Effect of early intervention strategies on children with developmental delays using a multidisciplinary approach—a single-group design study

Monika Kundu Srivastava [1], Insha Mohammad[2], Swati Seth [3]
1. Consultant Occupational Therapist (Former HOD, OT), District Early Intervention Centre, Noida, RBSK NHM, Uttar Pradesh (Operationalised by HLFPPT), India
2. HOD Psychology, District Early Intervention Centre, Noida, RBSK NHM, Uttar Pradesh (Operationalised by HLFPPT), India
3. HOD Paediatrics, District Early Intervention Centre, Noida, RBSK NHM, Uttar Pradesh (Operationalised by HLFPPT), India

Address for correspondence
Monika Kundu Srivastava
Consultant Occupational Therapist (Former HOD, OT), District Early Intervention Centre, Noida, RBSK NHM, Uttar Pradesh (Operationalised by HLFPPT), India

Received : 11 JULY 2025; Accepted: 15 NOVEMBER 2025

Abstract

Objectives: To determine the effectiveness of early intervention strategies on children with developmental delays or at risk for delays using a multidisciplinary approach.

Methods : A single-group design study was conducted at an early intervention centre at the district level over a period of 1 year. Fifty-two children who had neurodevelopmental delays (NDD) and 1 child who was 'at risk' for delay were assessed on the Developmental Screening Test (DST) for changes in their development quotients (DQ) before and after medical, occupational therapy, psychology and speech therapy intervention. The 53 children selected for the study had cerebral palsy (n=26), autism (n=21), cerebral palsy and autism (n=2), and a miscellaneous group (n=4).

Results: Forty children showed improvements in DQ after intervention and 12 children showed deterioration. There was no change in the DQ of 1 child. Post intervention, the mean DQ improved significantly from 55.15±21.67 (DST 1) to 60.83±23.42 (DST 2), $p<0.05$(CI 95%; -1.24 to -10.11). Though the study revealed no significant changes in individual groups, positive trends (improvements) were seen in cerebral palsy only, autism only, cerebral palsy and autism, and the miscellaneous group. Additionally, there were no significant changes in DQ scores reported gender-wise though females did show a greater improvement than males in the study.

Conclusion : Early intervention strategies using a multidisciplinary approach are effective in improving the fine motor, gross motor, language and personal-social skills of children with neurodevelopmental delays.

How to cite this article:
Srivastava MK, Mohammad I, Seth S.Effect of early intervention strategies on children with developmental delays using a multidisciplinary approach—a single-group design study. Indian J DevBehavPediatr. 2025;Vol 3(4):1-10. https://doi.org/10.5281/zenodo.18100078

Keywords:

- Early intervention
- Multidisciplinary approach
- neurodevelopmental delay (NDD)
- development quotient (DQ)
- Development Screening Test (DST)

Introduction

The rapid advances in medical technology have successfully increased the survival of high-risk babies, thus adding to the number of babies who might end up with developmental delays and disabilities. [1] These conditions may affect day-to-day functioning due to impairment in physical, learning, language, or behaviour areas, and are usually lifelong. [2]

The global prevalence of developmental delay in children is reported as 1% to 3%, while the World Health Organization (WHO) estimates that 15% of the world's population lives with some form of disability [3]. Over 43 % of children under the age of 5 years are at risk of not fulfilling their full developmental potential[4]. According to the 2016, Global Burden of Diseases, Injuries, and Risk Factors (GBD) study, India had the highest number of children affected with developmental disabilities (around 1.15 crore) and the highest cases of years living with disability (YLD) in the world (739 per 1 lakh). [5]

During early childhood, i.e., the first 5 years of life, the developing brain grows rapidly and is most sensitive to stimulation. The first 1,000 days, i.e., from 0 through 2 years are a unique period of opportunity when the foundations of optimum health, growth, and neurodevelopment across the lifespan are established. [6] Early intervention strategies enhance brain development[7]. Timely and periodic assessments of young children's development make it possible to identify and treat developmental disabilities at the earliest possible point of manifestation and to prevent loss of developmental potential. [8] It can also help identify developmental risk factors and target effective anticipatory guidance to provide parents with strategies for promoting optimal developmental outcomes. [8]

