

Effect of Parent-Mediated Pivotal Response Treatment in Improving Communication Skills of Children with Autism Spectrum Disorder

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Abstract

This study aimed to explore how parent-led pivotal response treatment (PRT) impacts the communication abilities of children diagnosed with Autism Spectrum Disorder (ASD). An ABAB research design was employed, consisting of four distinct phases. Three children with ASD, who met the inclusion criteria, participated in the intervention, receiving PRT administered by their parents. To assess outcomes, the researchers utilized the Social Communication Questionnaire, the Autism Diagnostic Interview-Revised, and the Vineland-3 Adaptive Behavior Scales focusing on communication. The effectiveness of the intervention for each child was analyzed through visual analysis, as well as comparisons of raw scores, v-scale scores, and standard scores. Findings revealed that parents were able to effectively learn and apply the principles of PRT, resulting in notable improvements in their children's communication skills. The study highlights that with thorough and structured training, parents can competently implement PRT techniques, leading to meaningful progress in the communicative development of children with ASD.

Keywords: *Autism spectrum disorder, Pivotal response treatment, Parent Mediated Intervention, Communication skill*

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Introduction

According to the Centers for Disease Control and Prevention (2014), Autism Spectrum Disorder (ASD) is a neurodevelopmental condition that emerges in early childhood and is characterized by challenges in communication, social interaction, and behavior. Children diagnosed with ASD frequently face difficulties in building social connections and often experience significant barriers in developing effective communication skills. Communication skills are how well the child exchanges information with others. Communication is based on the child's ability in three domains: Receptive, Expressive, and Written. Receptive communication involves the ability to attend to, comprehend, and appropriately respond to information shared by others. Expressive communication refers to a child's ability to use words and sentences to convey thoughts and ideas verbally. Written communication encompasses an individual's proficiency in reading and writing to express and interpret information.

Pivotal Response Treatment (PRT) is an intervention approach designed to enhance communication abilities in children with Autism Spectrum Disorder (ASD) (Coolican et al., 2010). It is grounded in the core principles of behavior modification, focusing on key areas such as motivation, the ability to respond to various cues, self-regulation, and initiating social engagement. PRT utilizes a child's natural interests—such as preferred toys, games, or activities—as tools to teach and reinforce positive social behaviors (Koegel et al., 2012). PRT is not just limited to mental health centers and educational settings; it can also be effectively implemented by parents in community settings such as homes due to its emphasis on natural environments (Hardan et al., 2015). Parent-mediated Pivotal Response Treatment refers to when a practitioner/researcher seeks to support a child by teaching

the child's parent how to teach the child using PRT strategies and acting as the child's intervention provider.

It is important to highlight that Ethiopia's cultural diversity leads to varying beliefs and interpretations regarding the causes and treatment of Autism Spectrum Disorder (ASD) in children. These differing perspectives on symptoms underscore the need for culturally appropriate diagnostic methods and intervention strategies. However, once a child is diagnosed with ASD, there are few available services in Ethiopia that offer psycho-education or facilitate referrals to specialized educational institutions (Ali & Kumar, 2022).

In rural regions of Ethiopia, which are home to approximately 80% of the population, diagnostic and educational services for autism are virtually nonexistent. In these communities, autism often goes unrecognized due to inadequate healthcare infrastructure, limited public awareness, and the presence of social stigma (Tekola et al., 2016). In addition, Autism-type symptoms are often seen as a punishment from God as a result of sin or the curse of the parents (Zeleke et al., 2018). In accordance with (Zeleke et al., 2018), parents hide their children with autism away from the community due to the fear of social exclusion and negative attitudes/judgments from others. The country's education and training policy of 1994 aimed to teach handicapped and gifted learners based on their potential and capacity (MOE, 1994). However, autism is not given enough attention by governmental or social stakeholders although it affects nearly 500,000 children in Ethiopia and has a significant impact on their overall well-being (Burton, 2016).

Parents of children with autism face challenges, especially managing their children's behavior, accessing assessment and early intervention services. They are also unable to effectively interact with their children. When this problem is coupled with poverty, it becomes unbearable for families (Ali & Kumar, 2022). In addition to

the lack of access to trained professionals in schools, there is no support system for families of children with autism since there are limited specialized centers that provide support for children with autism, it is the responsibility of parents or caregivers to provide interventions for ASD management (Zeleke et al., 2020).

It is known that there are many children with autism staying at home without intervention and schooling in Ethiopia due to financial constraints, lack of awareness, shortage of assessment and intervention centers, schools' refusal to admit children with autism, and poor-quality service by schools (Ali & Kumar, 2022).

