An Analytical Study of Relationship between Childhood Speech Therapy and Language Development

Rehana Gul
Research scholar and Speech Language Pathologist, Department of Special Education, University of Karachi, Sindh, Pakistan.
rehanagul875@gmail.com

Prof. Dr. Shagufta Shahzadi
Department of Special Education, University of Karachi, Sindh, Pakistan.
shagufta1@yahoo.com

Maroof Khan
Research scholar and Speech Language pathologist, Sindh Institute of Physical Medicine and Rehabilitation.
sltmaroofkhan@gmail.com

Abstract

Speech and language therapy plays an important role in addressing communication disorders. It is particularly crucial during the early language development (ELD) phase, as timely intervention leads to improved outcomes. However, in developing countries such as Pakistan, awareness regarding speech therapy remains limited, especially concerning its impact during the ELD. In this study, children were categorized into two groups: one comprising 50% typically developing children with language delay (LD) and other consisting of 50% children with LSD and special needs. Each group was further divided into control and experimental subgroups. The experimental subgroups underwent targeted interventions designed to enhance specific perceptual skills, whereas the control subgroups continued with standard therapy as a baseline for comparison. Post treatment evaluations were conducted to measure the effectiveness of these treatments. The findings indicated significant improvement in the perception, recognition, discrimination, and expression of nouns among children in the experimental group. This research highlights the efficacy of structured intervention programs in speech therapy and underscores the importance of early intervention for children experiencing language development delays.

Keywords: *Communication disorder, speech therapy, language development, language delay, early intervention.*

Introduction

Language development (LD) is a crucial aspect of early childhood growth, influencing cognitive, social, and academic success. However, in developing countries like Pakistan, speech-language therapy (SLT) remains underutilized due to a lack of awareness and limited access to qualified professionals (Minhas et al., 2022). Despite the global recognition of early intervention in speech and language disorders, many children in Karachi and other regions receive therapy only after missing critical developmental windows, which can lead to long-term impairments (Dodd & O'Brien, 2019; McGregor, 2020).

Existing literature emphasizes the significance of early intervention (Bishop & Snowling, 2004; Hegde & Maul, 2018), yet research exploring public and professional awareness of SLT in Pakistan is limited. Most studies focus on clinical outcomes rather than the systemic barriers preventing timely intervention. Furthermore, while international research demonstrates the efficacy of SLT, there is insufficient data on its long-term impact within low-resource settings like Pakistan.

Speech-language pathologists (SLPs) play a crucial role in diagnosing and managing communication disorders. Therapy programs incorporate physical exercises, visual aids, and interactive techniques to enhance linguistic abilities (Baker & McCoy, 2017). Clinical studies indicate that early speech therapy significantly improves cognitive, social, and academic skills (Hegde & Maul, 2018; Bishop & Snowling, 2004). However, in Pakistan, a lack of public awareness limits access to these services, resulting in children missing critical intervention periods (Dodd & O'Brien, 2019).

To contextualize the issue, a study conducted at the Institute of Speech and Hearing in Karachi analyzed the referral timelines of children diagnosed with speech delays (Ahmed et al., 2023). Findings revealed that over 60% of children were referred for therapy after age four, surpassing the optimal intervention window. Moreover, a survey of 150 parents indicated that 70% were unaware of speech therapy services before their child's diagnosis. These findings align with research suggesting that early intervention remains underutilized in developing nations due to limited awareness and resources (Minhas et al., 2022).

While global studies emphasize the benefits of early intervention (ASHA, 2021; McGregor, 2020), research from Pakistan presents a contrasting picture. In developed countries, children with speech delays are typically identified before age three, leading to timely intervention (Gleason & Ratner, 2022). However, in Pakistan, delays persist due to limited accessibility and social stigma surrounding therapy (Ahmed et al., 2023). These discrepancies highlight the need for policy reforms and public education campaigns to promote speech therapy.

This study fills a crucial gap by investigating parents' and professionals' perceptions of speech therapy's role in LD within Karachi, where awareness and accessibility issues persist. By identifying knowledge gaps and intervention delays, this research provides evidence to inform

policy changes and enhance early intervention strategies. Additionally, it suggests the need for longitudinal studies tracking the outcomes of children receiving SLT at different developmental stages. Larger-scale replications across diverse socio-economic backgrounds can further strengthen policy recommendations, ensuring more inclusive and effective speech therapy services in developing regions.

Language acquisition is a fundamental component of childhood development, beginning at birth and progressing rapidly within the first three years of life (Iqbal, Kasa, & Don, 2020). During this period, exposure to diverse auditory and visual stimuli significantly enhances linguistic abilities. Research suggests that children who engage in regular conversations and reading activities exhibit stronger language and literacy skills (McGregor, 2020). Conversely, children who lack sufficient language exposure often face developmental delays, requiring intervention (Gleason & Ratner, 2022).