Despite the Integrated Child Development Services (ICDS), one of the world's largest and most unique outreach programs for early childhood care and development since 1975,[9] provisions for early identification and intervention for infants and young children in the Persons with Disabilities (Equal opportunities, Protection of Rights and Full Participation) Act of 1995[1] [now known as Rights of Persons with Disabilities (RPWD)] Act, 2016, the National Policy for Persons with Disabilities (2006)[10], and the *Rashtriya Bal Swasthya Karyakram* (RBSK) initiated under the National Health Mission (NHM) and launched in 2013[3], India still lacks routine developmental screening and surveillance[3] to handle the 67,385 babies born daily about one-sixth of the world's child births. [10]

Almost 54 % of deliveries take place in government hospitals [11] and having an early intervention centre in all such hospitals that cater to newborn and high-risk babies within the government sector should be prioritised. A common approach to early identification that ensures optimal intervention and limitation of secondary disabilities is developmental surveillance. [8] Each child often requires a multi-professional approach to the diagnosis and management and it is essential to ensure that children have access to the most appropriate range of support and interventions.[8] The availability of early detection and intervention services such as pediatrics, occupational therapy, speech therapy and audiology, psychology, optometry, dentistry, special education, social work, and basic laboratory facilities under one roof has been documented to be effective in the management of many childhood situations spanning from healthy child surveillance to inpatient mental health care. [1, 8]

A multidisciplinary approach brings together scientific knowledge from professionals who are trained to assess and deliver remediation and rehabilitation services. The strategies used by the professionals in early intervention include motor, sensory, cognitive-perceptual, psychosocial and emotional dimensions that are critical for the overall growth and development of children.

However, as there are very few studies that have been documented in Indian government hospital settings using a multidisciplinary approach for early detection and intervention, the present study was

undertaken to determine the effectiveness of early intervention strategies on infants and children at one such centre.

Materials and Methods

The study was conducted at the District Early Intervention-Centre of Excellence (DEIC-COE), located in NOIDA (GB Nagar District), Uttar Pradesh, India. The DEIC, caters to children from 0 through 6 years of age referred from the neonatal intensive care unit (NICU) of the Super Speciality Pediatric Hospital located within the same campus, other medical facilities and also walk-in patients without referrals. A single-group study was considered for ethical reasons. Fifty–two children from 0 through 6 years with neurodevelopmental delays (NDD) and 1 child 'at risk' for delay were included in the study from among all the children registered as out-patients with the DEIC from July 2018 through July 2019. Verbal consent was taken from the parents of the children included in the study.

The 53 children included had received some or the other form of intervention or guidance from all the different speciality departments of pediatrics, psychology, occupational therapy, speech therapy and audiology, dentistry and optometry. Special education intervention was provided to children above the age of 3 years. A minimum of two readings of development quotient (DQ) on the Developmental Screening Test (DST)—one pre-intervention (DST 1) and at least one post-intervention (DST 2)—were mandatory for inclusion in the study.

Those children who did not require active intervention from psychology, occupational therapy and speech therapy were excluded from the study. Those children who did not comply with the follow-up schedules were also excluded.

Anthropometric data was collected at the outset after registration of the child which included height in centimetres, weight in kilograms, head and chest circumference in centimetres, and mid-upper arm circumference (MUAC) in centimetres. A

