

Effect of Applied Behavioral Intervention on Social Communication Skills among Children with AutismTaha Humayun Baig^a, Irshad Ahmad^b, Ifrah Humayun Baig^a Ms. Aniqua Abid^a^a International Islamic University, Islamabad, Pakistan^b Riphah International University Malakand Campus, Pakistan**Abstract**

Early and personalized applied behavioral analysis (ABA) leads to greater progress in social and communicative development. The earlier the intervention, the more significant the improvements in a child's ability to navigate their social environment. The main aim of this study was to examine the efficacy of ABA on social communication skills in autistic children, as well as the roles of gender, age, and family. The study also focuses on the implementation of ABA, the need for trained professionals, the high costs of therapy, and the significance of a collaborative approach among various specialists. The population of the present study consists of 7 to 12-year-old children with Autism enrolled at an Autism center. To obtain a baseline score, a social check list consisting of conversational, non-conversational, and compliments skills is conducted. Clinicians filled the social communications skills checklist. After obtaining the baseline score and implementing the intervention, the check list was filled out again, and the paired samples t-test was used to compare the mean score of the pre- and post-check lists. Children with Autism were introduced to ABA utilizing the reinforcement and discrete trail learning strategies. The mean comparison of this study highlights the significant mean difference upon conversational skills ($p < .001$). It is found that the children's conversational abilities improved by post-intervention ($M=15.13$) as compared to pre-intervention ($M=10.00$) and non-conversational skills are significantly enhanced by post-intervention ($M=9.63$) as compared to pre-intervention ($M=5.93$). Moreover, a significant improvement is seen in compliment skills after intervention ($M=9.06$) in comparison with pre-intervention ($M=5.06$). In addition, the study found no significant gender, age, or family system differences. Overall, the approach used in this research combined with consistent data capture and analysis ensures that the therapy is responsive and effective.

Keywords: Mental Health, Autism Spectrum Disorder, Applied Behavior Analysis, Psychological Intervention

Correspondence: Mr. Taha Humayun Baig
International Islamic University, Islamabad, Pakistan
Email: aadaam9696@gmail.com

Pages 29-35//Received, April 23, 2025, Revision Received May 26, 2025, Accepted June 1, 2025,

1. Introduction

Due to the growing prevalence of Autism, more research has been conducted on their parents' health and wellbeing. According to recent surveys (Blumberg et al., 2013), fifty school-aged children in the United States have Autism. To address issues with quality of life, Autism interventions frequently seek to improve skills that can reduce learning barriers and increase independence, and they employ best-practice ABA techniques (Anagnostou et al., 2014; LeBlanc et al., 2006).

It is essential to acknowledge that children with Autism possess distinct strengths and skills. Numerous people with autism have exceptional abilities in areas such as mathematics, music, art, and memory. It is essential to emphasize their strengths and provide opportunities for their abilities to flourish. Remember that each child with Autism is unique, with varying experiences and obstacles. Understanding, acceptance, and support from family, friends, educators, and the larger community can significantly improve the lives of those with Autism. The common goal of interventions for Autism is to enhance skills that can eliminate learning barriers, foster independence, and promote best practices to address issues with quality of life by utilizing ABA techniques (Park, 2023). Social communication is the exchange of ideas, emotions, and information between children. It includes both verbal and nonverbal communication, including speaking, listening, body language, facial expressions, and gestures. Effective social communication skills enable children to clearly express their thoughts and emotions, comprehend the perspectives of others, develop relationships, and resolve conflicts (Gozalova et al., 2016). Emotional regulation is the capacity to appropriately manage and control one's emotions. It involves recognizing and comprehending emotions, adapting to various situations, and employing techniques to modulate emotional responses. Effective emotional regulation enables children to manage tension, regulate their mood, and form healthier relationships (Gross, 2015).

