# Effects Of Applied Behavior Analysis Treatment In Children With Autism Spectrum Disorder To Develop Social Interaction Skills

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## Abstract

This study was designed as an experimental study divided into two groups (control group & experimental group) and uses pre-test and post design. The selected research group includes 30 participants (both male and female without any discrimination). In this study, a random sampling technique was used for data collection. Four social-interaction factors (social group skills, peer interaction, social communication and interaction, and appropriate behavior of a child) were figured out using portage guide early education and ABLLS-R. The instrument was developed with the help of the ABLLS-R protocol and portage guide of early education. The study results indicate that selected participants give complete eye contact and respond to everyone when calling their names. Experimental group participants show interest in a group activity and positively participate in social activities. Children can develop a nature of sharing with others. Children can understand the social reinforcement and work for it, and the child show interest and listen to conversations with another peer.

**Keywords:** Autism Spectrum Disorder, Applied Behavior Analysis, Social Interaction Skills

Autism Spectrum Disorder (ASD) is a neurodevelopmental issue that outcomes in huge deep-rooted disability. ASD has various clinical indications, social phenotypes, and formative measurements, and these entangle research and clinical practice concerning finding, etiology, and choosing many treatments and interventions. A striking component of autism is its fluctuation; a few children talk in complete sentences while others will never figure out how to talk; a few children stay reserved while others are tender and keen on communicating with others. This incredible changeability is found in children's reactions to therapy or intervention. Some will show restricted advancement through therapy, and others make quick and incredible

improvements through therapy (Ben-Itzchak & Zachor, 2007). Behavior therapy is vital for children with autism to develop different skills. The worldwide predominance of autism has expanded twenty-fold since the most punctual epidemiologic investigations were directed in the late 1960s and mid-1970s. Around then, commonness gauges from European examinations were one of every 2,500 children in the populace, and by the 2000s, commonness gauges from massive studies were 1%–2% all things considered (3–5) (Baio, 2014). Autism spectrum disorder (ASD), generally known as a chemical imbalance, is a perceived handicap in the West; however still can't seem to be recognized in Pakistan, where just four classifications of disability are thought of – visual impairment, hearing impairment, physical handicapped and mental retardation (MR).

Autism is a complex neurodevelopmental issue that is shown in children from a year and a half to 3 years old. It influences a kid's correspondence, socialization, insight, and social collaboration. It is evaluated that 350,000 children in Pakistan experience the ill effects of autism, and this number is expanding step by step. Instructing and preparing these children requires exhaustive experts and particular hardware. Sadly there is next to no mindfulness about autism spectrum disorder in Pakistan. Thus there are not many spots where these children can be overseen (Junaidi, 2019). Autism is a spectrum disorder that implies a kid's manifestations can present in a wide assortment of mixes, from gentle to severe. Mental disorders can make it hard for a kid to convey also connect with others. It can likewise make a child perform monotonous exercises and developments, become angry with changes in everyday schedule, and have abnormal reactions to particular circumstances. In confident children, signs of autism can be viewed as right on time as a year. Children that don't prattle, or then again point by age one, could be giving early indications of autism. Other youngsters may create ordinary language, what's more, social abilities for a period, be that as it may, at that point start to relapse as autism presents, this is called ,regressive autism (Speaks, 2011). Intercessions that depend on logical standards of applied behavior analysis(ABA) are perceived as powerful medicines for children with autism range issues (ASD) by numerous administrations, what's more, experts  (Dillenburger, Keenan, and Disability, 2009). Applied Behavior Analysis (ABA) is not a stale, single continuum of endorsed techniques but instead stresses the utilization of techniques that change conduct in orderly and quantifiable ways with an accentuation on examination, replication, social significance, and responsibility. ABA incorporates a vast number of reasonably steady strategies that can be utilized in different mixes across a wide range of settings while staying side by the side with advancements in science, medication, and neuroscience (Leaf et al., 2016).

