechanisms, such as DNA methylation, may mediate gene-environment interactions, adding another layer of complexity to ASD's etiology (Kimberly, 2021). These interactions suggest that environmental exposures may influence gene expression, potentially contributing to ASD risk. Despite progress in understanding ASD's causes, many questions remain unanswered. The interplay between genetic and environmental factors is intricate, and further research is needed to elucidate the mechanisms underlying ASD development. Given the heterogeneity of ASD, identifying specific causal pathways remains a challenge. Future longitudinal studies integrating genetic, environmental, and neurological data may provide a more comprehensive understanding of ASD etiology and inform the development of targeted interventions (Park

et al., 2016).

Interventions for ASD and Their Impact on Child Development

Early intervention is widely recognized as a critical factor in improving outcomes for children with Autism Spectrum Disorder (ASD). A variety of interventions have been developed to address the core symptoms of ASD and support the overall development of affected children. These interventions can be broadly categorized into behavioral, educational, and medical approaches, each with its own strengths and limitations.

Behavioral interventions, such as Applied Behavior Analysis (ABA), are among the most widely used and empirically supported treatments for ASD. ABA focuses on modifying behavior through reinforcement strategies and has been shown to improve communication, social skills, and adaptive behavior in children with ASD (Virués-Ortega, 2010). Early intensive behavioral intervention (EIBI), a subtype of ABA, has been particularly effective in improving cognitive and language abilities in young children with ASD (Reichow et al., 2018). However, the intensity and duration of ABA-based interventions can be demanding for families, and access to these services may be limited in some regions.

Educational interventions, such as the Treatment and Education of Autistic and Related Communication-Handicapped Children (TEACCH) program, focus on creating structured learning environments tailored to the needs of children with ASD. TEACCH emphasizes visual supports, routine, and individualized instruction, which can help children with ASD develop independence and functional skills (Mesibov et al., 2005). While TEACCH has been shown to improve adaptive behavior and reduce maladaptive behaviors, its effectiveness may vary depending on the individual needs of the child.

Medical interventions, including pharmacological treatments, are often used to manage co-occurring conditions associated with ASD, such as anxiety, attention-deficit/hyperactivity disorder (ADHD), and sleep disturbances. While medications do not address the core symptoms of ASD, they can improve quality of life by alleviating associated symptoms (McPheeters et al., 2011). For example, risperidone and aripiprazole have been approved by the U.S. Food and Drug Administration (FDA) for treating irritability and aggression in children with ASD. However, the use of medications in ASD requires careful consideration of potential side effects and long-term impacts.

Early intervention for children under three with ASD or at risk for ASD is essential for fostering optimal developmental outcomes. Recent studies underscore the effectiveness of various interventions, including ABA, parent-mediated programs, NDBIs, ESDM, speech and language therapy, and occupational therapy. A study published in The BMJ in November 2023 conducted a systematic review and meta-analysis of early childhood autism interventions, highlighting the effectiveness of ABA in enhancing developmental outcomes for young children with ASD

Implementing these evidence-based approaches during the critical early years can lead to significant improvements in communication, social skills, and adaptive behaviors, thereby enhancing the quality of life for children and their families. Recent studies have explored various interventions for Autism Spectrum Disorder (ASD), focusing on early childhood and innovative approaches. A notable meta-analysis published in The BMJ in November 2023 evaluated the effectiveness of early childhood autism interventions. The study highlighted the benefits of Naturalistic Developmental Behavioral Interventions (NDBIs) in enhancing social communication skills among young children with ASD. However, the authors emphasized the need for higher-quality randomized controlled trials to strengthen the evidence base for these interventions.