In Ethiopia, there is a shortage of autism therapists in the country (Tekola et al., 2016). It is known that Autism is a lifelong disorder that needs intensive and continuous support. Currently, it is observed that some individuals are opening private autism centers in Ethiopia; however, they are very expensive, and as a result, many parents cannot afford the cost of early intervention services in private mental health centers. It is believed that mediation service is highly valued and relevant in the context of Ethiopia.

In light of this, the study aimed to explore the following research question: Can training parents in the effective application of Pivotal Response Treatment (PRT) lead to improvements in the communication abilities of their children with Autism Spectrum Disorder (ASD)?

Research Methods

Design

This study utilized a Single-Subject Research Design, specifically the ABAB reversal design, which is one of the most commonly used formats in this methodology. The ABAB design was chosen to evaluate the effects of the intervention on individual participants. Single-subject designs are particularly effective in establishing causal links between specific interventions and behavioral changes (Nock, Matthew, Michel, & Photos, 2007). In this study, the ABAB sequence consisted of four distinct phases: A1 (baseline), B1 (intervention), A2 (withdrawal of the intervention), and B2

Participants

The study was conducted in Addis Ababa, Ethiopia, where a significant number of children with ASD reside. The children and the parents selected for the study were purposively chosen from targeted schools in Addis Ababa. The schools were targeted due to the reason that they admit children who are thought to have autism. The school first identified twelve children who were struggling with language, communication, and social interaction. A social communication questionnaire (SCQ) was administered to the twelve identified children. Five students who scored ≥ 15 (the cut-off score for further assessment) on the SCQ were referred for ASD assessment. The screened children underwent an Autism Diagnostic Interview-Revised, and three children diagnosed with ASD were targeted for the current study.

The PRT intervention was carried out by parents in the participants' homes. Purposive sampling was applied to select the targeted participants who had children with ASD. Purposive sampling is a suitable method for research involving specific contexts or populations. It involves selecting participants based on the informed judgment of an expert or targeting individuals who meet particular criteria relevant to the study's objectives (Bernard, 2002). Parents that fulfilled the inclusionary criteria were selected from regular schools. The inclusionary criteria were:

- Parents/Guardians willing to diagnose their children
- Parent/ Guardian who never took PRT before this research

- Parents/ Guardian willing to commit to the training and implementation process for up to 15 weeks;
- Parents or guardians who do not wish to enroll their children with ASD in specialized therapies such as speech or ABA therapy, in addition to the current study intervention, from the beginning to the end of the study.
- Parents/ Guardian having children with autism ages between two and eight years old;
- Parents/Guardian who completed grade 12

Research Instruments

The study utilized standardized assessment tools to evaluate children diagnosed with Autism Spectrum Disorder (ASD). These tools included the Social Communication Questionnaire (SCQ, Lifetime Form), the Autism Diagnostic Interview-Revised (ADI-R), and the Vineland-3 Adaptive Behavior Scales – Third Edition, specifically focusing on the communication domain. To ensure accessibility and accuracy, all instruments were translated into Amharic—the native language of the participants—by two qualified language experts.

The SCQ served as a preliminary screening tool to identify children who may present symptoms consistent with ASD. It was not designed to deliver a definitive diagnosis, but rather to flag individuals who might require more detailed evaluation. The SCQ comprises 40 yes-or-no questions and can be scored quickly—typically within five minutes. Each question is scored dichotomously: responses indicating atypical behavior are scored as 1, while typical or absent behaviors are scored as 0. A total score of 15 or above suggests the potential presence of ASD and signals the need for comprehensive diagnostic assessment.

To confirm the diagnosis, the Autism Diagnostic Interview-Revised (ADI-R)

was employed. This structured interview is divided into five sections: introductory questions, communication-related items, questions about social development and play, repetitive and restricted behaviors, and general behavioral concerns. Only children without co-occurring conditions were included in the diagnostic process.

Communication skills—the dependent variable in this study—were measured using the communication domain of the Vineland-3 comprehensive semi-structured interview. This tool was used to assess each child's communication abilities both before and after the intervention. The communication domain evaluates how effectively a child conveys and receives information and includes three subdomains: receptive, expressive, and written.

- The **receptive subdomain** examines a child's ability to attend to, understand, and appropriately respond to communication from others. Key content areas include comprehension of nonverbal cues, understanding spoken language, identifying objects, following directions, and processing informational content.
- The **expressive subdomain** measures how children use language—words and sentences—to verbally express their thoughts and ideas. This includes areas such as early vocabulary development, grammar, self-identification, and general self-expression.
- The **written subdomain** evaluates reading and writing skills. It covers pre-literacy skills, the development of basic reading and writing abilities, and the functional use of those skills in daily life.