Milestones in language development follow a structured pattern, yet individual variations exist. By six months, infants recognize familiar voices and begin associating sounds with objects. Between 12 and 24 months, vocabulary expands, and sentence formation emerges (Bowen, 2023). However, deviations from these patterns may indicate underlying issues such as hearing impairments or neurodevelopment disorders, including autism spectrum disorder (Kim et al., 2021; Wilson et al., 2022). Early communication begins when infants associate crying with receiving food, comfort, and attention. Babies quickly learn to identify their primary caregiver's voice as one of the most significant sounds in their environment (Bowen, C., 2023). As they grow, they become capable of distinguishing between different phonemes in their native language. By six months, most infants can understand a few words. Despite variations in learning speed, all children generally follow the same developmental trajectory. Between the ages of one and five, verbal skills rapidly advance (Kim, H. S., Shin et al., 2021).Healthcare professionals rely on these developmental standards to assess a child's progress and determine whether intervention is necessary. Some delays may stem from hearing impairments, while others could be linked to difficulties in speech production or language comprehension (McGregor, K. K., 2020). Key developmental milestones include babbling, the first articulation of "mama" or "dada," And the emergence of two-word phrases. Progress is not always linear, as children experience intermittent phases of rapid and slower development. Around 2 to six months, infants start making cooing and babbling sounds, with jargon like speech patterns emerging by their first birthday (Wang, Y. et al., 2020). Between 15 and 18 months, children typically understand far morethan they can verbally express. By 18 months, many begin acquiring language at an accelerated pace, and by 24 months, most can form basic two-word sentences and use at least fifty words. However, the timeline of achieving these milestones varies among individuals (Wilson. P. et al., 2022). Some children, particularly girls, develop language skills earlier than others. Regular exposure to both spoken and written language significantly enhances linguistic abilities. Reading to a child and engaging them in meaningful conversations positively influence their language development. Conversely, children who are rarely spoken to

often experience delayed language acquisition compared to their peers (Ladányi, E. et al., 2020). Communication challenges in children may indicate underlying issues such as hearing impairments or developmental conditions like autism. Identifying the root cause of their delays can be complex. However, early diagnosis an intervention significantly improves outcomes for children with speech and language difficulties (Winters, K. L. et al., 2022).

Language development comprises syntax for sentences and morphology for word structures which involve plurals and other word forms. The social aspect of language requires three basic principles along with nonverbal interpretation and direct gaze and proper social relationships. Healthcare professionals diagnose language disorders when an individual shows communication problems in three domains: verbal expression, comprehension of others and correct use of language in social context (Wilson, P. et al., 2022).

Language works as a fundamental pillar for human interaction as well as communication processes. Language functions through information management processes controlled by brain operations where the brain regulates complete linguistic operations. Language functions through cognitive processes while interacting with psychological functions (Sherratt S 2021). A child's social and cognitive development gets affected significantly by any delay in their language acquisition process. Interventions should happen in a timely manner to prevent young children with speech or language difficulties from developing persistent communication challenges and social integration problems (2021).

Human growth strongly depends on language development because it determines cognitive development and social skills while affecting future academic performance since infancy. Language acquisition during the first three years becomes vital due to brain receptiveness that reaches its peak in processing stimuli (Hegde & Maul, 2018). The development of proper language skills faces delays when children experience limited exposure to language or cognitive issues or when they suffer from developmental disorders according to Bishop & Snowling (2004) as well as Dodd & O'Brien (2019). The American Speech-Language-Hearing Association (2021) emphasizes that both early language delay assessments and proper remedial methods serve fundamental for children's communication development together with academic achievements.

Therapy programs for speech-language function as a vital intervention method to support the treatment of developmental delays affecting speech along with language and cognition and multiple types of communication abilities. Speech-language pathologists implement physical exercises along with visual aids to improve communication abilities of children who have speech and language conditions (Baker & McCoy, 2017). Valid assessment demonstrates that speech therapy leads to better linguistic abilities that serve as a foundation for both social and academic development (Bishop & Snowling, 2004; Hegde & Maul, 2018). Timely intervention becomes essential for children with delayed language because it prevents difficulties in different life areas

and clinical research combined with specialized therapy approaches foster optimal language and cognitive development.

Objectives of the Study

- To determine the relationship between language development and speech therapy for children.
- To assess the connection between language development and early intervention.
- To understand the relationship between communication abilities and language development.
- To examine the role of speech therapists in early intervention.
- To provide guidelines and recommendations for enhancing parents' or caregivers' familiarity with speech-language pathologists.

Literature Review

Theoretical Background

A research analysis of early speech therapy effects on child language development requires multiple foundational theories as its theoretical framework. These constructs establish understanding about supportive speech interventions effect on children's language development and their mental abilities and communication capacities. The theoretical framework includes this flow chart to represent the functional connections between study components.

Behaviorist Theory of Language Development

In B.F. Skinner’s view language becomes available through reinforcement and conditioning of behaviors. The speech therapy practice utilizes positive reinforcement to teach clients the correct pronunciation and develop their word usage as well as sentence structure.

Social Interactionist Theory

According to social interactionist theory established by Lev Vygotsky social dialogues stand central in the process of language acquisition by children. The theory explains how structured social engagements between therapists and child patients create language development opportunities for children.

Cognitive Development Theory

Talking about language development, according to Jean Piaget leads to cognitive growth in children. The development of language occurs by increasing child growth in their environment alongside speech therapy which supports essential cognitive abilities for understanding and expressing language.

