Applied Behavior Analysis in Autism : A Clinical Perspective

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Abstract: Background : Children with Autism Spectrum Disorder (ASD) generally experience difficulties in communication skills, both verbal and nonverbal. These difficulties impact social interaction and academic development in children. Objective: This study aims to determine the effectiveness of Applied Behaviour Analysis (ABA) in improving communication skills in children with Autism Spectrum Disorder (ASD). Method : Three children aged 4, 5, and 6 years, diagnosed with moderate-level ASD using the Childhood Autism Rating Scale (CARS), participated in the study. A six-month ABA intervention was administered individually, incorporating Discrete Trial Training (DTT), prompting, and positive reinforcement. Communication outcomes were measured pre- and post-intervention using the Vineland Adaptive Behavior Scales (VABS), supported by direct observation and parent interviews. Data were triangulated across multiple sources. Result : Participant A1, who participated for 4 years, showed modest improvements across all categories. For example, their RSP score increased from 45 (RSPe) to 60 (RSPo), while TTL scores rose from 30 (TTLPe) to 42 (TTLPo). Participant A2, with 5 years of engagement, exhibited more pronounced progress. Their RSP scores improved from 52 to 70, and TTL scores increased from 40 to 55, reflecting consistent gains across emotional expression and overall performance. Participant A3, who had the longest participation (6 years), achieved the highest scores in all areas. Their RSP scores increased from 60 to 78, EXPe to EXPo from 58 to 76, and TTL scores from 50 to 68, indicating strong developmental outcomes over time. Conclusion : The results of the VABS and CARS before and after the intervention showed significant improvement. These findings indicate that ABA therapy is effective in developing communication skills and reducing the severity of symptoms in children with ASD. Result : The implications of these results reinforce the importance of early behavioural-based intervention in therapy programmes for children with autism.

Keywords: ABA; Autism Spectrum Disorder; CARS; Communication; VABS.

1. Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by persistent deficits in social communication and interaction, alongside restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2022). ASD encompasses a spectrum of disorders, including classic autism, Asperger's syndrome, and Pervasive Developmental Disorder–Not Otherwise Specified (PDD-NOS), which are now grouped under a single diagnosis due to shared features and varying severity (Matson, 2021; Volkmar & Lord, 2021).

The core impairments in ASD typically manifest in two primary domains: (1) difficulties in social communication—such as poor reciprocal interaction, limited use of nonverbal cues (e.g., eye contact, gestures), and difficulty forming age-appropriate relationships—and (2) restricted behaviors, including stereotypical movements (e.g., hand flapping, echolalia), inflexibility to change, intense focused interests, and abnormal sensory responses (Lord et al.,

2018; Freeman, 2024; McFayden, Kennison, & Bowers, 2022; Shimomura et al., 2022; Silva et al., 2025; Castro et al., 2024).

Globally, ASD is recognized as a significant public health concern, with the World Health Organization (2023) estimating a prevalence of approximately 1 in 100 children. In Southeast Asia, including Indonesia, prevalence rates have increased over the past two decades, reaching around 0.6% (Shrestha, 2024). In Indonesia alone, an estimated 2.4 million children live with ASD, with approximately 500 new cases reported annually (Ministry of Health of the Republic of Indonesia, 2018). However, limited access to diagnostic services, lack of trained professionals, and persistent social stigma hinder early detection and appropriate intervention (Fitriyani & Haryono, 2024; Deva et al., 2025; Crane et al., 2022).

Communication deficits, both verbal and nonverbal, are among the most pressing challenges faced by children with ASD. These difficulties can severely restrict academic progress and social functioning, especially in early childhood when language development is critical. Despite the known benefits of early intervention, many Indonesian children are diagnosed late, often after preschool age, due to low public awareness and service gaps (Crane et al., 2022; Deva et al., 2025).

Applied Behaviour Analysis (ABA) is one of the most empirically validated interventions for ASD. ABA employs behavioral learning principles—such as reinforcement, shaping, prompting, and stimulus control—to teach adaptive behaviors and reduce maladaptive ones (Cooper et al., 2020; Kazdin, 2017). It is individualized, data-driven, and structured to address specific deficits in communication, cognition, and daily functioning.

2. Preliminaries or Related Work or Literature Review

Previous research has shown that intensive ABA programs (20–40 hours/week) implemented across home, school, and clinical settings lead to significant improvements in communication, social interaction, and academic readiness in children with ASD (Chandrawijaya, 2021; D. Granpeesheh et al., 2017; Liang, 2020).