Each item within the subdomains is organized in a developmental sequence from simpler to more complex behaviors. Items scored as 0 (not performed independently) or 1 (sometimes performed independently) represent skills that the child has not yet mastered and were selected as targets for intervention. The highest score, 2, indicates full mastery of a skill.

Interviews were conducted by trained, independent research assistants who used open-ended questions to elicit detailed responses from the parents. Based on

these narratives, the interviewers assigned scores to the appropriate items. In total, the communication domain contains 109 items, divided as follows: 49 in the expressive subdomain, 39 in the receptive subdomain, and 21 in the written subdomain.

Research Procedures

Phase 1: Baseline

During the baseline phase, the communication abilities of the selected children were assessed using the communication domain of the Vineland-3 Adaptive Behavior Scale. Two independently trained data collectors conducted multiple assessments (six times over one month) at the participants' homes until the data stabilized. Each parent interview took approximately 40 minutes to cover all 109 items in the communication domain.

Phase 2: Parent Training – Pre-Intervention

Parents underwent a five-day training program on Pivotal Response Treatment (PRT), with sessions lasting three hours each day. The training covered fundamental concepts of Autism Spectrum Disorder, the Antecedent-Behavior-Consequence framework, and Applied Behavioral Analysis. Parents also received instruction on implementing PRT, including antecedent components such as gaining the child's attention, presenting clear cues, mixing familiar and new tasks, sharing control, and using multiple cues. Additionally, they learned about prompting and consequent components, which involve providing direct, contingent reinforcement and encouraging attempts. Training methods included lectures, video demonstrations, worksheets, and role-playing exercises. A comprehensive PRT manual in Amharic, adapted to the Ethiopian context but faithful to the original steps, was provided. While the procedural steps remained unchanged, culturally relevant examples were incorporated to enhance understanding. The trainer offered ongoing feedback, addressed questions, and reviewed worksheets and role-plays. Parents were also briefly introduced to how fidelity of PRT implementation would be assessed. After each session, they were instructed to practice the PRT techniques at home.

Parents' fidelity to PRT was measured using a checklist developed by the National Professional Development Center on Autism Spectrum Disorder, translated into Amharic without modification. To be considered proficient, parents had to achieve at least 80% accuracy across three consecutive sessions. Following training completion, parents began delivering PRT to their children. Table 6 displays the fidelity results.

Phase 3: Parent-Implemented Intervention

During this phase, parents applied the communication strategies learned, interacting with their children according to the PRT procedures. The researcher and trained assistants observed sessions without providing coaching or modeling but took detailed notes. This phase lasted eight weeks, with PRT sessions held five days a week, each lasting one hour. All sessions took place at the participants' homes between 4:30 and 5:30 p.m. To minimize external influences, parents were informed about the study's objectives and procedures. None of the children received other specialized therapies such as speech or ABA therapy during this time.

Phase 4: Intervention Withdrawal

The intervention was paused entirely for four weeks. Parents were instructed not to provide any PRT during this period but were informed that the intervention would resume afterward.

Phase 5: Intervention Reintroduction

Following the break, parents resumed PRT delivery for another four weeks, maintaining the same schedule of five days per week and one-hour sessions between 4:30 and 5:30 p.m. at home.

Phase 6: Follow-Up

Two months after the intervention ended, the two independent data collectors and the researcher revisited the participants' homes to assess whether children had retained the gains made through parent-mediated PRT. During this period, the researcher conducted six interviews with parents to gather additional information.

Data Collection

Three parents who met the specified criteria were selected to serve as interventionists in the study. Two independently trained research data collectors administered the communication domain of the Vineland-3 Adaptive Behavior Scale. The children's communication skills were assessed at multiple stages: baseline, intervention, withdrawal, re-intervention, and follow-up phases. The data was collected at the participants' home in different sessions. Sessions are the specific times when trained data collectors interview respondent parents, and when parents provide PRT intervention for their children (Intervention phase and Re-intervention phase). The study consisted of 72 sessions. Each child underwent a baseline assessment (A1) six times, which was conducted during sessions one to six. The baseline phase lasted 47 days, with interviews conducted every seven days.

Data were collected six times during the intervention phase (B2) which began in session seven and ended in session 42. The data were collected every six sessions, specifically in sessions 13, 19, 25, 31, 36, and 42. Similarly, the withdrawal phase data (A2) was collected six times as well. The intervention involved a withdrawal period of one month, during which the withdrawal phase interview was conducted

every three days. The withdrawal phase data was collected in sessions 43, 44, 45, 46, 47, and 48.