In recent years, ABA has become a well-respected, evidence-based treatment for Autism-related behaviors. ABA is a scientific method utilized in behavior intervention and therapy. It emphasizes understanding and modifying behavior by analyzing the relationships between behavior and its environmental variables. Even though ABA incorporates numerous principles and techniques, there is no widely accepted framework defining its seven dimensions. Baer, Wolf, and Risley proposed the "Seven Dimensions of Applied Behavioral Analysis" in a 1968 seminal article (Contreras et al., 2021). Liao et al. (2020) gave a review of applied behavior analytic interventions for children with autism in mainland China. ABA relies on continuous data collection to evaluate the efficacy of interventions and monitor progress. Target behaviors, environmental factors, and intervention strategies are the subjects of data collection. This data assists practitioners in making data-driven decisions and modifying the treatment plan as necessary. The implementation of intervention principles in academic settings, it discusses the significance of data collection and analysis in assessing student behavior and monitoring progress; it provides examples and strategies for collecting and analyzing data in educational contexts; and it emphasizes the role of data in making informed instructional decisions. These skills provide in-depth information on data collection and analysis in ABA, including various measurement techniques, graphing methods, and statistical procedures. They are valuable resources for practitioners, researchers, and educators who wish to implement data-driven

approaches to behavior assessment and intervention (Trump et al., 2018). Falligant and Hagopian (2020) demonstrated an analysis of prediction response to functional communication training. Anderson (2023) discussed the autistic experiences of ABA. Ringdahl et al. (2023) emphasized ABA and its application to autism and autism-related disorders. Graber and Graber (2023) presented an ethical analysis on ABA and abolitionist neurodiversity critique. D'Agostino et al. (2023) implemented naturalistic developmental behavioral interventions on wide scale with deeper understanding.

A comprehensive meta-analysis on ABA-based interventions in the treatment of children with autism spectrum disorder is presented by Eckes et al. (2023). Siegel et al. (2023) explored the behaviors of tourists affected by social media through behavioral interventions as salient destination response strategy. Assent was defined by Breaux, and Smith (2023), who also discussed the importance of assent-based practices and provided assent-based methods for ABA and PBS-based interventions. An integrative comprehensive assessment of educational strategies to enhance the communication abilities of students with autism spectrum disorder and concomitant intellectual handicap was provided by Kamilla Klefbeck (2023).

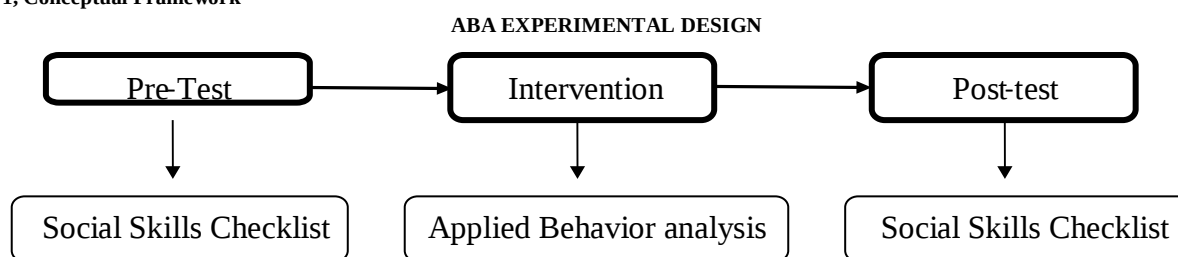
A systematic review of randomized controlled trials and quasi-experimental studies for autism spectrum disorders is given by Pruneti et al. (2024). Using repeated measures, Peterson et al. (2024) investigated how ABA affected target behaviors in autistic people. In a naturalistic setting, Peterson et al. (2024) examined the effects of mass trials and discrete trial training on general target behaviors. According to Denne et al. (2024), the sharland foundation developmental disabilities applied behavioral research and impact network has a methodical approach to building an evidence base for behaviorally based interventions.

To enable children with special educational needs and impairments to participate in their school environment, more study is required to determine the best ways to promote their language and communication development. Thus, the main aim of this study was to examine the efficacy of ABA on social communication skills in autistic children, as well as the roles of gender, age, and family. The study also focuses on the implementation of ABA, the need for trained professionals, the high costs of therapy, and the significance of a collaborative approach among various specialists. This study addresses the following objectives.