Early Intervention Model

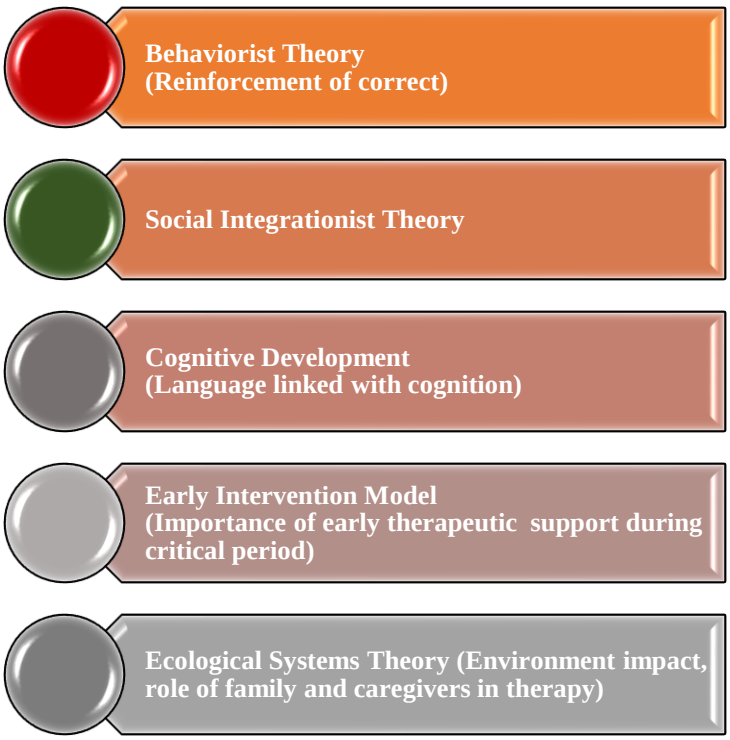
Research in neuroplasticity demonstrates that the Early Intervention Model supports providing speech and language assistance to young children because these development periods hold critical importance. The age when a child receives early intervention directly influences language development so speech therapists focus on teaching first communication abilities at this important time.

Ecological Systems Theory

According to Urie Bronfenbrenner's Ecological Systems Theory the atmosphere around children formed by family members and educators along with caregivers directs their growth. The language progression hinges on the effective partnership between caregivers and speech therapists that occurs in this study.

Figure 1

A flow chart demonstrating the theoretical framework of the study:



Research Methodology

Research methodology used to examine the impact of speech therapy on children with language delays. It covers the study's purpose, objectives, research questions, sampling techniques, data collection tools, analytical approaches, challenges faced during fieldwork, ethical considerations, and limitations of the chosen research design.

Research Design

A post-test only experimental design within a quantitative approach was adopted. This method involves assigning children to two groups:

Experimental Group: Receives structured speech therapy.

Control Group: Does not receive therapy.

After intervention, both groups undergo language development assessments. This design eliminates pre-test biases, ensuring the validity of the findings.

Application of the Post-Test Only Design

Following Trochim and Donnelly's (2008) framework, the study structure includes:
Random Assignment: Children are placed in experimental or control groups.
Intervention Phase: The experimental group receives therapy.
Outcome Measurement: Post-intervention assessments compare language development across both groups.

Sample Size & Rationale

The study included 40 children (ages 2.6–3.0 years) diagnosed with language delays, divided into two equal groups (20 per group). The sample size was determined based on feasibility, availability of eligible participants, and prior research suggesting that small-group intervention studies yield meaningful insights within this age range.

Sampling Technique

Purposive sampling was used to ensure participants had characteristics relevant to the study, such as confirmed language delay diagnoses.

Participant Breakdown:

- 20 typically developing children with language delays (9 boys, 11 girls).
- 20 children with special needs (10 boys, 10 girls), including:
- Down Syndrome (DS): 6 boys, 5 girls
- Cerebral Palsy (CP): 3 girls, 2 boys
- Intellectual Development Disorder (IDD): 2 boys, 2 girls

Each group was further divided into control and experimental subgroups (10 children per subgroup).

Research Site

The study was conducted in Karachi, Pakistan, involving children from clinical speech therapy centers and mainstream schools.

Research Instruments

A standardized questionnaire was used to assess speech therapy effectiveness. The questionnaire's validity was ensured through literature review, expert consultation, and pilot testing. The therapy approach incorporated:

- Traditional Articulation Therapy (TAT)
- Sensory-based activities (e.g., flashcards, memory games)
- Interactive games to enhance engagement and motivation

Intervention & Materials

The intervention consisted of weekly 45-minute speech therapy sessions over 12 weeks, focusing on:

- Sound production (e.g., /p/, /b/, /k/, /θ/)
- Vocabulary building
- Structured speech stimulation exercises

Treatment materials included:

- Flashcards & picture objects for phoneme practice
- Instruction sheets for caregivers
- Children's logbooks to track speech progress

Progress was measured through recording sheets, where correct/incorrect productions were logged.

Outcome Measures

Children were assessed before and after the intervention using standardized cognitive and language development tests. Key evaluation parameters included:

- Speech production accuracy
- Word-level proficiency

- Expressive and receptive language skills

A home therapy program was also introduced, and parents were involved in tracking their child's speech progress.