The re-intervention phase, also known as B2, lasted one month, starting from session 49 to session 66. During the B2 sessions, data was collected every three sessions, specifically in sessions 51, 54, 57, 60, 63, and 66. The final phase of the research was the follow-up phase, which involved measuring the children's communication skills in sessions 67 to 72. Follow-up data was collected once a week for six consecutive weeks.

To ensure consistency and minimize variability between interviewers, two trained data collectors independently gathered data and evaluated the level of agreement between their assessments. After each administration of the Vineland-3 communication domain, the inter-interviewer agreement was reviewed. An agreement rate of 90% or higher was established as the criterion for acceptable consistency.

Data Analysis

To evaluate changes in the children's communication skills across the pre-intervention, post-intervention, and follow-up phases, performance data were analyzed and compared using line graphs. These visual representations, alongside visual inspection techniques, helped identify trends and response patterns across the baseline, intervention, withdrawal, re-intervention, and follow-up phases. Given the single-subject research design, each child's data was analyzed individually.

Quantitative analysis involved examining raw scores, v-scale scores, and standard scores. The raw scores for each subdomain—receptive, expressive, and written—were calculated as the average of repeated measures, while the communication domain score represented a composite of these three subdomains. Each subdomain's scores were converted into v-scale scores, which have a mean of 15 and a standard deviation of 3, with a possible range from 1 to 24. The overall communication domain score

Communication domain standard scores of 86 or above were classified as adequate or above adequate, scores between 71 and 85 were considered moderately low, and scores below 70 indicated significant deficits compared to peers of similar age.

To measure the intervention's impact, effect sizes were calculated individually for each child using Cohen's d for Z-tests. This was done by subtracting the population mean (pre-treatment score) from the sample mean (post-treatment score) and then dividing the result by the population standard deviation (15).

Ethical Considerations

This researcher secured a Certificate of Ethical Clearance from Addis Ababa University; Department of Special Needs and Inclusive Education Institutional Review Committee. The names that are mentioned in this article are all pseudonyms. The research participants were informed about the objective of the study, and all of the training was given based on their informed consent. In this research, the participants were notified about their right to decide of their free will and to withdraw or drop out after training/intervention began if discomforted. Parents were informed about the confidentiality of the information they would provide and that their privacy would be fully respected.

Results

Three mothers of children with Autism participated in the study as interventionists.. The age range of the parents' was 28-35.

The result of each child is discussed separately. The findings are described and presented in figures and tables based on the children's intervention outcome. The scores of each child in different sessions and phases are shown in Figures 1, 2, and 3. The baseline phase took place from sessions one to six. The intervention phase started with session seven and lasted until session 42. The withdrawal phase began in session 43 and ended in session 48. Re-intervention was introduced in session 49 and lasted until session 66. Finally, the follow-up session was conducted from sessions 67 to 72. Tables 3, 4, and 5, display the communication skills raw scores, v-scale scores, overall composite raw scores, and standard scores.

Table 1

Parents' Demographic Characteristics

Parents	Yakob Mother	Feven Mother	Elias Mother
Age	32	28	35
Education Level	BA Degree	Diploma	BA Degree
Occupation	Accountant	Tailor	Unemployed
Relationship with the Child	Biological Mother	Biological Mother	Biological Mother
No of Children	2	1	3

Table 2

Targeted Children Demographic Characteristics

Targeted Children	Age Year and month	Sex	Diagnosis	Intervention setting	Interventionist	Any other medical Diagnosis
Yakob	4:1	Male	ASD	Home	Mother	Low vision
Feven	4:5	Female	ASD	Home	Mother	None
Elias	5:2	Male	ASD	Home	Mother	None

Yakob's Communication Skill

Yakob's communication abilities were assessed in three areas: Receptive, Expressive, and Written. These scores were used to determine his communication domain raw score, v score, and standard score. During the baseline sessions, Yakob scored below average in receptive, expressive, and written language skills. However, his written score was higher than his receptive and expressive scores. Yakob's average raw score was 35, with a range of 33-36, and a standard score of 8. However, as depicted in Figure 1, Yakob's communication skills significantly improved during the Intervention phase, with an average raw score of 71.5, a range of 42-93, and a standard score of 24. This raw score was twice as high as the baseline score.