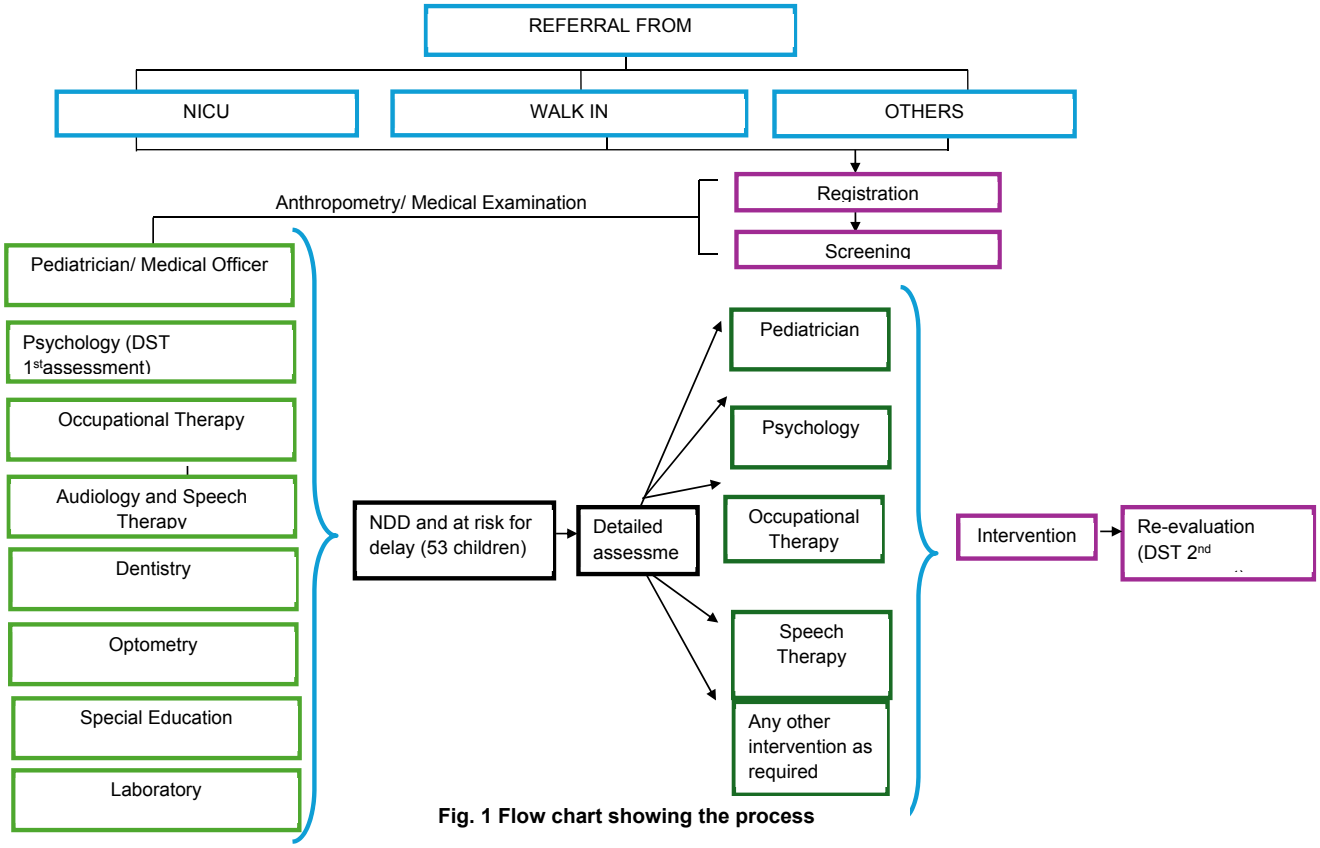

Fig. 1 Flow chart showing the process

detailed medical history was taken and a thorough examination was done by the paediatrician / medical officer. All the children were screened by the heads of department of psychology, occupational therapy, speech therapy and audiology, dentistry, optometry and special education for possible delays. Routine blood testing was done wherever indicated. The counsellor advised every parent on the nutritional requirements of the child and the social worker coordinated the appointment schedules on an 'as needed' basis vis-à-vis the parent and the respective departments.

If the screening process revealed a NDD, a detailed assessment was done by all concerned department heads. Intervention commenced thereafter by the respective specialists for remediation and rehabilitation. Each specialist followed their own protocols of assessment and intervention as detailed by their respective specialities. Parents or caretakers were counselled and explained the importance of their active participation in the intervention process. Each child was given a home programme. Regular assessments were done by all concerned speciality departments to monitor progress of the child. The first post-intervention scoring was done after at least 3 months of intervention, except for 03 children who were re-evaluated before 3 months due to reasons beyond our control **(Fig. 1)**.

The 53 children comprised of 26 who had cerebral palsy (CP), 21 with autism (ASD), 02 with CP and ASD, 03 children had delays including 01 female child who had a syndromic manifestation and was under evaluation, and 01 child was 'at risk' for delay **(Table 1)**.