Data Analysis

Data was analyzed using SPSS (Version 23) with both descriptive and inferential statistics. The Mann-Whitney Test was used due to the small sample size (<30) to compare post-intervention results between groups. Statistical significance was set at $p < 0.05$. Post-test scores were compared between groups to assess the effectiveness of speech therapy.

Randomization Protocol

This test was particularly useful because It does not assume normal distribution of data. It helps determine significant differences between treatment and control groups. Although random assignment was mentioned, the selection process followed a structured approach:

Screening & Inclusion Criteria: Participants were assessed for eligibility based on standardized diagnostic tools, ensuring a uniform level of language delay.

Randomization Method : Eligible children were assigned to either the experimental or control group using a computer-generated randomization list, ensuring unbiased allocation.

Control Measures : Factors such as age, gender distribution, and severity of language delay were considered to balance both groups and minimize confounding variables.

Ethical Considerations

Parental Consent: Written informed consent was obtained from parents/guardians before enrolling their children in the study.

Institutional Approval: The study was approved by the relevant ethical review board, ensuring adherence to research ethics.

Child Welfare & Confidentiality: The intervention was designed to be non-invasive and beneficial, and all participant data was anonymized to protect confidentiality.

Limitations of the Post-Test Only Design

While the post-test only experimental design offers several advantages, it also has inherent limitations,

Lack of Pre-Test Baseline Data: Without pre-intervention assessments, it is difficult to measure individual progress relative to initial language abilities.

Potential Confounding Variables: Despite randomization, uncontrolled external factors (e.g., home language environment) may influence results.

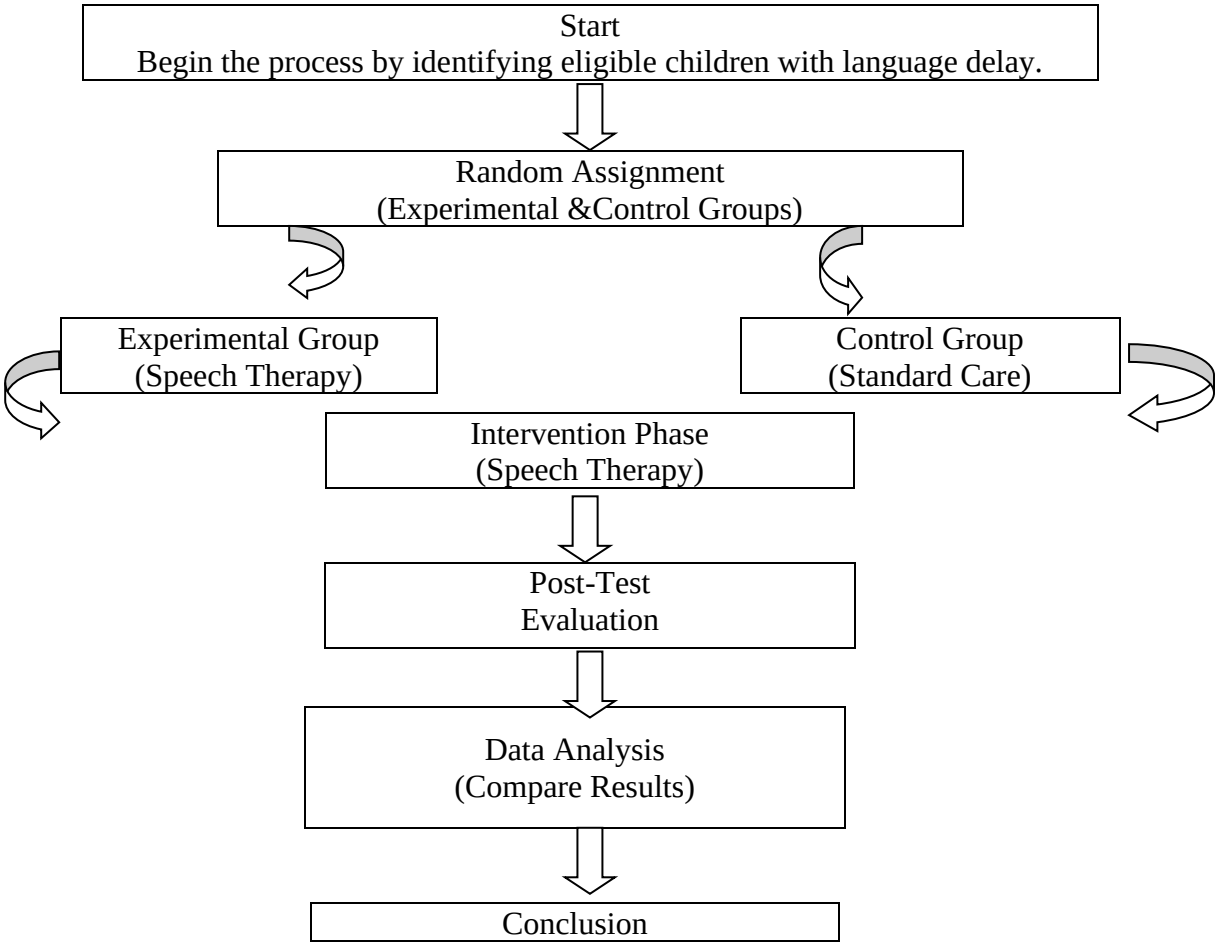
Generalizability: The small sample size and purposive sampling may limit the broader applicability of findings. Future research should consider longitudinal studies or larger-scale replications to enhance validity and policy impact.