The study was conducted to study the effectiveness of ABA among children with Autism on social communication skills. Furthermore to study the role of demographic variables which include (Gender, age and family system) in relation to social communication skills.

The current study is based on two primary hypotheses. First, it is expected that Applied Behavior Analysis (ABA) will lead to a significant improvement in the social communication skills of children with autism following the intervention, as compared to their baseline scores. Second, the study hypothesizes that there will be notable differences in the social communication skills of children with autism based on demographic factors such as gender, age, and family type.

Figure 1, Conceptual Framework



2. Method

2.1 Research Design

The design employed for this research was a one-group pretest-posttest model, a type of pre-experimental research design. The primary objective behind this approach was to gauge the impact of ABA therapy on the social communication skills among children who are diagnosed with Autism Spectrum Disorder (ASD). By comparing the base line score of the participants before intervention and after the score obtained after the intervention, this design aimed to provide insights into the effectiveness of ABA.

2.2 Data analysis

The data was analyzed by using the Statistical Package for Social Sciences (SPSS) 24.0 version. Paired sample t-test was used for analyzing mean difference score based on pre-test and post-test design. Further, the descriptive statistics including mean, standard deviation, minimum and maximum are calculated for continuous level data and frequencies and percentages for categorical level data related to sociodemographic characteristics.

2.3 Sample/Participants

For this study, a total of 15 children diagnosed with autism were meticulously chosen. These participants were recruited from a range of specialized autism institutes located in Islamabad and Rawalpindi. Notably, these institutes included the Zamzam Autism Center, Kreative Kinder Haus, and Bases Islamabad, which are renowned for their dedicated services to children with autism.

To ensure the focus, relevance, and integrity of the study, both inclusion and exclusion criteria were carefully defined. The inclusion criteria specified that only children diagnosed with a mild to moderate level of autism were eligible to participate, in order to maintain a certain level of uniformity within the sample. Additionally, the age range of participants was restricted to 7 to 12 years, as this period is considered a critical phase in social and communicative development. Geographically, the study was limited to children residing in Islamabad and Rawalpindi to ensure logistical feasibility and maintain a clear regional focus.

In parallel, exclusion criteria were established to minimize potential confounding variables. Children diagnosed with any additional co-morbid disorders alongside autism were excluded to ensure that the effects observed could be attributed specifically to the ABA

intervention. Furthermore, children younger than 7 or older than 12 were not considered, preserving the developmental consistency of the sample. Lastly, participants from cities outside of Islamabad and Rawalpindi were excluded to maintain geographic uniformity and the study's regional relevance.

2.4 Sampling Technique

The method employed for selecting participants was purposive sampling. This non-random technique was chosen as it allowed for the selection of specific children from various Autism centers who best met the research criteria. This ensured that the sample was not only representative of the broader population but also aligned closely with the research objectives.

2.5 Instruments

2.5.1 Demographic Sheet The demographic sheet comprises gender, age, nature of disorder, duration of disorder, Family Type (Nuclear, Joint) and several questions based on parental and professional views regarding efficacy of ABA.

2.5.2 Social Skills Checklist Autism Toolkit for Evaluation and Programming developed by Richard (2018). Social skill checklist is used to measure social skills of children. Social Skills Checklist is comprised of different scales including Social Play and Emotional Development and Emotional Regulation. However, in this study we will use Communication Skills Scale only. The Communication Skills Scale has three subscales including Conversational Skills comprises of 8 items, Non-Verbal Conversational Skills comprises of 4 items and Compliments comprises of 4 items. Items are rated as Almost, Always, Often, Sometimes and Almost Never. The reliability of the scale is 0.97.