Table 1 Baseline demographics of participants

	CP	ASD	CP & ASD	Delay/ At risk
Male	13	16	01	02
Female	13	05	01	02
Total	**26**	**21**	**02**	**04**

For the purpose of the study, the Developmental Screening Test (DST) was used as the outcome measure to determine pre- and post- intervention results. The DST is a screening test to ascertain the development of the child according to their respective age. It was developed by Bharath Raj (1977, 1983) and was designed to measure the developmental sequences of children from birth through 15 years of age. It consists of 88 items which assesses the overall development of the child (fine motor, gross motor, language and personal social skills). The administration was done by a semi-structured interview with a parent or a person well acquainted with the child. The attained score i.e., the DQ was then converted to IQ to get the results of the level of development of the child.

Results

Fifty-three children with delays/ at risk for delays were investigated. All children received medical, occupational therapy, psychology and speech therapy intervention. Paired sample statistics, using t-test revealed a significant difference between DST 1 (mean=55.15; SD=21.67) and DST 2 (mean=60.83; SD=23.43) scores on the complete sample (n=53), $p<.05$ (CI 95%, -1.24 to -10.11) as shown in **Table 2 and Fig. 2**.

Table 2 Comparison of DST 1 and DST 2 scores on the participants

Paired Samples Test									
Mean		Paired Differences					t	df	Sig. (2-tailed)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	dst1 - dst2	-5.68113		16.07785	2.20846	-10.11274	-1.24953	2.572	52	.013

Fig. 2 A significant difference was found between DST 1 and DST 2 scores on the participants

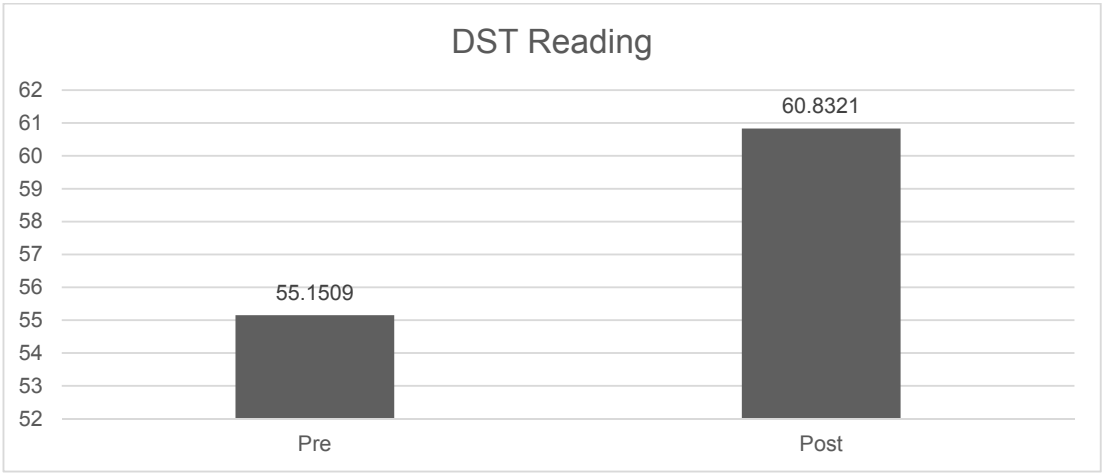

Table 3 indicates that most of the children (40 out of the 53 children) who participated in the study showed improvement in their overall development that included fine motor, gross motor, language and personal-social skills**.** The DQ of 1 child did not change but development continued to be age appropriate and hence has been considered as an improvement in the study. Only 12 children showed a deterioration in scores **(Table 4)**.

Table 3 Category-wise improvement (DQ) seen in 40 children

No change in category but increase in scores	Profound to Severe	Severe to Moderate	Severe to Mild	Moderate to Mild	Moderate to Borderline	Mild to Borderline	Mild to Dull Normal/ Age appropriate	Borderline to Age appropriate
20	01	02	01	03	03	06	01/01	02

Table 4 Category-wise deterioration (DQ) seen in 12 children

No change in category but decrease in scores	Moderate to Severe	Mild to Moderate	Borderline to Mild	Age appropriate to Borderline
05	01	03	01	01

Table 5 shows the trends for individual groups. The improvement trend suggests that the intervention program benefitted the individual groups (only CP: 58%; only ASD: 86%; CP & ASD/ Delay: 100%). However, results of Mann Whitney U Test for only CP and only ASD did not suggest a significant change in DST1 and DST 2 (p=0.108) scores due to the small sample size.