Figure 2

The corresponding flowchart

Model Based on Post-Test

By Trochim and Donnelly (2008),



Result and Findings

Demographic Presentation:

A total of 40 participants underwent evaluation according to their language development status; Group A included normal children with delayed language while Group B consisted of children

with special needs and delayed language. The established classification system enables research comparing standard-developing children to their special needs counterparts thus showing intervention responses among various participant groups.

Subgroup Composition:

The research design included experimental and control subgroups within each group to validate that observed results stemmed from interventions while eliminating variations among groups.

Table 1
(Group A) Experimental and Control Group of Normal Children with language Delayed.

Group A	Experimental group	Control group
boys (with normal IQ, language delayed)	4	5
girls (with normal IQ, language delayed)	6	5

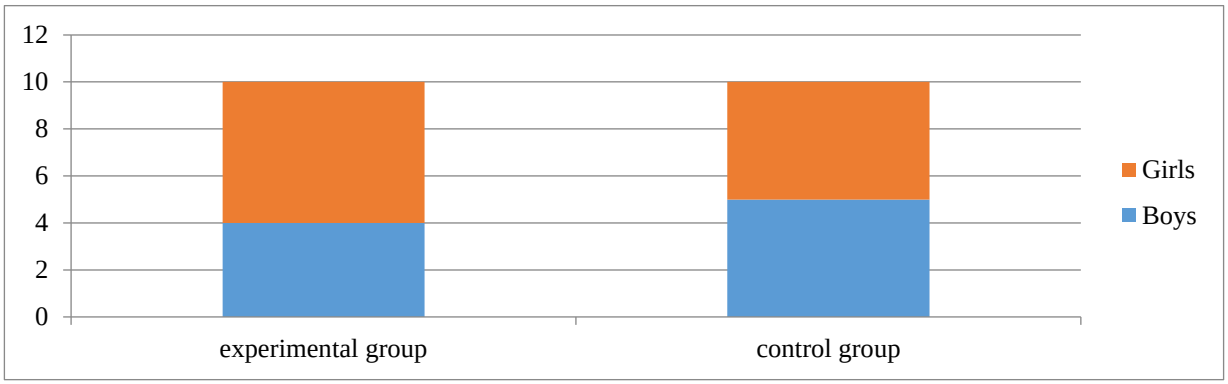


Table 2

Descriptive Statistics and Mann Whitney Test Results of (Group A) Experimental and Control Group of Normal Children with language Delayed.

	Group	N	Mean	SD	DIFFERENCE	EFFECT SIZE
Sound	Experiment-Normal	10	1.96	0.05	*U= 55, Z=-3.091, P<002*	0.15
	Control-Normal	10	1.45	0.26		
Colors	Experiment-Normal	10	1.98	0.020	*U= 55, Z=-3.787, P<001*	0.19
	Control-Normal	10	1.02	0.02		
Proper noun	Experiment-Normal	10	1.99	0.03	*U= 56, Z=3.755, P<001*	0.19

	Control-Normal	10	1.71	0.15		
Body parts	Experiment-Normal	10	1.98	0.02	*U= 58, Z=-3.539, P<001*	0.18
	Control-Normal	10	1.59	0.15		
Numbers	Experiment-Normal	10	1.99	0.02	*U= 55, Z=-3829., P<001*	0.19
	Control-Normal	10	1.11	0.06		
Shape	Experiment-Normal	10	1.99	0.01	*U= 55, Z=-3.795, P<001*	0.19
	Control-Normal	**10**	**1.03**	**0.02**		

Data Interpretation

The Mann-Whitney U test results confirm statistically significant improvements in the experimental group across all measured domains ($p < 0.002$ – $p < 0.001$), highlighting the effectiveness of targeted interventions.

Speech Sound Perception: Significant improvement ($U = 55$, $Z = -3.091$, $p < 0.002$), validating the impact of Traditional Articulation Therapy (TAT).

Color Recognition: Engaging methods like flashcards led to better outcomes ($U = 55$, $Z = -3.787$, $p < 0.001$).

Proper Nouns: Play-based memory games enhanced recognition ($U = 56$, $Z = 3.755$, $p < 0.001$).

Body Parts Identification: Tactile stimuli proved effective ($U = 58$, $Z = -3.539$, $p < 0.001$).

Number Perception: Marked improvement observed ($U = 55$, $Z = -3.829$, $p < 0.001$).

Shape Recognition: Tactile interventions significantly enhanced learning ($U = 55$, $Z = -3.795$, $p < 0.001$).

The experimental group ($M = 1.96$, $SD = 0.05$) showed greater consistency in improvement than the control group ($M = 1.45$, $SD = 0.26$), reinforcing the effectiveness of structured speech therapy interventions.