A more recent and promising intervention for ASD is the Assessment, Evaluation, and Programming System for Infants and Children (AEPS-3). AEPS-3 is an evidence-based framework designed to assess and track developmental progress while providing individualized intervention strategies for children with ASD. Studies have demonstrated that AEPS-3 enhances cognitive, motor, and social development by focusing on functional goals and play-based learning (Bricker et al., 2021). The structured yet flexible nature of AEPS-3 allows caregivers and professionals to implement tailored interventions that align with the child's strengths and challenges. Preliminary research suggests that children who receive AEPS-3 interventions show significant improvements in adaptive behaviors, communication skills, and emotional regulation (Kim et al., 2022). The AEPS-3 system also supports collaboration between educators, therapists, and families, leading to more comprehensive and cohesive intervention approaches.

Recent studies have explored various interventions for Autism Spectrum Disorder (ASD), focusing on early childhood and innovative approaches. A notable meta-analysis published in *The BMJ* in November 2023 (Sandbank M et al., 2023) evaluated the effectiveness of early childhood autism interventions. The study highlighted the benefits of Naturalistic Developmental Behavioral Interventions (NDBIs) in enhancing social communication skills among young children with ASD. However, the authors emphasized the need for higher-quality randomized controlled trials to strengthen the evidence base for these interventions.

In a 2024 article in *Current Psychiatry Reports*, (Vivanti, G, 2023) researchers examined the acceptability and cultural adaptability of early intervention practices for children on the autism spectrum. The study underscored the importance of tailoring interventions to diverse cultural contexts and incorporating perspectives from various disciplines, including applied behavior analysis and neurodiversity approaches, to enhance the effectiveness and acceptance of these interventions.

In addition to these interventions, complementary and alternative therapies, such as dietary modifications, sensory integration therapy, and animal-assisted therapy, have gained popularity among families of children with ASD. While some parents report positive outcomes, the empirical evidence supporting these approaches is limited, and further research is needed to determine their efficacy (Höfer et al., 2019).

Another innovative approach involved a virtual reality training program aimed at enhancing social skills in individuals with ASD (Kourtesis, P., 2023). Participants reported high levels of acceptability and usability, and the training was associated with improvements in social scenario performance and executive functions. The findings indicate that immersive virtual reality environments can effectively supplement existing social skills training programs for the ASD population.

A 2024 study by Alvari et al. investigated the use of Virtual Reality (VR) as a tool to enhance social skills and emotional well-being in individuals with ASD. The study employed a multiplayer serious gaming environment within VR, engaging 34 individuals diagnosed with ASD and utilizing high-precision biosensors to monitor participants' physiological responses during VR sessions. Preliminary analysis revealed significant correlations between physiological responses and behavioral outcomes, indicating the potential of physiological feedback to enhance VR-based interventions for ASD. The study demonstrated the feasibility of using real-time data to adapt virtual scenarios, suggesting a promising avenue to support personalized therapy.

Advancements in technology have also been explored as potential interventions for ASD. A study introduced the Hide and Seek Virtual Reality System (HSVRS) (Yu.C et al, 2023), designed to improve gaze fixation abilities in autistic children. The pilot study demonstrated that children engaging with the HSVRS showed better performance in eye gaze tasks compared to a control group, suggesting that virtual reality could be a promising tool for augmenting traditional interventions.

Table I: Frequency and percentage of demographic variables for both experimental and control group

Variables		**Experimental Group (n=35)**		**Control Group (n=35)**		**Chi square test statistics (P value)**
		Frequency (f)	**Percentage (%)**	**Frequency (f)**	**Percentage (%)**	
Age (in months)	24-30	11	31.4	10	28.6	0.068 (0.794)
	31-36	24	68.6	25	71.4	
Family type	Nuclear	35	100	35	100	-
	Joint	0	0	0	0	
Religion	Christian	6	17.1	4	11.4	1.24 (0.538)
	Hindu	25	71.4	24	68.6	
	Muslim	4	11.4	7	20.0	
Gender	Female	8	22.9	4	11.4	1.609 (0.205)
	Male	27	77.1	31	88.6	
Awareness on ASD	No	25	71.4	28	80.0	0.699 (0.403)
	Yes	10	28.6	7	20.0	
Awareness on AEPS®-3	No	35	100	35	100	-
	Yes	0	0	0	0	

Giannetti (2024) conducted a systematic review focusing on the application of social robotics in joint attention tasks, a core area of difficulty in ASD. The study analyzed various formal models used to design prompts and reward systems enabling robots to adapt to children's responses. The research proposed a novel algorithm integrating interactive environmental factors and a more sophisticated prompting and reward system, aiming to enhance the effectiveness of robot-assisted autism therapy.