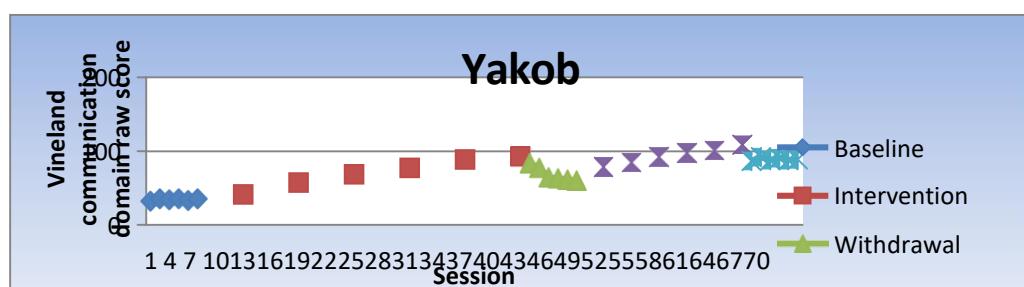


Figure 1: Yakob Vineland Adaptive Behavior Scale Communication Domain Raw Score

Yakob's ability to receive information from others improved by attending to cues, understanding communication, and responding appropriately. This includes following his parent's gaze or pointing when they wanted his attention, understanding gestures, identifying objects and body parts in pictures, answering questions, and recognizing actions shown in pictures. Yakob's ability to communicate verbally

improved significantly. After the intervention, he could use common words more fluidly, named objects, and addressed his siblings and peers by name. Additionally, he was able to say his name, use one-word requests, and describe actions. Yakob also made progress in his written communication skills. Furthermore, He was able to hold a book and turn pages correctly while reading. He recognized simple signs, icons, and symbols, and was able to identify his name in printed form. Furthermore, he was able to write his name correctly by copying it.

During the Withdrawal phase, Yakob's communication skills declined, with an average raw score of 69, a range of 61-84, and a standard score of 23. His ability to understand and respond to cues and information from others declined after the removal of the intervention. He had difficulty identifying objects and body parts in pictures and answering questions. Additionally, he lost some words he had learned and struggled to address his siblings and peers by name. Yakob also had difficulty saying his name and describing his actions. He even forgot some simple symbols and had trouble writing his name.

However, during the re-intervention phase, Yakob's communication skills improved, with an average raw score of 94, a range of 79-109, and a standard score of 32. This phase had Yakob's highest score of all phases. Two months later, follow-up sessions were conducted at the participants' homes using the methods previously used. The results indicate that Yakob persisted in applying the communication intervention although the follow-up score was not precisely the same as the intervention phase. Throughout the follow-up phase, Yakob achieved an average raw score of 89.1, ranging from 87 to 92 and a standard score of 30. The study revealed a significant

contrast between Yakob's initial and follow-up communication ability scores, with an intervention effect size of 1.4

Table 3

Yakob Communication Skill Score Summary

Communication Subdomain	Baseline Raw Score	Baseline v-Score	Intervention Raw Score	Intervention v-Score	Withdrawal Raw Score	Withdrawal v-Score	Re-intervention Raw Score	Re-intervention v-Score	Follow-up Raw Score	Follow-up v-Score
Receptive	19	1		7	36	7	48	10	45.1	9
			36							
Expressive	15	1	30.5	2	28	2	38	5	36	7
Written	3	9	5	11	5	11	8	12	8	12
Overall composite Raw Score		37		71.5	69		94		89.1	
Standard Score			8		24		23		32	
										30

Feven's Communication Skills

Feven's communication skills were assessed based on three subdomains: Receptive, Expressive, and Written, which contributed to the calculation of her communication domain raw score, v-score, and standard score. As indicated in Table 4, during the baseline sessions, Feven scored below average in receptive, expressive, and written language skills. However, her written score was higher than her receptive and expressive scores. Feven's average raw score was 37.6, falling within the range of 36-38, and her standard score was 8. However, after the intervention began, Feven's communication abilities significantly improved as indicated by her average raw score

of 72.5 during the Intervention phase, with a range of 48-95. Her standard score during this phase was 25. Compared to her baseline score. Her intervention phase score was almost double, demonstrating excellent progress.

Feven demonstrated notable progress in her receptive skills by effectively paying attention, understanding, and responding to information from others. For example, she followed her parents' gestures to focus her attention, responded quickly when her name was called, followed instructions, comprehended gestures, identified objects and body parts in pictures, answered questions, and recognized actions shown in images. Additionally, Feven's expressive abilities improved as she began using words to communicate more clearly. She repeated familiar words, named objects, addressed siblings and peers by their names or nicknames, used simple words like "no" and "yes," made one-word requests, and named various actions. Furthermore, her reading and writing skills also advanced. She was able to hold a book properly, turn its pages, recognize both uppercase and lowercase letters, identify simple signs and symbols, recognize her printed name, and correctly write her first name.