The least improvement was seen in dyskinetic type of CP and in moderate ASD. Score trends in **Table 5** also indicate that females appear to have benefitted from treatment more than males in 2 of the 4 major groups (only CP: 60%; only ASD: 100 %). The other 2 groups showed an equal improvement rate. However, the study did not reveal any significant gender differences with respect to the DST 1 and DST 2 on total sample size (n=53; p=0.304), only CP (n=26, p=0. 545), or only ASD (n=21; p=0.240).

Table 5 Changes for DST 2 for all diagnosis

1.	CP	TOTAL (M/F)	IMPROVEMENT (M/F)	IMPROVEMENT (M/F)	DETERIO-RATION	DETERIORA-TION
	Spasticity	4 (3/1)	3 (2/1)	75	1 (1/0)	25
	Hypotonia	6 (3/3)	4 (2/2)	66.7	2 (1/1)	33.3
	Ataxia	1 (1/0)	1 (1/0)	100	0 (0/0)	0
	Mixed	5 (3/2)	3 (1/2)	60	2 (2/0)	40
	Dyskinetic	10 (3/7)	4 (0/4)	40	6 (3/3)	60
	TOTAL	**26** (13/13)	**15** (6/9)	**58** (40/60)	**11** (7/4)	**42** (63.6/36,4)
2.	**ASD#**					
	Minimal	10 (7/3)	9 (6/3)	90	1 (1/0)	10
	Mild	1(0/1)	1 (0/1)	100	0 (0/0)	0
	Mild-Moderate	5 (5/0)	4 (4/0)	80	1 (1/0)	20
	Moderate	1 (1/0)	0 (0/0)	0	1 (1/0)	100
	Severe	1 (1/0)	1 (1/0)	100	0 (0/0)	0
	OTHERS (INCLEN)	3 (2/1)	3 (2/1)	100	0 (0/0)	0
	TOTAL	**21** (16/5)	**18** (13/5)	**86** (81/100)	**3** (3/0)	**14** (19/0)
3.	**CP and ASD**	2 (1/1)	2 (1/1)	100	0 (0/0)	0
4.	**Delay/ Atrisk**	4 (2/2)	4 (2/2)	100	0(0/0)	0

ASD#: Eighteen children were diagnosed using CARS. Three other children were assessed on INCLEN

An additional finding from the study was that that there was no correlation between DST 2 scores and the time interval for each child (p=.962) i.e., irrespective of whether DST 2 was done after 1,3,6, or even 12 months, changes were seen in scores.

Discussion

The primary purpose of the study was to determine the effect of early intervention strategies on children with developmental delays from 0 through 6 years of age using a multidisciplinary approach. Results indicated that 41 out of the 53 children (including the child who progressed age appropriately) improved in their overall development that included fine motor, gross motor, language and personal social skills. Families of the all 41 children were keenly involved with their children and strictly adhered to the instructions provided at the hospital and complied with the prescribed home program.

Twelve children showed deterioration on DST 2 scores. Compliance and follow-up vis-à-vis the treatment program was a concern for 11 children except 1 child who had CP and was in the severely acute malnourished (SAM) category. A total of 9 children had CP of who 8 had marked involuntary movements that affected their performance on fine motor skills, gross motor skills and language component of the DST; 3 children had ASD with major language delays. It can be said that lack of

compliance could be a major factor for deterioration because there were 4 other children in the CP group with marked involuntary movements who showed improvement and had good compliance and follow-up. Out of the 3 children with ASD who showed fall in DST 2, there was one child each in the mild, mild-moderate and moderate category. Other than these 3 children, all the other children in their respective groups showed improvements. Poor compliance and follow-up were major issues with the 3 children as well.