2.6 Procedure

In the conducted study, autistic children from various special education institutions in Rawalpindi and Islamabad were identified and selected. Before including these children in the study, their parents and legal guardians were consulted, and their consent was obtained. Initially, the participants underwent a pretest by completing a Social Skills Checklist to assess their current skill levels. Following this, they underwent ABA treatment. After the treatment phase, a post-test was administered using the same Social Skills Checklist to gauge the impact of the intervention. Participants in the therapy group were exposed to ABA techniques for 45 minutes a day, five days a week, with the frequency adjusted based on parental feedback and the specific needs of the children. The ABA was delivered by a trained behavior therapist, with a primary focus on enhancing the communication skills of children with Autism. For data analysis, quantitative data was processed using SPSS. An independent

sample t-test was conducted to discern differences based on demographic factors. Additionally, to compare the same group under two different experimental conditions—namely the pretest and posttest—a paired sample t-test was employed.

2.7 Intervention

The study used Discrete Trial Teaching/learning, a well-established intervention method, and reinforcement to modify children's behavior. B.F. Skinner's theory of operant reinforcement suggests that the frequency of a behavior is influenced by the events that follow it. A preference assessment was conducted before conducting ABA for children with autism. Common methods used included single, paired, multiple, and multiple-stimulus assessments. Free-Operant Observation was also used to observe the child's natural environment. Reinforcer assessments were used to identify effective reinforcers for desired behaviors, using positive and negative reinforcement. Techniques from ABA were used to improve the quality and effectiveness of therapy. Positive punishment included presentation punishment and overcorrection, which required the individual to correct or compensate for the consequences of their behavior.

ABA techniques involve negative punishment, timeout, planning to ignore, and contingent observation. Negative punishment involves removing a desirable stimulus following undesirable behavior, while timeout decreases the frequency of a behavior by removing the individual from a reinforcing environment. Planning to ignore is used to get attention and escape from work, while contingent observation observes others engaging in reinforcing activities without allowing participation. Prompts are cues or hints given to help the learner perform desired behaviors, such as greeting others. Examples include full physical prompts, partial physical prompts, modeling, verbal prompts, visual prompts, and gestural prompts. Modeling involves demonstrating

the correct behavior, verbal prompts involve verbal commands, visual prompts involve visual cues, and gestural prompts use non-verbal gestures. These techniques help support the individual in acquiring new skills or improving existing ones.

The prompt level was adjusted based on the child's level and progress, gradually reducing support as they became more independent. Behavior was identified and adjusted using drive, cues, response, and reinforcement. 36 individual sessions were conducted over two months, with makeup sessions arranged for missed sessions. After 36 sessions, children continued therapy to avoid regression of learned positive behavior.

3. Results

Table 1

Demographics Characteristics of the Study Variables (N=15)

Characteristics	<i>f</i>	%	<i>M(SD)</i>
Age			8.46(1.55)
Duration of illness			6.20(1.82)
Gender			
Male	10	66.6	
Female	5	33.3	
Family System			
Nuclear	8	53.3	
Joint	7	46.7	
Severity			
Mild	8	53.3	
Moderate	5	33.3	
Severe	2	13.3	

A summary of information about intervention is presented in this section. Table 1 shows frequency and percentage of sociodemographic characteristics of study participants.

Table 2

Mean Comparison of children in pre and post intervention phase upon conversational, non-conversational and compliments skills (N=15)

Variables	Pre-Intervention		Post-Intervention		<i>t</i> (14)	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Conversational Skills	10.00	3.11	15.13	6.49	-3.54	.003	1.00
Non-Conversational Skills	5.93	1.43	9.60	1.99	-9.81	<.001	2.11
Compliments Skills	5.06	0.96	9.06	1.38	-9.40	<.001	3.36

Table 3

Comparison of Scores upon conversational, non-conversational and compliments skills among children based upon gender (N=15)

Variables	Male (10)		Female (5)		<i>t</i> (148)	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Pre-Conversational Skills	10.30	3.62	9.40	1.94	.625	.61
Pre-Non-Conversational Skills	5.60	1.57	6.60	.89	-1.56	.14
Pre-Compliments Skills	5.30	1.05	4.60	.54	1.68	.11
Post-Conversational Skills	15.40	7.18	14.60	5.54	.23	.81
Post-Non-Conversational Skills	9.40	2.11	10.00	1.87	-.56	.58
Post-Compliments Skills	8.90	1.52	9.40	1.14	-.71	.49

Table 4**Comparison of Scores upon conversational, non-conversational and compliments skills between among children based upon Family system (N=15)**