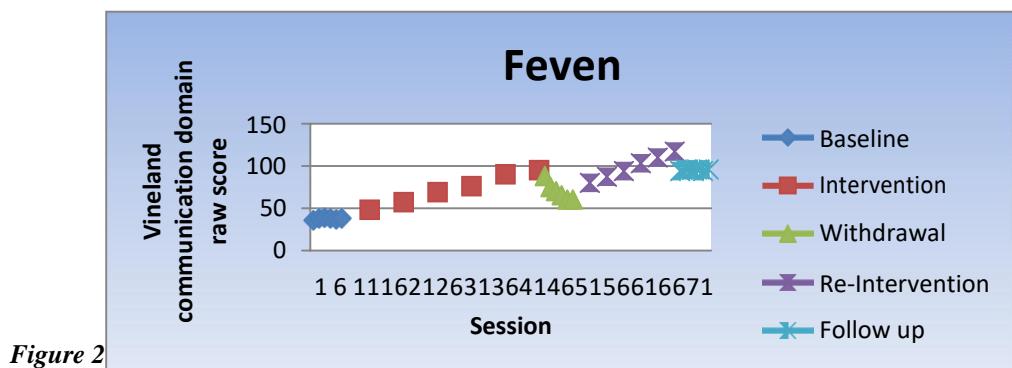


Figure 2

During the withdrawal phase, Feven's communication skills showed a noticeable decline, with an average raw score of 69.6 (ranging from 60 to 88) and a standard score of 23. Once the intervention was paused, her ability to attend to and respond appropriately to others' communication decreased. She experienced difficulties following her parents' gestures and identifying actions shown in pictures. Similarly, her expressive skills weakened, as she struggled to name objects. Additionally, her writing abilities declined; she found it challenging to recognize uppercase and lowercase letters, identify simple signs, icons, and symbols, recognize her printed name, and accurately write her first name.

During the re-intervention phase, Feven's communication skills improved significantly, with an average raw score of 98.5 (range: 80-117) and a standard score of 33. It is worth noting that Feven's highest raw score was achieved during the re-treatment phase, which surpassed all previous phases. The participants had follow-up sessions at their homes after two months. The procedures were the same as the baseline, intervention, withdrawal, and re-intervention sessions. Feven did well during this phase, with an average raw score of 95.1 and a range of 94-96. Her standard score increased to 32, which was more than twice her baseline score of 8. The intervention had a significant impact, with an effect size of 1.6, indicating improvement from Feven's baseline to the follow-up standard score.

Table 4

Feven's Communication Skill Score Summary

Communicat ion Subdomains	Baselin e Raw Score	Basel ine v- on Scale	Interventi on Raw Score	Intervent ion Raw Score	Withdr awal Raw Score	Withdra wal v- on Scale Score	Re- interventi on Raw Score	Re- intervent ion Raw Score	Follow -up Raw Score	Follow -up v- Scale Score
Receptive	18.4	1	40	5	38.5	7	56.2	8	56	8
Expressive	14	1	24.5	1	23.1	1	30.3	2	29	1
Written	5.2	9	8	11	8	11	12	13		10.1
Overall Composite Raw Score		37.6		72.5		69.6		98.5		95.1
Standard Score	8			25		23		33		32

Elias's communication skill

The scores for the communication domain are based on three subdomains: Receptive, Expressive, and Written. As Table 5 shows, during the baseline phase, Elias scored below average in receptive, expressive, and written language skills. However, his written score was higher than his receptive and expressive scores. Elias had an average raw score of 39.6 in the baseline sessions, with a range of 38-40 and a standard score of 9. However, when the intervention began, Elias's communication skills improved significantly. During the Intervention phase, his average raw score was 63.6, with a range of 45-75, and a standard score of 21.

Since Elias received intervention, his receptive skills have improved significantly. He can now attend to information from others, understand it, and respond appropriately. Furthermore, he could now follow instructions, interpret gestures, identify objects and body parts in pictures, answer questions, and identify

actions in pictures. Elias's expressive skills also enhanced, and he could now use words to express himself verbally. He was able to repeat common words, name objects, call his siblings and peers by their name, say his first name, say "no," make one-word requests, say "yes," name actions, and state his age when asked. In addition, Elias's written skills improved, and he used reading and writing skills effectively, including holding a book and turning pages correctly, recognizing simple signs, icons, and symbols, his name in printed form, identifying alphabet letters (both upper- and lowercase), and copying his first name correctly.