The findings were supported by a study conducted as a weekly supervised home-based developmental activity program for children with global developmental delay (GDD). Demographic data and baseline DASII (Development assessment scale for Indian infants) scores were obtained before intervention. Parents were trained for home-based intervention program with weekly follow-ups at the early intervention centre. After 6 months, DASII was repeated and difference in means of motor and mental quotients noted. There was a significant difference between pre- and post- therapy DASII scores in motor and mental scales with large effect size (Cohen's d >0.7) indicating that children across all severities of GDD showed improvement from home-based therapy supervised by weekly institute visits. [12]

A systematic review of studies on whether early developmental intervention programs provided post hospital discharge prevent motor and cognitive impairment in preterm infants suggested that early developmental interventions improve cognitive outcomes up to preschool age and also motor outcomes during infancy. However, these effects were small. [13]

Another study examined the age of referral and the effect of early intervention for physically challenged children. Fifty children were referred before 9 months of age, and they were compared with 55 children referred after 9 months of age. At 18 months of age, the children in the earlier referred group showed greater developmental progress in acquisition of skills in all of the six areas tested: perceptual-fine motor ($p<0.0003$), cognition ($p< 0.0001$), language ($p< 0.00(4)$, social-emotional ($p<0.001$), self-care ($p<0.0001$), and gross motor ($p<0.002$). The results show that, at least in the short term, there is a critical age for onset of intervention to achieve the most benefit for the developmentally disabled child [14]. A related study done on children with autism that involved different treatment modalities concluded that very early intensive therapy decreases the effect of autism. [15]

The above positive results could be due to the fact that early detection of abnormal white matter maturation is important in the design of preventive, protective, and rehabilitative strategies for the management of infants as white matter injury and abnormal maturation are thought to be major contributors to the neurodevelopmental disabilities observed in children and adolescents who were born preterm. [16]

Early intervention strategies include early educational and neuroprotection strategies that take advantage of cerebral plasticity and encompass all interventions that promote normal development and prevent disabilities, including organisational, therapeutic and environment□modifying measures, such as early stimulation programs. [7]

A study on premature infants admitted in the neonatal intensive care unit concluded that multisensory stimulation is an effective non-pharmacological method used in the development of premature infants to reduce stress and improve neuromuscular development. [17] Occupational therapy, psychology and speech therapy/audiology use a multisensory approach for intervention.

Early intervention programs have shown some small long-term benefits in heavier low-birth-weight babies. Cognitive and academic skills for heavier LBW (HLBW) premature children were better than for lighter LBW (LLBW) ones at the age of 8 years. However, attenuation of the large favourable effects was observed in both the heavier and lighter LBW groups at 3 years of age [18]. Favourable results were also seen only in HLBW youth at 18 years of age who had received early intervention. [19]

There are studies that indicate that early intervention approaches also enhance peer-related social competencies [20], benefit adult competencies and reduce violent behaviour[21] of young children with developmental delays.

Involvement of the families was also an important reason that the children who participated in the study showed improvements. Families understand their child's strengths, abilities, and special needs; know their rights and advocate effectively for their child; help their child develop and learn; have support systems; and are able to gain access to desired services and activities in their community. [22] Another study found that interventions that focus on parent–infant relationships have a greater impact on cognitive outcomes at infancy and preschool age than intervention programmes that focus on either infant development or parent support. [23].

The results of the study were also similar to programs such as NIDCAP (Newborn Individualized Developmental Care and Assessment Program) in Sweden and the IHDP (Infant Health and Development Program) created in the United States. The similarities were that efficacy was greatest with programs involving both the parents and the child; long-term stimulation improved cognitive outcomes and child-parent interactions; cognition showed greater improvements than motor skills and larger benefits were obtained in families that combined several risk factors including low education attainment by the mothers. [23]

Results for only CP and only ASD did not suggest a significant pre- and post-DST due to the small sample size. However, the positive trends towards improvement for both groups separately (only CP: 58 % ; only ASD: 86 %), indicated that the intervention programme was benefitting the individual groups as well.

The positive trends in CP can be supported by a systematic review of studies the effect of early intervention in infants at very high risk of cerebral palsy on child and on family outcome. [24].