However, despite the growing international evidence supporting the efficacy of ABA, empirical research evaluating its impact on communication development among children with ASD in Indonesia remains scarce. Most existing studies in the region focus on quantitative outcomes or clinical diagnostics, with limited use of in-depth, qualitative case-based approaches that can capture nuanced behavioral changes and contextual dynamics. This lack of localized, qualitative evidence creates a gap in understanding how ABA functions in real-world Indonesian therapy settings, especially in terms of parental involvement, cultural responsiveness, and day-to-day communication improvements.

Therefore, this study aims to qualitatively explore the effectiveness of Applied Behaviour Analysis (ABA) therapy in improving receptive, expressive, and written communication skills in children with Autism Spectrum Disorder (ASD), based on individual case analysis.

3. Proposed Method

3.1 Study Design

This study employed a qualitative case study design with methodological triangulation, aiming to explore in-depth the effects of Applied Behaviour Analysis (ABA) therapy on communication development in children with Autism Spectrum Disorder (ASD). Triangulation was used across data sources (observations, interviews, and assessments) to enhance validity and credibility of the findings.

3.2 Setting and Participants

The research was conducted at the Precious Semarang Psychologist Practice in Central Java, Indonesia. The participants were selected using purposive sampling based on the following inclusion criteria: Diagnosed with ASD using the Childhood Autism Rating Scale (CARS), Aged 4–6 years, Demonstrating deficits in communication (verbal and/or nonverbal), Attending regular ABA therapy at the institution, Committed to full participation with informed consent signed by parents/guardians. Three children were selected as participants: Participant A1 (age 4), Participant A2 (age 5), Participant A3 (age 6)

All three participants were classified within the moderate autism category at baseline (CARS scores between 34.5 and 37.5), indicating measurable but modifiable impairments in communication and behavior (Volkmar & Lord, 2021; Freeman, 2024).

3.3 Intervention Procedure

Participants received individualized ABA therapy over a 6-month period, consisting of: 48 structured in-clinic sessions (once or twice weekly), each lasting 60 minutes, 7 hours of weekly home-based ABA activities, supervised by parents and monitored by therapists. The therapy incorporated core ABA techniques as described by Cooper et al. (2020) and Matson (2023), including: Discrete Trial Training (DTT): Repetitive teaching trials with controlled stimuli, Prompting: Use of verbal, gestural, and physical cues to elicit responses, Positive, Reinforcement: Token economies, verbal praise, and tangible rewards to encourage desired behaviors, Intertrial intervals and stimulus fading techniques were applied to promote generalization. Each therapy session followed a structured format: Stimulus → Instruction → Child Response → Reinforcement → Pause → Next Trial.

3.4 Data Collection

Data were collected before and after the 6-month intervention through the following instruments and techniques:

- Standardized Assessment
  CARS was administered by licensed clinical psychologists to assess ASD severity. Vineland Adaptive Behavior Scales (VABS) was used to evaluate communication domains (receptive, expressive, and written skills) through parent interviews (Sparrow, Cicchetti, & Balla, in Cooper et al., 2020).
- Direct Observation
  Psychotherapy anecdotal sheets were used to record frequency and quality of communication behaviors (e.g., eye contact, number of words spoken, ability to follow commands).
- Parent Interviews
  Semi-structured interviews based on VABS communication items were conducted to identify developmental changes in natural settings.
- Documentation Review
  Progress notes, home activity logs, and reinforcement charts were reviewed to support observational data.

3.5 Data Analysis

Data were analyzed using descriptive qualitative methods. Observational data and interview transcripts were thematically coded based on the communication domains (receptive, expressive, written). Pre- and post-test scores from VABS and CARS were compared to identify patterns of improvement.

Triangulation was applied by integrating findings from three sources: professional observation, standardized scores, and parental reports. This method enhanced the reliability of the case-based conclusions (Kazdin, 2017; Leaf et al., 2016).

3.6 Ethical Considerations

Ethical clearance was obtained from the institutional review board of the psychologist practice. All parents provided informed consent. Children's identities were anonymized using codes (A1, A2, A3) to ensure confidentiality. The study adhered to ethical guidelines for psychological research involving children and individuals with disabilities.

4. Results and Discussion

This study examined the impact of Applied Behaviour Analysis (ABA) therapy on communication development in three children with Autism Spectrum Disorder (ASD) over a 6-month period. Changes in communication skills were evaluated using the Vineland Adaptive Behavior Scales (VABS) and the Childhood Autism Rating Scale (CARS). This qualitative case study explored the effectiveness of Applied Behaviour Analysis (ABA) therapy in improving communication skills—receptive, expressive, and written—in three children with Autism Spectrum Disorder (ASD). The findings revealed consistent improvements across all participants after a six-month intervention, with the most notable gains observed in expressive communication, followed by receptive comprehension and early writing skills. In addition, the CARS scores indicated a reduction in autism severity levels for all children, moving from moderate or moderate–severe categories to mild–moderate post-intervention.