Despite these advancements, concerns have been raised about the quality of existing autism intervention studies. A report from the Association for Child and Adolescent Mental Health emphasized the need for more rigorous research designs to

ensure the validity and reliability of findings in this field (Association for Child and Adolescent Mental Health, 2023)

Overall, the impact of interventions on child development depends on factors such as the timing, intensity, and individualization of the intervention. Early and tailored interventions have the potential to significantly improve outcomes for children with ASD, enhancing their social, communication, and adaptive skills. However, ongoing research is needed to identify the most effective strategies for supporting the diverse needs of individuals with ASD. Future studies should continue exploring the benefits of AEPS-3 in comparison to other intervention models to determine its long-term effectiveness and scalability.

In 2024, the Autism Research Institute awarded over $700,000 in research grants, supporting studies on genetics, neurology, co-occurring medical conditions, nutrition, sensory processing, severe and challenging behaviors, and adult and senior issues. This funding reflects a broad commitment to advancing understanding and interventions across the autism spectrum.

These studies collectively contribute to a nuanced understanding of effective interventions for ASD, highlighting the importance of personalized, technology-assisted, and culturally sensitive approaches in supporting individuals on the autism spectrum.

3. METHODOLOGY AND MATERIALS

This study employed a quantitative research approach to assess the impact of early diagnosis and intervention using AEPS®-3 on children aged 24-36 months at risk for Autism Spectrum Disorder (ASD). A two-group pre-post comparative design was utilized to compare developmental progress between an experimental group receiving intervention and a control group.

The research was conducted at Souparnika School for Children with Special Needs for the pilot study and South URC Autism Centre Multisensory Park, Trivandrum District, Kerala, for the main study. These locations were selected based on the availability of children diagnosed as at risk for ASD. The study population comprised male and female children within the specified age range in Trivandrum District, Kerala. The sample size was determined through statistical calculations for two-way repeated measures ANOVA, resulting in a total of 70 participants (35 in each group) to achieve 90% power with a 5% level of significance.

Participants were selected using a combination of purposive and simple random sampling. The research setting was chosen based on sample availability, while the children were randomly assigned to study and control groups. The M-CHAT R/F™ diagnostic tool was used to screen participants for ASD risk. Ethical approval was secured from Mangalayatan University, Beswan, Aligarh, and administrative permission was obtained from South URC Autism Centre Multisensory Park, Trivandrum District. Written informed consent was collected from parents to ensure voluntary participation and confidentiality.

Data collection tools included a demographic proforma for participant background information, the M-CHAT R/F™ standardized screener for ASD risk assessment, and the AEPS®-3 assessment tool, which evaluates six developmental domains: Fine Motor, Gross Motor, Adaptive, Cognitive, Social-Communication, and Social Skills.

A pilot study was conducted at Souparnika School for Children with Special Needs between November 4 and November 24, 2020, involving five participants in each group to test the feasibility of the research methodology. The main study took place from January 5 to September 5, 2021, with assessments conducted every two months. After parental consent, the M-CHAT R/F™ tool was administered, and AEPS®-3 assessments were performed pre- and post-intervention for both groups, with intervention applied only to the study group.

Data analysis involved summarizing categorical variables using frequency and percentages, while quantitative variables were analyzed using mean and standard deviation (SD). Chi-square or Fisher's exact tests were used to compare baseline demographic variables. The intervention's effectiveness was evaluated using two-way repeated measures ANOVA, with Bonferroni correction for multiple comparisons. Independent sample t-tests or ANOVA examined associations between developmental scores and demographic factors, while Mann-Whitney U and Kruskal-Wallis tests were used for non-parametric data. A significance level of $p<0.05$ was maintained, and data analysis was conducted using SPSS and EZR software.