Variables	Nuclear (8)		Joint (7)		<i>t</i> (14)	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Pre-Conversational Skills	10.37	3.96	9.57	1.98	.50	.62
Pre-Non-Conversational Skills	6.00	1.41	5.85	1.57	.18	.85
Pre-Compliments Skills	5.12	.83	5.00	1.15	.23	.81
Post-Conversational Skills	13.75	6.15	16.71	6.96	-.86	.40
Post-Non-Conversational Skills	9.12	2.16	10.14	1.77	-1.00	.33
Post-Compliments Skills	9.12	1.45	9.00	1.41	.16	.86

Table 5**Comparison of Scores upon conversational, non-conversational and compliments skills between among children based upon age group (N=15)**

Variables	7-9 years (10)		10-12 years (5)		<i>t</i> (148)	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Pre-Conversational Skills	9.00	1.63	12.00	4.52	-1.43	.21	-
Pre-Non-Conversational Skills	5.30	1.25	7.20	.83	-3.04	.01	.30
Pre-Compliments Skills	5.10	.87	5.00	1.22	.16	.87	-
Post-Conversational Skills	15.00	6.96	15.40	6.18	-.11	.91	-
Post-Non-Conversational Skills	9.20	2.04	10.40	1.81	-1.15	.27	-
Post-Compliments Skills	8.60	1.17	10.00	1.41	-1.90	.09	-

Table 2 revealed the mean comparison among children in pre-intervention and post-intervention period. Findings highlight the significant mean difference upon conversational skills ($p < .001$). It is evident that conversational skills among children pre-intervention ($M=10.00$) increased significantly post-intervention ($M=15.13$) which indicates that conversational skills of the children improved when they were provided with the ABA interventions. Findings also reveal that non-conversational skills among children pre-intervention ($M=5.93$) increased significantly post-intervention ($M=9.63$) indicating children improvement in non-conversational skills when they were provided with the ABA interventions. It is also evident that compliments skills among children pre-intervention ($M=5.06$) increased significantly post-intervention ($M=9.06$) which indicates that compliments skills of the children improved when they were provided with the ABA interventions. The values of Cohen's d indicate the larger effect size as values are higher than 0.8.

Table 5 shows the difference upon study variable based upon age group. Non-significant age group differences were found based among age groups upon study variables except for Pre-Non-Conversational skills where difference is significant. Value of Cohen's d indicates the small effect size for the significant mean difference.

4. Discussion

ABA therapy is a widely accepted and empirically supported method for treating children with Autism. Its significance derives from its efficacy in enhancing a variety of skills and behaviors in children with Autism, as well as its capacity to improve their quality of life. The objective of ABA is to break down complex behaviors into smaller, more manageable

steps. It teaches children with Autism communication, social interaction, daily living skills, and academic abilities. Therapists conduct evaluations to identify specific objectives and devise intervention strategies. Numerous studies have demonstrated the efficacy of ABA, which has a solid basis in research. By rewarding positive behaviors, children with Autism are encouraged to engage in activities more frequently. Generalization is promoted by ABA, ensuring that the skills obtained during therapy are transferable to the real world. ABA relies on data collection and analysis to objectively evaluate progress. This data-driven strategy permits clinicians to monitor the child's progress and modify interventions as necessary. Due to its evidence-based approach, affective nature, emphasis on functional skills, positive behavior support, and potential for long-term positive outcomes, ABA is significant for children with Autism. (Helal, 2018).