These findings are in line with previous research demonstrating the positive impact of ABA on communication development in children with ASD. Makrygianni et al. (2018) found

that ABA-based interventions significantly improve expressive language, social interaction, and adaptive behaviors. In this study, Participant A1 progressed from using single words to composing simple two-word phrases, while A3 advanced to telling short stories and writing simple words independently. Such outcomes align with the work of Kodak and Bergmann (2016), who emphasized ABA's effectiveness in teaching mands, tacts, and intraverbals through structured techniques such as Discrete Trial Training (DTT) and naturalistic teaching.

The improvement in receptive communication, although less rapid than expressive development, suggests that language comprehension in children with ASD may require more time and contextual support. Lang et al. (2017) similarly noted that expressive language often progresses more quickly with structured reinforcement, while receptive skills develop more gradually.

A unique contribution of this study lies in its attention to written communication. All participants showed increased engagement with literacy-related tasks, from imitating shapes to writing short words. This domain is often overlooked in early intervention programs but may serve as an essential component of academic readiness, particularly in older children like A3 (6 years old), who demonstrated the greatest progress in this area.

Another critical factor influencing therapeutic outcomes was family involvement. Parents of all participants reported improvements in their children's communication abilities at home, which were reinforced through consistent practice of ABA techniques. This finding supports Sandbank et al. (2020), who concluded that parental involvement enhances the generalization of learned skills and contributes to more stable developmental progress. The active role of caregivers in administering home-based reinforcement and maintaining routine structures likely contributed to the gains observed, particularly in expressive behavior.

The results also suggest that age and initial autism severity may influence the trajectory of communication development. While A1 and A2 (aged 4 and 5) showed more rapid progress in receptive and expressive skills, A3 (aged 6) exhibited the most pronounced gains in written and complex sentence formation. This reinforces findings by Smith et al. (2015) and Peters-Scheffer et al. (2011), who highlight that the effectiveness of ABA is moderated by factors such as age, intensity of intervention, and baseline developmental profiles.

4.1. Figures and Tables
4.1.1 Change in Autism Severity (CARS Scores)
All three participants showed a reduction in autism severity levels following the intervention, as measured by the CARS.

Table 1. Change in Autism Severity (CARS Pre–Post Scores)

Participant	Age	CARS Score (Pre)	Category (Pre)	CARS Score (Post)	Category (Post)
A1	4	34.5	Moderate Autism	30.5	Mild–Moderate Autism
A2	5	36.0	Moderate Autism	32.0	Mild–Moderate Autism
A3	6	37.5	Moderate–Severe Autism	35.0	Mild–Moderate Autism

CARS categories: 15–29.5 = Non-autistic; 30–36.5 = Mild–Moderate Autism; 37–60 = Moderate–Severe Autism (Freeman, 2024)

Improvements in Communication Skills (VABS Interviews)

The VABS results indicated improvements across all three communication subdomains: receptive, expressive, and written. Key observations from therapist records and parental interviews are summarized below.

Table 2. Qualitative Changes in Communication Domains (Pre vs. Post ABA Therapy)

Domain	A1 (4 y.o.)	A2 (5 y.o.)	A3 (6 y.o.)
Receptive	Responded only when touched; understood 1-step with visuals → Responds to name,	Understood 10–15 words, needed gestures → Understands 20+ words, follows complex instructions	Follows 2–3 step daily instructions → Understands verbal

	follows 2-step verbal commands		instructions even in new contexts
Expressive	Spoke 1 word (e.g., "mama") → Produces 2-word phrases (e.g., "want milk")	Echoes 2 words → Speaks 3–4-word sentences, answers "what" questions	Uses 3-word phrases → Tells short stories (5–6 words)
Written	No interest in letters → Imitates lines and circles	Recognizes letters → Copies A–E and writes name with help	Copies name → Writes simple words independently ("mama", "ball")

4.1.2 Quantitative Summary of VABS Communication Scores

The following table presents pre- and post-intervention scores derived from the VABS, capturing receptive (RSP), expressive (EXP), and written (TTL) subdomain performance. Mental age was also estimated before and after the therapy.

Table 3. VABS Communication Scores and Mental Age Comparison

P	Chron. Age	Mental Age (Pre)	Mental Age (Post)	RSP (Pre)	RSP (Post)	EXP (Pre)	EXP (Post)	TTL (Pre)	TTL (Post)
A1	4 years	2y 6m	3y 4m	45	60	40	58	30	42
A2	5 years	3y 8m	4y 6m	52	70	50	68	40	55
A3	6 years	4y 11m	5y 8m	60	78	58	76	50	68

Scores below 70 are considered developmentally delayed (Sparrow et al., in Cooper et al., 2020).