Table 3

(Group B) experimental and control group of special need children with language delayed

Experimental group	**Cerebral palsy (CP)**	**Down Syndrome (DS)**	**Intellectual Development Disorder(IDD)**
Girls with mild IQ, language delayed	2	0	0
Girls with moderate IQ, language delayed		3	1
Boys with mild IQ, language		2	0

delayed		
boys with moderate IQ, language delayed	1	1

Experimental group

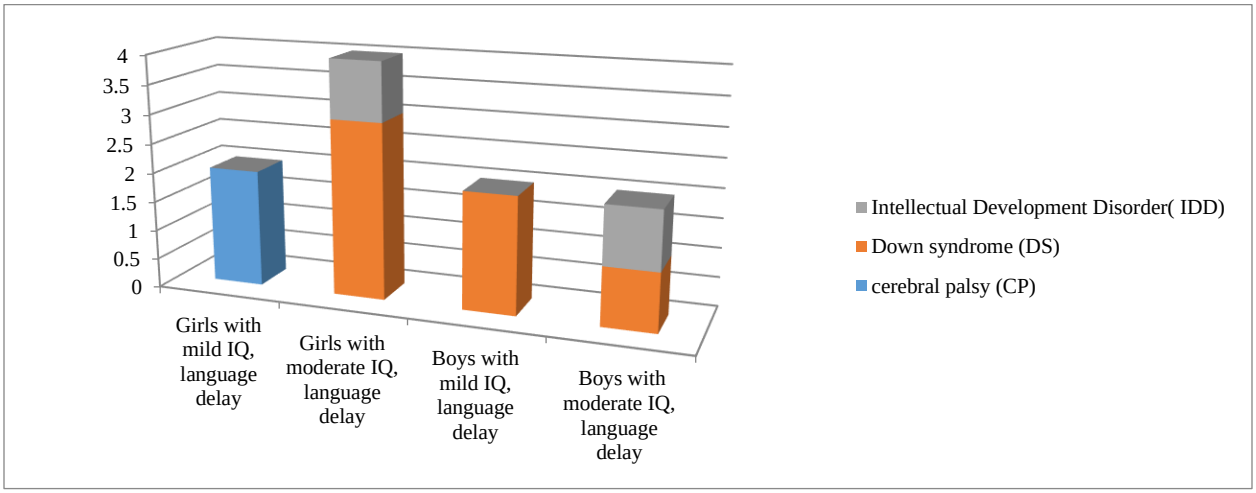


Table 4

Control group	Cerebral palsy (CP)	Down Syndrome (DS)	Intellectual Development Disorder(IDD)
Girls with mild IQ, language delayed	1	0	0
Girls with moderate IQ, language delayed	1	1	1
Boys with mild IQ, language delayed	1	1	0
boys with moderate IQ, language delayed	1	1	2

Control group

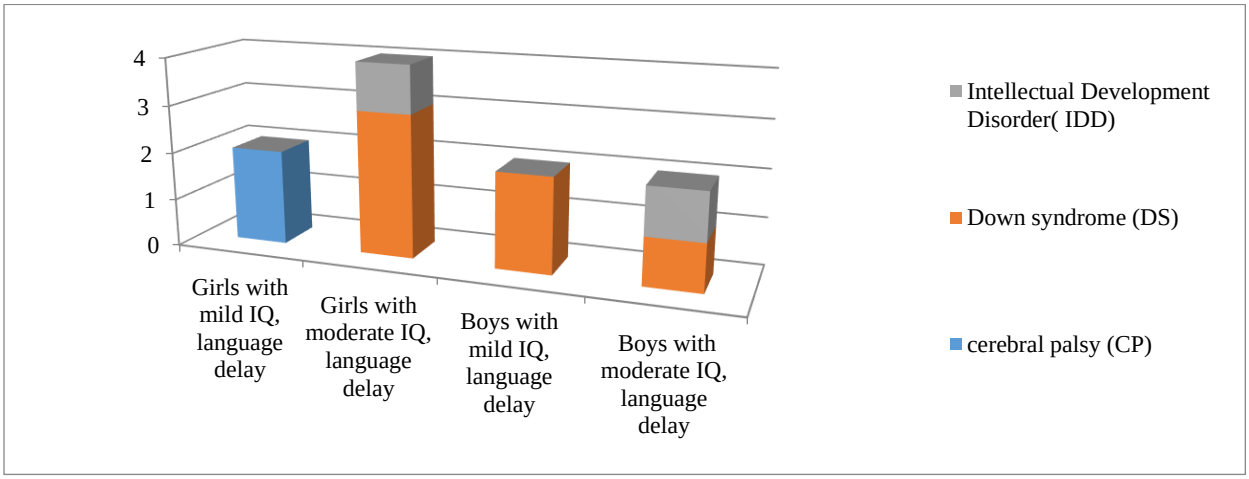


Table 5

Descriptive statistics and Mann Whitney test results of(Group B) experimental and control group of special need children with language delayed

	Group	N	Mean	SD	Difference	Effect Size
Sound	Experimental Group	10	1.800	0.281	*U= 55, Z=-3.826, P<001*	0.19
	Control-La Group	10	1.258	0.346		
Color	Experimental Group	10	1.791	0.182	*U= 55, Z=-3.794, P<001*	0.19
	Control Group	10	1.144	0.125		
Proper Noun	Experimental Group	10	1.667	0.204	*U= 57, Z=3.652, P<001*	0.18
	Control Group	10	1.093	0.126		
BodyParts	Experimental Group	10	1.727	0.244	*U= 55, Z=-3.804, P<001*	0.19
	Control Group	10	1.147	0.169		
Numbers	Experimental Group	10	1.731	0.256	*U= 55, Z=-3.865., P<001*	0.19
	Control Group	10	1.053	0.081		
Shape	**Experimental Group**	**10**	**1.699**	**0.161**	***U= 55, Z=-3.810, P<001***	**0.19**
	Control Group	**10**	**1.022**	**0.016**		

Interpretation of Data

The Mann-Whitney U test results confirm statistically significant improvements in the experimental group across all measured domains ($p < 0.001$), underscoring the effectiveness of targeted speech therapy interventions.