This study aims to determine the efficacy of ABA among children with Autism by applying B.F. Skinner's operant conditioning techniques, such as reinforcement and trial and error, which enable the child to acquire new skills and live independently. Reinforcement in ABA consists of identifying and administering rewards or consequences contingent on the occurrence of a desired behavior. This increases the likelihood that the behavior will occur again. ABA therapists undertake assessments to identify effective reinforcers that are meaningful to children, such as items, activities, or social interactions. Positive reinforcement is the addition of a motivating stimulus immediately following a desired behavior. This motivates the person to replicate the behavior. As an illustration, a child may receive a small toy after completing a mission. Negative reinforcement entails removing or

averting aversive stimuli in response to a desired behavior. Additionally, this increases the likelihood that the behavior will be repeated. A student who completes their assignments to avoid parental nagging is an example. It is important to observe that reinforcement strategies are taught according to the preferences and needs of the children. The objective is to create a learning environment that promotes the development of new skills and behaviors (Sarafino, 2011). In ABA, a strategy known as trial-and-error correction is employed to assist patients in learning new skills by adjusting in response to the results of their initial attempts. It is giving the person a task, letting them try it out, and then giving them rapid feedback and direction based on how well they did. This procedure keeps going till the person succeeds in finishing the work. In trial-and-error correction, mistakes are not simply disregarded; rather, they are viewed as possibilities for growth. To help the patient choose the right reaction, the therapist offers prompts, clues, or corrective feedback. Through repeated practice and direction, this strategy promotes active problem-solving and aids children in developing the appropriate response (Sarafino, 2011).

Children with Autism who get ABA have shown improvement in social communication abilities. To target and improve social interaction, communication, and associate behaviors in people with Autism, ABA makes use of a variety of approaches and strategies, including reinforcement and trial-and-error learning. ABA therapists strive to address certain social communication problems that children with Autism may have through methodical assessment, data collection, and tailored intervention programs. Joint attention, a crucial skill in social interactions that is assisted by ABA, is the capacity to focus on the same thing or activity while sharing attention with others (Yu et al., 2020). Moreover, by using ABA, therapists may teach kids how to imitate others' actions and behaviors. Children with Autism frequently struggle with imitating other people's actions and behaviors. The foundation for social learning is imitation, which ABA therapists promote and reinforce. Turn-taking: ABA interventions teach kids how to switch roles during games and talks, which encourages reciprocal communication. Communicative Language By using ABA, kids can communicate their wants, thoughts, and feelings in both verbal and nonverbal ways (Warner, 2013). After implementing ABA, social play skills are improved to promote cooperative play, sharing, and other appropriate play behaviors with peers. ABA aids autistic children with comprehending and expressing their feelings as well as recognizing others' emotions through their body language and facial expressions, a skill known as emotional comprehension. Additionally, ABA focuses on conversational skills such how to initiate and conclude conversations, keep eye contact, stay on topic, and listen intently. The strategies used in ABA are highly customized and tailored to the unique requirements and abilities of each kid. Data gathering is used to monitor progress, and therapy plans are modified as the kid improves by comparing the baseline score with the score obtained after therapeutic sessions (Elbeltagi et al., 2023).

It was also hypothesized that there will be gender difference upon social communication skills among children taking ABA. Results from the study show that there was no significant gender difference found upon social communicative skills score both pre-intervention and post-intervention. (Fulton et al., 2017; McVey et al., 2017). Furthermore, no effect or change is noted based on age and family system. ABA generically emphasizes the behavioral issue which came with. In the previous study no gender difference was found after taking ABA

intervention. While conducting my difference no gender and family system difference were noted. Both male and female responded to task and goal equally (Blair et al., 2019).

Implications

Our study found that ABA is highly helpful in helping autistic children learn tasks and objectives that were chosen after the child's assessment. It is observed that the ABA is a valuable therapy for autistic children, aiding in their development of communicative, social, academic, and daily life abilities. It can improve children's quality of life and independence by focusing on specific behaviors and skills. Parents are often involved in ABA training, leading to more harmonious family relationships. Implementing ABA can foster understanding of AUTISM difficulties and increase autism awareness in Islamabad, reducing stigma and increasing acceptance. Data collection and analysis are crucial for monitoring the effectiveness of ABA interventions. Adoption of ABA can promote the growth of institutions and learning tools focusing on AUTISM and associated therapies, fostering collaboration among professionals, researchers, educators, and families.