A study done on children with ASD from birth to 3 years of age group to review the early intervention methods and studies available on each method revealed that early intervention gives better outcomes. [25] The positive trends in ASD can be supported by other studies as well. [26, 27] The present study did not reveal any gender differences with respect to the pre- and post-test DST scores. This could be due the small sample size for male only and females only. However, 80 % of the females included in the study showed an improvement vis-a-vis 68 % of males on DST 2. This can be corroborated by studies which demonstrate that girls have an advantage over boys in their cognitive function as measured by intelligence tests (Doyle and PFL Evaluation Team, 2016). [28] Another study of children aged two to four years found that girls had significantly stronger verbal and non-verbal abilities than boys. [28] Both the studies however, suggested that the possible advantage for girls in cognitive development during early childhood appeared to reduce over time. [28]

Limitations of the Study

The sample size of 53 children comprised only of children with NDD or at risk for delay. Through the study we were unable to determine the effects of early intervention with confidence on a specific group of children such as CP or ASD due to a small sample size. The study did not take into consideration the birth history of the child or whether the child had taken therapy prior to intervention as part of the present study as most children did not have the required documentation. Age of referral to the Centre, presence of co-morbidities such as epilepsy, heart conditions, etc., (past or current), and socioeconomic status was also not considered. As most of the children had feeding issues due to sensory or physiological limitations, the current nutritional status too was not considered

Conclusion

The study has proven that following a multidisciplinary team approach in early intervention settings improves the effectiveness of care. The present study in a government set-up strengthens the assumption that quality care need not come at a high price. Future studies could analyze various factors such as affect of birth history, nutritional status, co-morbidities, socioeconomic status, prior intervention received and parental motivating factors on DST scores. Whether treatment in a hospital set-up only, a home program only, or a combination of both is necessary for optimal results could also be studied.

Authors conclusion

'Zero-cost' or 'minimum-cost' quality care in a clinical setting given with a home program and regular follow-ups increases the likelihood of parent motivation and compliance thereby improving favourable outcomes such as: (a) preventing occurrence or development of a condition, (b) reducing the impact and magnitude of disability or delay in development, (c) providing supportive programmes for the complicated disability, and (d) to maximize the residual ability. More such early intervention centres offering multidisciplinary team services for detection and intervention should be commissioned through either government schemes or public-private partnerships at the district as well as the village level.

Acknowledgements

The authors of this publication thank the parents of the children who participated and cooperated in every way during the study, the staff of DEIC, NOIDA, for helping in data collection, and Hindustan Latex Family Promotion Trust (HLFPPT) for the opportunity to carry out the processes towards a successful study. A special mention to Dr. Usama Rehman, PhD, Asst. Professor, Aligarh Muslim University, for statistical analysis and Dr. Kamal N. Arya, PhD, Lecturer, Occupational Therapy, Pt. Deendayal Upadhyaya National Institute for Persons with Physical Disabilities, New Delhi, for his keen observations and useful suggestions.

Conflict of Interest: None

Funding: None

References

1. Maria A, Upadhyay S, Vallomkonda N. Nurturing Beyond the Womb — Early Intervention Practices in Newborn Care Unit. Indian Pediatr 2021; 58 (Suppl 1), 53–59. https://doi.org/10.1007/s13312-021-2357
2. https://www.cdc.gov/child-development/about/developmental-disability-basics.html?CDC_AAref_Val=https://www.cdc.gov/ncbddd/developmentaldisabilities/facts.html .Accessed 09July 2025.
3. Mukherjee SB, Aneja S, Krishnamurthy V, Srinivasan R. Incorporating developmental screening and surveillance of young children in office practice. Indian Pediatrics. 2014 ;51(8):627-635.
4. https://www.unicef.org/india/what-we-do/early-childhood-development. Accessed 09July 2025.
5. Olusanya BO, Davis AC, Wertlieb D, Boo NY, Nair MK, Halpern R, Kuper H, Breinbauer C, De Vries PJ, Gladstone M, Halfon N. Developmental disabilities among children younger than 5 years in 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. The Lancet Global Health. 2018 ;6(10):e1100-1121.
6. UNICEF. (2017). First 1000 days - the critical window to ensure that children survive and thrive.
7. Bonnier C. Evaluation of early stimulation programs for enhancing brain development. Acta Paediatrica. 2008;97(7):853-858.
8. Ogundele M. A Multidisciplinary Approach to the Assessment and Management of Pre-school Age Neuro-developmental Disorders: A Local Experience. Clinical Journal of Nursing Care and Practice. 2017;1(1):01.
9. https://wcd.delhi.gov.in/wcd/introduction-integrated-child-development-services. Accessed 14 July, 2025.
10. Pandit, A. (2020, July 21). Over 54% births happened in govt hospitals, 28% in private health facilities in 2018. The Times of India. https://timesofindia.indiatimes.com/india/over-54-births-happened-in-govt-hospitals-28-in-private-health-facilities-in-2018/articleshow/77086201.cms.
11. Accessed 09July 2025.
12. Buch PM. Study of Weekly Supervised Home Based Developmental Activity Program for Children with Global Developmental Delay. Journal of Medical Science and Clinical Research. 2019,7(7):796-803. https://doi.org/10.18535/jmscr/v7i7.142.
13. Spittle A, Orton J, Anderson PJ, Boyd R, Doyle LW. Early developmental intervention programmes provided post hospital discharge to prevent motor and cognitive impairment in preterm infants. Cochrane Database Syst Rev. 2015;2015(11):CD005495.
14. Sharkey MA, Palitz ME, Reece LF, Rutherford BL, Akers JP, Alvin BL, Budenholzer BR. The effect of early referral and intervention on the developmentally disabled infant: evaluation at 18 months of age. The Journal of the American Board of Family Practice 1990;3(3):163-170.
15. Rogers SJ. Brief report: early intervention in autism. Journal of Autism and Developmental disorders. 1996;26(2):243-46.
16. Dudink J, Kerr JL, Paterson K, Counsell SJ. Connecting the developing preterm brain. Diffusion weighted imaging of the neonatal brain 2010; 84(12), 31.
17. Zeraati H, Nasimi F, Rezaeian A, Shahinfar J, Zade MG. Effect of multi-sensory stimulation on neuromuscular