The study showed that early age diagnosis and early age intervention was truly effective in terms of escalation in development in the areas of fine motor (64%) [Fig 1], gross motor (65%) [Fig 2], adaptive behaviour (77%) [Fig 3], cognitive behaviour (52%) [Fig 4], social communication (68%) [Fig 5], social behaviour (78%) [Fig 6], overall (66%) when compared to the other group of children showing only 51 % of growth in the overall development.

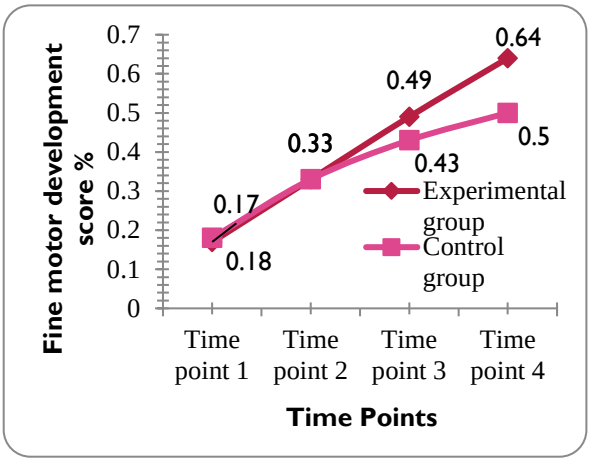

Figure 1: Profile plot showing change in Fine motor development score across time between groups

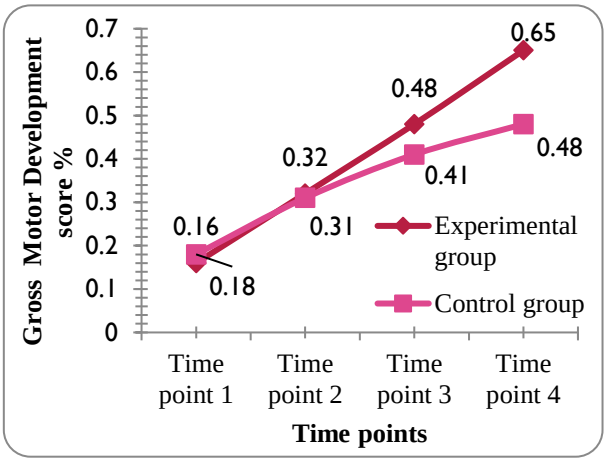

Figure 2: Profile plot showing change in Gross motor development score across time between groups

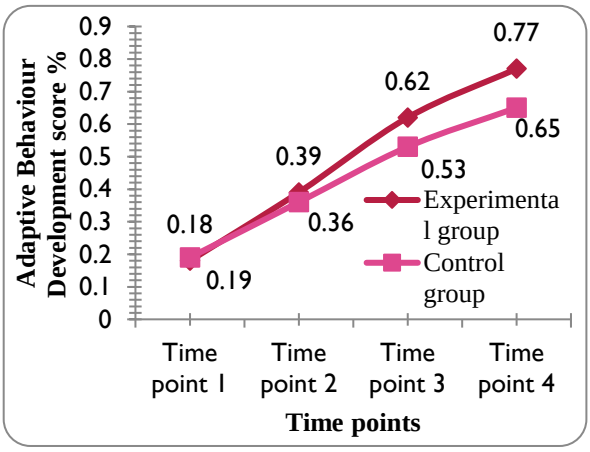

Figure 3: Profile plot showing change in Adaptive Behaviour Development score across time between groups