Conclusion

The research conducted provided a comprehensive examination of the impact of ABA therapy on children with Autism. The findings reaffirmed the efficacy of ABA in enhancing social and communicative skills among children with Autism. Through the application of B.F. Skinner's operant conditioning techniques, such as reinforcement, trial and error, children were empowered to acquire new skills and navigate their environments more independently. The study also demonstrated how ABA may be tailored to meet the needs and preferences of children. This approach, combined with consistent data collection and analysis, ensures that the therapy remains responsive and effective. Interestingly, the study found no significant gender differences in the outcomes of ABA, suggesting that both male and female children with autism benefit equally from the intervention. Similarly, factors like age and family system did not significantly influence the therapy's outcomes. However, while the results are promising, the study also shed light on the challenges faced in the implementation of ABA, such as the need for trained professionals, the high costs associated with the therapy, and the importance of a collaborative approach among various experts. In conclusion, this study underscores the potential of ABA as a transformative tool for children with autism, offering them a brighter, more communicative future. While challenges exist, the tangible benefits of the therapy emphasize the need for its broader adoption and accessibility.

References

- Abo Hamza, E. G., & Helal, A. A. (2018). The effectiveness of early intensive intervention in modifying the frequency of repetitive behavior for children with ASD in Egypt. *International Journal of Psychology and Behavior Analysis*, 4, 152.
- Anagnostou, E., Zwaigenbaum, L., Szatmari, P., Fombonne, E., Fernandez, B. A., Woodbury-Smith, M., Brian, J., Bryson, S., Smith, I. M., Drmic, I., Buchanan, J. A., Roberts, W., & Scherer, S. W. (2014). Autism spectrum disorder: Advances in evidence-based practice. *Canadian Medical Association Journal*, 186(7), 509–519. <https://doi.org/10.1503/cmaj.121756>
- Anderson, L. K. (2023). Autistic experiences of applied behavior analysis. *Autism*, 27(3), 737–750. <https://doi.org/10.1177/13623613221126112>
- Blair, B. J., Blanco, S., Ikombo-Deguenon, F., & Belcastro, A. (2020). Sex/gender phenotypes and the diagnosis and treatment of autism spectrum