4.1.3 Visual Summary of Communication Progress

A bar graph (not shown here) illustrates individual improvements in each communication domain, confirming steady progression across all three participants. The most significant gains were observed in expressive language, particularly the ability to formulate multi-word sentences and reduce reliance on gestures.

4.1.4 Thematic Observations from Triangulated Data

Based on qualitative triangulation (observation notes, interviews, and documentation), three primary themes emerged:
- Increased verbal spontaneity: Children began initiating verbal requests rather than using nonverbal cues.
- Improved receptive comprehension: Ability to follow multi-step instructions without prompts increased.
- Early literacy engagement: Interest in writing activities improved, especially in older participants.

These changes were consistent with behavioral principles of reinforcement, modeling, and consistency in ABA, aligning with findings from prior research (Makrygianni et al., 2018; Kodak & Bergmann, 2016).
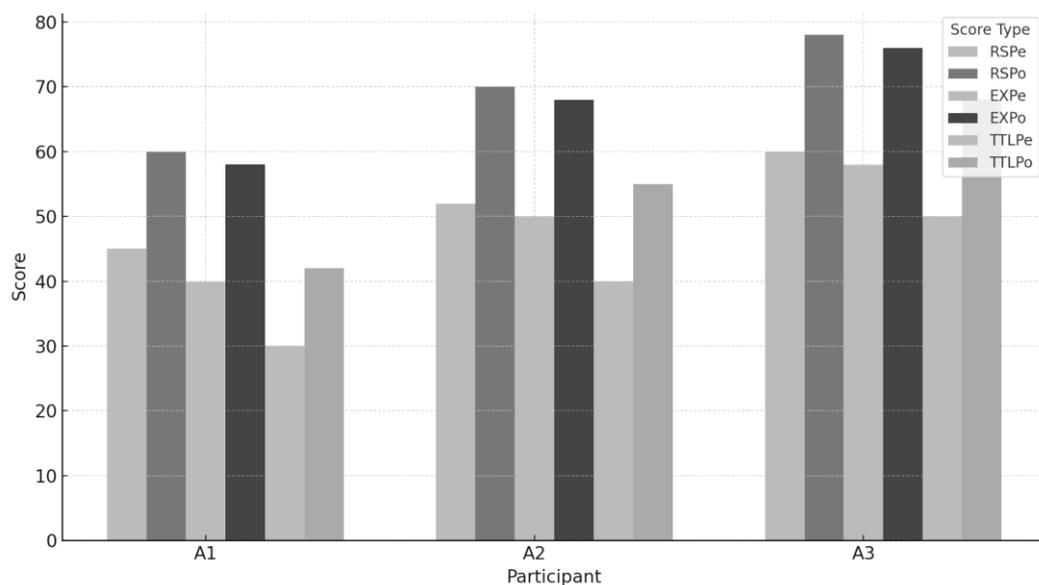
Figure 1. Comparison of Scores Across Participants

Explanation:

P :Participants; UK   : Chronological Age; UMPe   : Usia mental Pre test; UMPo : Mental age Post test; RSPe   : Receptive

Pre test; RSPo   : Receptive Post test; EXPo   : Explicit Post test; EXPe   : Expressive Post test; TTLPe :   Written   Pre   test;

TTLPo : Written Post test

5. Conclusions

This study demonstrated that Applied Behaviour Analysis (ABA) therapy, delivered through individualized and structured interventions, was effective in enhancing communication skills in children with Autism Spectrum Disorder (ASD). Across all three case participants, improvements were observed in receptive understanding, expressive language, and early writing abilities following six months of therapy. Notably, expressive communication showed the most substantial gains, consistent with prior research emphasizing the responsiveness of expressive skills to behaviorally-based interventions (Makrygianni et al., 2018; Kodak & Bergmann, 2016).

The observed reduction in autism severity levels, as reflected in CARS scores, further supports the potential of ABA to positively influence core developmental outcomes when applied consistently. The role of family involvement, especially in reinforcing skills at home, also emerged as a crucial factor in maximizing therapy impact (Sandbank et al., 2020).

While the study's findings are not generalizable due to the limited sample size, they offer valuable insights into the practical application of ABA in clinical and home settings in Indonesia. These results underscore the need for early, intensive, and contextually responsive interventions to support communication development in children with ASD.

It is recommended that ABA be implemented as part of an integrated therapeutic plan involving trained professionals and active parental collaboration. Future studies should employ larger samples and longer durations to explore the sustainability and broader applicability of these outcomes.

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