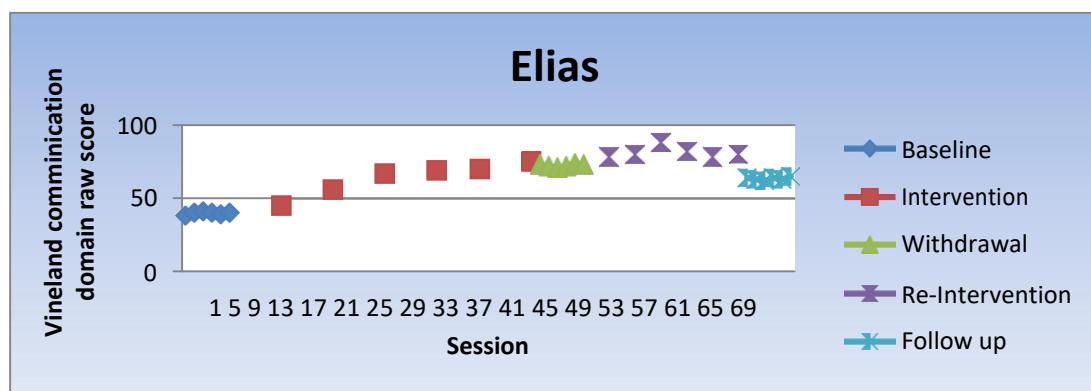


Figure 3: Elias Vineland Adaptive Behavior Scale Communication Domain Raw Score

The withdrawal phase showed that Elias's communication skills remained stable, with an average raw score of 72.5 and a standard score of 25. During the Re-intervention phase, Elias's communication skills improved again, with an average raw score of 81 and a standard score of 28, which was the highest score of all phases. Two months later, the follow-up sessions showed that Elias maintained the intervention, with an average raw score of 63.5 and a standard score of 21. Comparing Elias's baseline standard score to his follow-up standard score, the intervention had a significant effect size of 0.8.

Table 5

Elias's Communication Skill Score Summary

Communication Subdomains	Baseline Raw Score	Baseline v-Scale Score	Intervention Raw Score	Intervention v-Scale Score	Withdrawal Raw Score	Withdrawal v-Scale Score	Re-intervention Raw Score	Re-intervention v-Scale Score	Follow-up Raw Score	Follow-up v-Scale Score
Receptive	18.2	1	33.3	4	37.1	6	40.5	7	30.4	3
Expressive	15.4	1		1	24.4	1	27.3	1	21	1
			20.1							
Written	6	7	10.2	9	11	10	13.2	11	12.1	11
Overall composite Raw Score		39.6		63.6	72.5		81		63.5	
Standard Score		9		21	25		28		21	

Table 6

Fidelity Assessment

Trainee	Yakob Mother	Feven Mother	Elias Mother
Fidelity of trial 1	Implementation: 81%	83%	82%
Fidelity of trial 2	Implementation: 83%	85%	83%
Fidelity of trial 3	Implementation: 85%	86%	86%

Note. Parents' fidelity to the implementation of PRT was measured before the intervention began. Parents demonstrate PRT with children who were not the target of this research. The above scores of each parent are the scores of three consecutive sessions.

Discussion

The parents who served as interventionists in this study were mothers, who demonstrated strong dedication, active participation, and consistent effort throughout the research. The role of mothers in autism research and early intervention has been frequently highlighted (Flippin & Crais, 2011), with fathers often underrepresented in such studies. For example, Seung et al. (2003) found that fathers of children with ASD engaged less in parallel play compared to mothers, tended to be more directive, and were less consistently responsive.

Parents are essential agents in enhancing the communication abilities of children with ASD. Pivotal Response Treatment (PRT) specifically involves parents as primary intervention providers (Koegel & Koegel, 2006). To effectively support their children, parents need ongoing education to understand autism and their child's specific needs. Recent research indicates that parents can be successfully trained to implement PRT and provide meaningful support. This aligns with findings from Erbas et al. (2020), where trained parents showed increased self-confidence and efficacy, reduced anxiety and stress, and engaged more responsively with their children, resulting in improved vocabulary, receptive language, and overall communication development.

Consistent with previous studies such as Garnett et al. (2022a), the current research demonstrated that parent-delivered PRT significantly enhanced children's communication skills across receptive, expressive, and written domains. Garnett and colleagues reported that parents who received autism intervention training improved their children's responsive communication, with children showing more frequent initiation and responses in social interactions and greater joint attention. Additionally, parents gained confidence and awareness of their interactive behaviors following training.