development of premature infants: a randomized clinical trial. Iranian Journal of Child Neurology 2018;12(3):32.

18. McCarton CM, Brooks-Gunn J, Wallace IF, Bauer CR, Bennett FC, Bernbaum JC, Broyles RS, Casey PH, McCormick MC, Scott DT, Tyson J. Results at age 8 years of early intervention for low-birth-weight premature infants: The Infant Health and Development Program. JAMA. 1997;277(2):126-132.

19. McCormick MC, Brooks-Gunn J, Buka SL, Goldman J, Yu J, Salganik M, Scott DT, Bennett FC, Kay LL, Bernbaum JC, Bauer CR. Early intervention in low birth weight premature infants: results at 18 years of age for the Infant Health and Development Program. Pediatrics. 2006;117(3):771-780.

20. Guralnick MJ. Early intervention approaches to enhance the peer-related social competence of young children with developmental delays: A historical perspective. Infants & Young Children 2010 ;23(2):73.

21. Walker SP, Chang SM, Vera-Hernández M, Grantham-McGregor S. Early childhood stimulation benefits adult competence and reduces violent behavior. Pediatrics 2011;127(5):849-57.

22. Bailey Jr DB, Bruder MB, Hebbeler K, Carta J, Defosset M, Greenwood C, Kahn L, Mallik S, Markowitz J, Spiker D, Walker D. Recommended outcomes for families of young children with disabilities. Journal of Early Intervention 2006; 28(4):227-251.

23. Bonnier C. Evaluation of early stimulation programs for enhancing brain development. Acta Paediatrica. 2008;97(7):853-858.

24. Hadders‐Algra M, Boxum AG, Hielkema T, Hamer EG. Effect of early intervention in infants at very high risk of cerebral palsy: a systematic review. Developmental Medicine & Child Neurology 2017; 59(3):246-258.

25. Corsello CM. Early intervention in autism. Infants & Young Children. 2005;18(2):74-85.

26. Reichow B, Wolery M. Comprehensive synthesis of early intensive behavioral interventions for young children with autism based on the UCLA young autism project model. Journal of Autism and Developmental Disorders. 2009;39(1):23-41.

27. Weiss MJ, Delmolino L. The relationship between early learning rates and treatment outcome for children with autism receiving intensive home-based applied behavior analysis. The Behavior Analyst Today. 2006;7(1):96.

28. Bando, R., Lopez-Boo, F., Fernald, L. et al. Gender Differences in Early Child Development: Evidence from Large-Scale Studies of Very Young Children in Nine Countries. J Econ Race Policy 2024; 7, 82–92 . https://doi.org/10.1007/s41996-023-00131-1