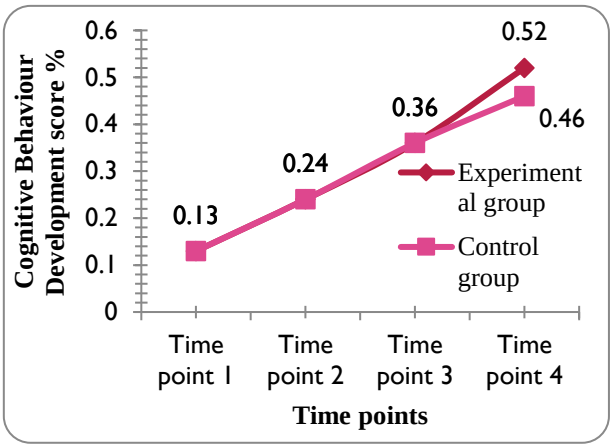

Figure 4: Profile plot showing change in Cognitive Behaviour Development score across time between groups

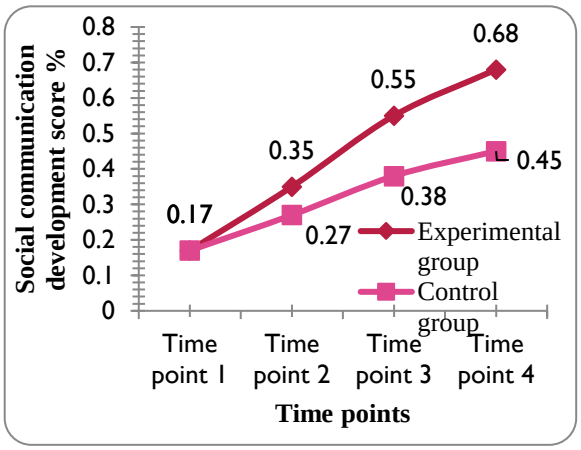

Figure 5: Profile plot showing change in Social communication development score across time

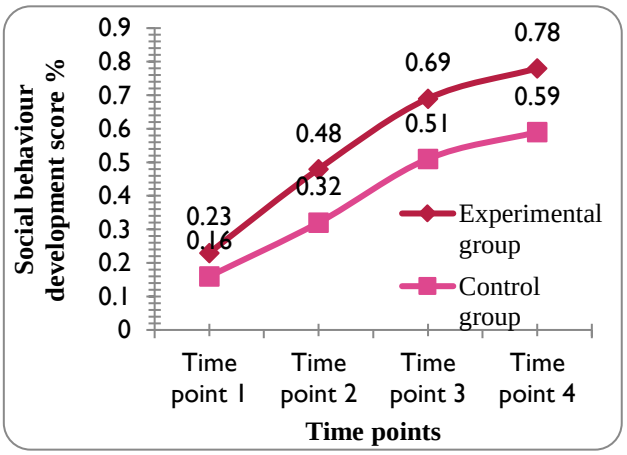

Figure 6: Profile plot showing change in social behaviour development score across time between

between groups **groups**

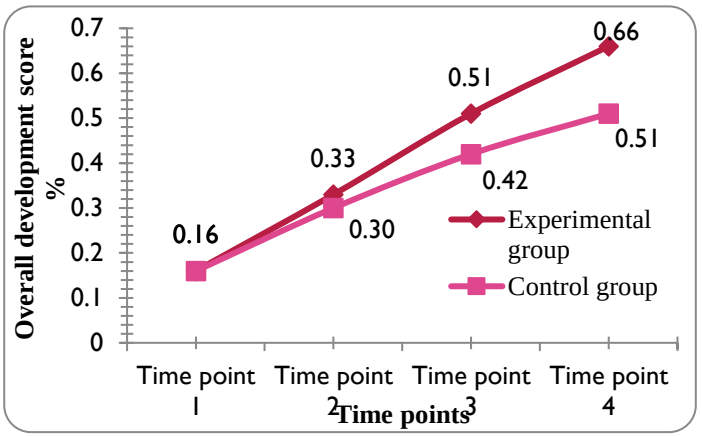

Figure 7: Profile plot showing change in Overall development score across time between groups

Data Analysis

Descriptive and inferential statistics were computed to evaluate empirical evidence. Categorical variables were summarized as frequencies and percentages, while quantitative variables were summarized using mean and standard deviation (SD) or median and interquartile range (IQR).