Specifically, children in this study showed notable improvements in expressive language, effectively using words and sentences to communicate verbally.

Supporting these findings, Sokum et al. (2017) reported that parents participating in a parent-mediated program increased their use of responsive strategies—such as simplified language, playful physical contact, imitation, and expansions—more than parents in control groups. Consequently, children exhibited significant gains in communication, receptive and expressive language, and overall development.

The children also showed advancements in receptive skills, with enhanced understanding and appropriate responses to communicated information. Following parent-led PRT, vocabulary and language skills improved, echoing results from Girolametto et al. (2007), who found that parent-mediated interventions led to more responsive parent-child interactions, larger child vocabularies, more frequent communication, and greater participation in turn-taking.

Early introduction of reading and writing in enjoyable and engaging ways is vital. In this study, children enhanced their literacy skills through practice during the intervention. Similarly, Kashinath et al. (2006) demonstrated that parents could effectively apply teaching strategies during daily routines at home, generalizing skills across activities including reading and writing.

Overall, the study found that all participating children with ASD showed improvement and maintenance of communication skills. A follow-up study by Suhrheinrich et al. (2013) also reported positive outcomes in children whose trained parents delivered intensive behavioral interventions. Empowering parents to actively engage in their children's therapy is a cost-effective approach, as children are often more responsive to their caregivers.

This research emphasizes the importance of considering family sociocultural contexts and daily routines when designing interventions. Integrating therapy within family activities provides valuable opportunities for social communication and behavioral learning, while fostering positive family interactions. Parents, as primary caregivers, play a critical role in early intervention programs, and their direct involvement leads to enhanced skill development. Teaching parents to facilitate

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communication and social skills at home is both practical and beneficial. Jull and Mirenda (2011) found that parents are capable of acquiring the skills necessary to effectively support communication in the home environment.

In Ethiopia, there is a significant shortage of autism specialists relative to the number of children with ASD (Tekola et al., 2016). In such settings, parent-mediated therapy is particularly recommended. Since communication difficulties are among the core challenges faced by children with autism, empowering parents to address these skills is essential.

Conclusion

This study aimed at investigating the impact of parent-mediated PRT on improving the communication abilities of children diagnosed with ASD. The findings revealed that parent-mediated PRT had a significant effect on enhancing the communication skills of children with ASD. Specifically, the results showed that this intervention improved the children's receptive language, which included their ability to attend, understand, and respond appropriately to information from others. Additionally, it enhanced expressive language, which pertains to the child's use of words and sentences to express themselves verbally, and written language skills, which involve the use of reading and writing. Notably, children who received parent-mediated PRT retained the learned communication skills.

Implication

A recent study has shown that children with ASD experience significant improvement when receiving parent-delivered Pivotal Response Treatment (PRT). The study found that implementing these interventions led to improved receptive, expressive, and written communication skills in children with ASD. Improved communication skills can also positively impact behavior and social interaction. Additionally, the study found that children with ASD could maintain the communication skills they learned. Access to effective Applied Behavior Analysis (ABA) training can also help ensure that all students with autism have access to evidence-based interventions, regardless of geographic or socioeconomic barriers.

It is unlikely that there will be a quick solution to the shortage of highly qualified teachers and therapists, while the number of students with autism spectrum

disorder continues to increase (Christensen et al., 2012). Therefore, parents of children with ASD require specialized levels of appropriate instruction and supervision. As discussed above, research has shown that when Pivotal Response Treatment (PRT) interventions are deemed necessary for a student with autism, parents receive intensive training to learn techniques and deliver interventions with fidelity. Training parents on interventions can substantially improve their understanding of autism characteristics and how to address their children. This training is essential regardless of the availability or quality of in-person professional development and enables parents to enhance the skills of children with ASD.

The findings of this study have important implications for other researchers. As the study was conducted with only three participants, the results cannot be applied directly to the wider population. It is, therefore, important to replicate the intervention for children with disabilities in general, and specifically for children with ASD. Early intervention programs aimed at improving communication skills are crucial, as they have a significant impact on the overall development of children with ASD. In order to generalize results to all students with ASD in Ethiopia, further research is needed on mediated intervention and the recommendations that can be drawn from it. However, the findings of this study suggest that parent-mediated PRT were effective in enhancing the communication abilities of children with ASD.

Declaration of interest statement

The authors confirm that there are no conflicts of interest. They have no financial or personal relationships that could have inappropriately influenced the research presented in this article.

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