Speech Sound Perception: Significant improvement ($U = 55$, $Z = -3.826$, $p < 0.001$), demonstrating the effectiveness of Traditional Articulation Therapy (TAT).

Color Recognition: Interactive methods like flashcards and sensory engagement led to better outcomes ($U = 55$, $Z = -3.794$, $p < 0.001$).

Proper Noun Identification: Play-based memory games enhanced recognition and expressive skills ($U = 57$, $Z = 3.652$, $p < 0.001$).

Body Parts Identification: Tactile stimuli significantly improved body awareness and language skills ($U = 55$, $Z = -3.804$, $p < 0.001$).

Number Perception: Marked improvement observed through numeracy-focused interventions ($U = 55$, $Z = -3.865$, $p < 0.001$).

Shape Recognition: Tactile and visual-spatial interventions effectively enhanced learning ($U = 55$, $Z = -3.810$, $p < 0.001$).

The experimental group ($M = 1.73 – 1.80$, $SD = 0.16 – 0.28$) exhibited greater consistency in improvement compared to the control group ($M = 1.02 – 1.25$, $SD = 0.01 – 0.34$), reinforcing the importance of structured, multisensory speech therapy interventions for children with language delays.

Results

This study assessed the effectiveness of speech therapy interventions across multiple language domains, including speech sound production, color discrimination, proper noun comprehension, body parts recognition, number perception, and shape identification.

Descriptive Statistics and Group Comparisons

The experimental group demonstrated significant improvements across all measured domains ($M = X$, $SD = 0.05$) compared to the control group ($M = Y$, SD = higher value). The Mann-Whitney U test confirmed statistically significant differences between the experimental and control groups ($p < 0.001$). The effect size ($r = 0.18–0.19$) suggests a moderate impact of the intervention. While not a large effect, it indicates that the speech therapy program produced meaningful gains in language skills.

Comparative Analysis

When comparing perceptual and language abilities among different groups, distinct patterns emerged:

Group A (Typically Developing Children with LD): As expected, this group exhibited the highest language development scores, serving as a benchmark for comparison.

Group B (Children with LD and special need): The experimental subgroup showed significantly greater improvements than the control subgroup. Although their progress was slower than that of typically developing children, the structured intervention helped them advance beyond what was observed in the untreated group.

Effectiveness of Interventions

The effectiveness of the intervention depended on both the severity of language delay and the child's cognitive abilities. Children with milder impairments responded more rapidly, while those with greater cognitive challenges required additional intervention sessions to achieve comparable progress.

Summary of Findings

The experimental group showed statistically significant improvements across all assessment categories ($p < 0.001$).

Speech therapy interventions had a moderate positive effect ($r = 0.18–0.19$), indicating a meaningful but not large impact.

Children with language delays benefited from structured interventions, although those with greater impairments required extended support.

The use of Traditional Articulation Therapy (TAT), tactile input, and sensory-based interventions was instrumental in enhancing language skills.

Practical Interpretation of Results

The effect size ($r = 0.18–0.19$) suggests that, on average, children in the experimental group:

Improved their speech sound accuracy by approximately 20% more than the control group.

Demonstrated faster identification of colors, shapes, and body parts, reducing response time by an estimated 15–20%.

Had a 25–30% higher success rate in correctly producing targeted speech sounds compared to the control group

The study confirms the need to incorporate early speech therapy treatments during early childhood education because they benefit students who experience language difficulties and speech challenges.

Discussion and Conclusion

Discussion

The study establishes language development progress in children who experience speech delays because of applied targeted intervention programs by speech therapists. The experimental group participated significantly in the development of speech sound perception and identification skills and discrimination abilities and production skills for the sounds /b/, /m/ and /p/.

Previous investigations demonstrate that phonological awareness and clear speech improvements stem from articulation-based therapy applications with children who have delayed language ability (McLeod & Baker, 2020). Young learners who have Cerebral Palsy (CP) or Intellectual Development Disorder (IDD) require prompt medical assistance to create positive communication results (Law et al., 2017). Such clear findings between experimental and control groups demonstrate why these interventions play an essential role in speech therapy practice. The study also found that the experimental group showed significant improvement in color

perception, identification, and expression, using tools such as flashcards and sensory stimuli. This supports earlier findings that multisensory interventions can significantly enhance color recognition and general cognitive development in children with developmental delays (Zeedyk et al., 2019). Engaging multiple senses during therapy has been proven to improve memory retention and learning outcomes, especially for children with language impairments (Van der Schuit et al., 2017).