Baseline demographic comparability was assessed using chi-square tests. A two-way repeated-measures mixed ANOVA evaluated the intervention's impact on developmental domains, with Bonferroni correction addressing multiple comparisons. Independent t-tests and ANOVA determined associations between demographic variables and overall development scores for normally distributed data. Mann-Whitney U and Kruskal-Wallis tests were used for non-normal data. Significance was set at $p<0.05$, and all analyses were performed using SPSS and EZR software.

4. DISCUSSION OF RESULTS

The American Academy of Pediatrics recommends universal autism screening at 18 months, emphasizing the need for early interventions for toddlers at risk for Autism Spectrum Disorder (ASD) (Johnson CP, 2007). This study was designed to address this critical window, as ASD symptoms often emerge around 1.5 years but frequently remain undetected until age four, leading to delayed diagnosis and intervention. Early intervention is crucial for improving developmental outcomes across multiple domains, reinforcing the necessity for timely screening and targeted therapies.

The study sample consisted of 70 very young children aged 2-3 years, divided into an experimental and a control group. Within the experimental group, 31.4% were between 2-2.6 years old, while 68.4% were between 2.7-3 years old. The majority of the participants were male (77.1%) from nuclear families and Hindu backgrounds (71.4%). Alarmingly, only 28.6% of parents had any awareness of ASD, and none were familiar with early intervention strategies. This underscores the pressing need for awareness programs and accessible intervention frameworks for families.

The study implemented the AEPS®-3 intervention over eight months, evaluating developmental progress at two-month intervals. The results demonstrated significant improvements in various developmental domains in the experimental group, highlighting the effectiveness of early, structured interventions tailored to children's unique needs. The key developmental gains observed in the experimental group included:

- Fine motor development: 64% improvement
- Gross motor development: 65% improvement
- Adaptive behavior development: 77% improvement
- Cognitive behavior development: 52% improvement

- Social communication development: 68% improvement
- Social behavioral development: 78% improvement

These results translated into an overall developmental gain of 66%, compared to only 51% in the control group. The findings confirm that early-age diagnosis and intervention lead to significantly better outcomes, particularly in adaptive and social behavioral development.

The outcomes of this study provide valuable insights for both communities and families, offering evidence-based strategies to facilitate effective intervention planning for children at risk of developing ASD. By promoting early diagnosis and structured interventions, this study contributes to a framework that can improve developmental trajectories and enhance the quality of life for children with ASD and their families.

5. CONCLUSION

The outcomes of this study will greatly benefit the community and families by guiding the adoption of effective intervention strategies to support developmental skills in children at risk for ASD. This research underscores the significant benefits of early and comprehensive intervention strategies, emphasizing collaboration between clinicians and parents to ensure consistent support across various settings. Such approaches not only improve developmental outcomes but also enhance the overall effectiveness of intervention.

Further high-quality studies are essential to deepen our understanding of prodromal interventions, optimize treatment pathways for low responders, personalize approaches, define active intervention components, determine the best timing for skill development, and sustain treatment effects over time. Addressing these areas will refine early intervention strategies and improve outcomes.

The findings also highlight the importance of expanding expertise in teaching, administration, and research to equip practitioners with the necessary skills to support children with ASD and their families effectively. Strengthening interdisciplinary collaboration among healthcare professionals, educators, and researchers will facilitate the development of targeted interventions that maximize developmental potential.

In conclusion, early diagnosis and intervention are pivotal in improving developmental trajectories for children with ASD. Systematic screening and intervention programs should be prioritized to maximize outcomes and provide children with a strong foundation. Future research should validate these findings across larger, more diverse populations to guide policy, practice, and best approaches in early intervention. This will ensure that children receive timely and individualized support, ultimately enhancing their long-term development and quality of life.

6. ACKNOWLEDGEMENT

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