- disorder: Implications for applied behavior analysts. *Behavior Analysis in Practice*, 13(1), 263–269. <https://doi.org/10.1007/s40617-019-00367-4>
- Blumberg, S. J., Bramlett, M. D., Kogan, M. D., Schieve, L. A., Jones, J. R., & Lu, M. C. (2013). Changes in prevalence of parent-reported autism spectrum disorder in school-aged U.S. children: 2007 to 2011–2012. *National Health Statistics Reports*, 65, 1–11.
- Breaux, C. A., & Smith, K. (2023). Assent in applied behaviour analysis and positive behaviour support: Ethical considerations and practical recommendations. *International Journal of Developmental Disabilities*, 69(1), 111–121. <https://doi.org/10.1080/20473869.2020.1846794>
- Contreras, B. P., Hoffmann, A. N., & Slocum, T. A. (2021). Ethical behavior analysis: Evidence-based practice as a framework for ethical decision making. *Behavior Analysis in Practice*. <https://doi.org/10.1007/s40617-021-00567-0>
- D'Agostino, S. R., Dueñas, A. D., Bravo, A., Tyson, K., Straiton, D., Salvatore, G. L., Pacia, C., & Pellecchia, M. (2023). Toward deeper understanding and wide-scale implementation of naturalistic developmental behavioral interventions. *Autism*, 27(1), 253–258.
- Denne, L. D., Roberts-Tyler, E. J., & Grindle, C. (2024). Developing an evidence base for behavioural interventions: A case study of the Headsprout® Early Reading programme. *Tizard Learning Disability Review*, 29(1), 20–28.
- Eckes, T., Buhlmann, U., Holling, H. D., & Möllmann, A. (2023). Comprehensive ABA-based interventions in the treatment of children with autism spectrum disorder—A meta-analysis. *BMC Psychiatry*, 23(1), 133.
- Elbeltagi, R., Al-Beltagi, M., Saeed, N. K., & Alhawamdeh, R. (2023). Play therapy in children with autism: Its role, implications, and limitations. *World Journal of Clinical Pediatrics*, 12(1), 1–11.
- Falligant, J. M., & Hagopian, L. P. (2020). Further extensions of precision medicine to behavior analysis: A demonstration using functional communication training. *Journal of Applied Behavior Analysis*, 53(4), 1961–1981.
- Fulton, A. M., Paynter, J. M., & Trembath, D. (2017). Gender comparisons in children with ASD entering early intervention. *Research in Developmental Disabilities*, 68, 27–34.
- Gozalova, M. R., Gazilov, M. G., Kobeleva, O. V., Seredina, M. I., & Loseva, E. S. (2016). Non-verbal communication in the modern world. *Mediterranean Journal of Social Sciences*, 7(4), 217–224.
- Graber, A., & Graber, J. (2023). Applied behavior analysis and the abolitionist neurodiversity critique: An ethical analysis. *Behavior Analysis in Practice*, 16(4), 921–937.
- Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, 26(1), 1–26.
- Klefbeck, K. (2023). Educational approaches to improve communication skills of learners with autism spectrum disorder and comorbid intellectual disability: An integrative systematic review. *Scandinavian Journal of Educational Research*, 67(1), 51–68.
- LeBlanc, L. A., Esch, J., Sidener, T. M., & Firth, A. M. (2006). Behavioral language interventions for children with autism: Comparing applied verbal behavior and naturalistic teaching approaches. *The Analysis of Verbal Behavior*, 22(1), 49–60.
- Liao, Y., Dillenburger, K., He, W., Xu, Y., & Cai, H. (2020). A systematic review of applied behavior analytic interventions for children with autism in mainland China. *Review Journal of Autism and Developmental Disorders*, 7(4), 333–351.
- McEvoy, R. E., Rogers, S. J., & Pennington, B. F. (1993). Executive function and social communication deficits in young autistic children. *Journal of Child Psychology and Psychiatry*, 34(4), 563–578.
- Park, H. O. (2023). Autism spectrum disorder and savant syndrome: A systematic literature review. *Journal of the Korean Academy of Child and Adolescent Psychiatry*, 34(2), 76–92.
- Peterson, T., Dodson, J., & Strale, F. (2024). Replicative study of the impacts of applied behavior analysis on target behaviors in individuals with autism using repeated measures. *Cureus*, 16(3).
- Peterson, T., Dodson, J., & Strale, F. (2024). Treating target behaviors of autistic individuals with applied behavior analysis: An ongoing replication study. *Cureus*, 16(2).
- Pruneti, C., Coscioni, G., & Guidotti, S. (2024). Evaluation of the effectiveness of behavioral interventions for autism spectrum disorders: A systematic review of randomized controlled trials and quasi-experimental studies. *Clinical Child Psychology and Psychiatry*, 29(1), 213–231.
- Ringdahl, J. E., Kopelman, T., & Falcomata, T. S. (2023). Applied behavior analysis and its application to autism and autism-related disorders. In *Handbook of Applied Behavior Analysis for Children with Autism: Clinical Guide to Assessment and Treatment* (pp. 37–58). Springer.
- Sarafino, E. P. (2011). *Applied behavior analysis: Principles and procedures in behavior modification*. John Wiley & Sons.
- Siegel, L. A., Tusseyadiah, I., & Scarles, C. (2023). Exploring behaviors of social media-induced tourists and the use of behavioral interventions as salient destination response strategy. *Journal of Destination Marketing & Management*, 27, 100765.
- Trump, C. E., Pennington, R. C., Travers, J. C., Ringdahl, J. E., Whiteside, E. E., & Ayres, K. M. (2018). Applied behavior analysis in special education: Misconceptions and guidelines for use. *TEACHING Exceptional Children*, 50(6), 381–393.
- Warner, J. N. (2013). *National applied behavior analysis models*. https://ed-psych.utah.edu/school-psych/_resources/documents/grants/autism-training-grant/power-pt/National-ABA-Models.pdf
- Yu, Q., Li, E., Li, L., & Liang, W. (2020). Efficacy of interventions based on applied behavior analysis for autism spectrum disorder: A meta-analysis. *Psychiatry Investigation*, 17(5), 432–440.