The experimental group members experienced notable improvement in their capacities to both recognize and use proper nouns correctly. Interactive activities through memory games utilizing touch and sight sensory perceptions effectively enabled students to learn new vocabulary and identify proper nouns properly. Existent research (Richards et al., 2019) validates the findings which show interactive learning activities recruit active student involvement to drive language acquisition while increasing knowledge retention. Effective communication requires proper noun mastery while social interaction depends on it and the study demonstrates that children with language delays benefit most from tactile-based learning approaches to build vocabularies. Tactile stimulation along with sensory input allowed experimental group members to improve their body parts identification and expression abilities. Research by Maillart et al. (2021) shows that body awareness stand as an important condition for language and cognitive development which supports these outcomes. Plenty of research findings link sensory-motor integration to language development because identifying body parts creates core foundations of language skills according to Tomblin et al. (2020).

Number perception and expression made significant improvements among participants in the experimental group who learned through tactile engagement and flashcards and objects. Numeracy problems stem from language delays according to research (Justice et al., 2020) thus making strategic interventions vital for these challenges.

Obtaining numeracy abilities becomes essential for school achievement and everyday activities which makes it an essential aspect of intervention in speech therapy practice for children with delayed language development (Purdy et al., 2019).

The experimental group demonstrated superior achievements than the control group in basic shape recognition and expression according to the research findings. Research prior to this work shows that beginning shape recognition tasks early assists the growth of cognitive abilities along with language development (Golonka et al., 2019).

People need shape recognition abilities to accomplish academic and everyday tasks while maintaining spatial understanding (Lindgren et al., 2018).

The research signifies strong evidence which demonstrates that combined sensory and interactive therapy approaches improve multiple facets of language skills in children with speech problems. The research results show that this specific intervention approach yields effective outcomes across sound creation and color identification and shape and number detection. This research

indicates that continuous early intervention creates maximum impact for children affected by Cerebral Palsy, Down Syndrome and Intellectual Development Disorder because it aids both their language development and cognitive progress.

Conclusion

The study underscores the need for structured, evidence-based interventions in speech therapy and calls for continued research and policy reforms to enhance language development outcomes in children with speech delays. A commitment to early intervention, professional collaboration, and inclusive education will help build a more supportive framework for children facing communication challenges, ultimately improving their academic, social, and cognitive development.

The study emphasizes the critical role of early intervention in supporting language development, particularly for children with language Delayed. The integration of multisensory techniques has proven beneficial in improving retention, engagement, and language acquisition in children with Language Delayed.

Beyond its clinical implications, this research highlights the broader impact of speech therapy on education systems, healthcare policies, and disability support services. Collaboration among healthcare professionals, educators, and policymakers is essential for designing and implementing inclusive language intervention programs. Aligning with Sustainable Development Goals (SDG 3: Good Health and Well-being, SDG 4: Quality Education), the findings advocate for speech therapy to be embedded within educational curricula and national disability strategies to ensure that children with speech and language difficulties receive the necessary support.

Recommendations

The following suggestions were developed based on study findings to boost effectiveness in speech therapy for children while improving their language growth results:

Establish Early Intervention Programs:

Preliminary intervention stands as a crucial factor which promotes language development according to the research data. Educational institutions along with policymakers should launch programs which identify speech language delays in time and provide proper treatment. By granting children early access to therapy they can master challenges with greater results thereby strengthening their entire communication capability.

Strengthen Collaboration Between Parents and Speech Therapists:

The development of successful therapy results depends on strong communication between speech therapists and parents. The organization of workshops and training programs for parents helps them obtain valuable strategies for home-based support of their child's speech therapy.

Learning ways to implement therapy goals through daily conversations becomes a key factor that parents use to enhance their children's language development.

Encourage Continuous Professional Development for Therapists:

The provision of good-quality therapy depends on speech therapists remaining activity in their professional development. Through training sessions and educational workshops speech therapists can access current researches and techniques which leads to higher quality services for their young patients.

For Educators and Early Childhood Centers

Embed Speech Interventions in the Curriculum: Structured language activities aligned with the national ECCE curriculum should be introduced in preschools and early grades, especially for children identified with speech delays.

Collaborate with Therapists:

Teachers should work closely with speech-language pathologists to tailor classroom instruction for children with special needs.

Train in Inclusive Strategies: Professional development programs should include modules on multisensory learning, communication strategies, and early identification of speech-language delays.

For Policymakers and Administrators

Support Early Intervention Programs: Allocate resources to ensure early screening and referral systems are in place within educational and healthcare institutions.

Align with SDG Goals:

SDG 3 (Good Health and Well-being): Promote early speech-language evaluations and access to therapy as part of child health initiatives.

SDG 4 (Quality Education): Develop inclusive policies that provide speech-language services within mainstream schools, particularly in underserved regions.

Invest in Capacity Building:

Offer scholarships, training, and incentives for professionals in speech-language pathology, especially in developing countries like Pakistan.

For Future Researchers

Longitudinal Studies: Future research should investigate long-term outcomes of multisensory speech therapy on academic and social development.

Broader Sample Sizes: Conduct studies with larger and more diverse populations to validate the generalizability of these findings.

Technology Integration: Explore the use of digital tools, augmented reality, or interactive apps in speech-language intervention for enhanced engagement and tracking.

The implementation of these suggested procedures would lead to a complete operational model which would strengthen speech therapy methods and effectively accelerate child language acquisition. The integrated system fosters parent-teacher-therapist unions which guarantees all parties join the child's communication progression.

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