In Canada, ABA is seen as giving the establishment for successful treatment, and ABA-based administrations are likewise broadly accessible, even though the degree of inclusion changes across Provinces. ABA works inside which science point of view and utilizes the logical strategy applied to people, it offers the fundamental examination and innovation to accomplish the objectives related with concurred esteems. This isn't the same as advancing a standardization plan  (Keenan et al., 2015). ABA isn't a "treatment for autism. Instead, it is the science on which a broad scope of strategies is based that has been utilized to help individuals with an assortment of practices and analyses, autism being one of them. Like most different sciences, conduct examination epitomizes

three particular related fields: Philosophy of behaviorism, Basic trial inquiries about Experimental Investigation of conduct, and Applied research: Applied behavior analysis (Chiesa and together, 2005).

Many previous studies describe the role and effectiveness of applied behavior analysis treatment in children diagnosed with an autism spectrum disorder. In which many studies were based on the treatment of ABA (R. M. J. C. Foxx and America, 2008; Lim and Draper, 2011). The other was on behavioral therapy based on ABA to develop social skills in children with autism spectrum disorder (Matson, Matson, and Rivet, 2007; Petursdottir, McComas, McMaster, and Horner, 2007; Foxx and America, 2008; Shukla-Mehta, Miller, Callahan, and Disabilities, 2010).

ABA programming for children who have autism includes using deductively approved strategies consolidated into an extensive however exceptionally individualized bundle. A characterizing highlight of ABA programs is that they are applied reliably. To improve the probability of the speculation of the treatment endeavors, advisors/guardians need to be prepared to execute the projects across circumstances, settings, and individuals. Maladaptive practices, for example, hostility and self-injury, are not fortified, while explicit, proper elective practices are either instructed or kept up through encouraging feedback (R. M. Foxx, 1982). There is enormous observational proof that early and severe conduct mediations dependent on behavior analysis bring about recognizable and enduring practical enhancements for children with autism. Guardians who decide to profit themselves from ABA-based intervention for their children are generally left to their gadgets, what's more, have communicated dissatisfaction about the lousy vibe towards, what's more, deception of the study of conduct investigation (McPhilemy and Dillenburger, 2013). ABA gets enhancements and changes socially significant practices inside the setting of the person's social condition; is directed inside the logical system; centers on utilitarian connections and replicable systems; is adroitly efficient and intelligent; accomplishes quantifiable changes in effective objective practices that last over time and conditions; is responsible, open, possible, enabling, idealistic; and is increasingly powerful than diverse medicines. Aversive techniques are maintained a strategic distance from intercessions dependent on proper evaluation and utilitarian investigation, and positive reinforcement (Zachor, Ben-Itzchak, Rabinovich, and Lahat, 2007). The Behavior Analyst Certification Board (BACB, 2007) ensures and directs ABA experts. There are two degrees of affirmation. Board Certified Conduct Analysts (BCBA) must-have in any event Master's degree level preparation in conduct investigation just as 1,500 hours directed free hands-on work understanding before taking a thorough 4-hour test. At present, there are almost 3,500 BCBAs around the world. Board Certified Associate Behavior Analysts (BCABA), who since January 2009 is presently named Board Confirmed right-hand Behavior Analysts (BCaBA), must have at any rate Bachelor qualification level preparing in conduct investigation and 1,000 hours directed free hands-on work understanding preceding taking the test, and should be managed by a BCBA a short time later (Kazemi and Shapiro, 2013). However, in developed countries, ABA is considered a treatment for children with autism to develop different child skills. There is a need to highlight the importance and effectiveness of ABA shows to the parents, special centers, hospitals, and clinics to adopt this method and, through these techniques, help the children with autism live everyday life in a society.

For this kind of reason, the most essential variable of ABA and autism has been sleeted for this study and were started study also conducted data. In Pakistan, all unique education government center's only higher psychologists and special education teachers or doctors for special needs children. No proper professionals make assessments of the children with autism in a proper way or structured tool. ABA in Pakistan is new, and many parents and even in the center's head are not ready to accept this term and not adapt the strategies. Children with autism enrolled in clinics or center's many years, and improvement in children shows every miner. This study will help all behavior therapists, psychologists, government special education departments head, and principals, and heads about how the new and scientific approaches help develop a child's skills properly. Scientific approaches, not the only way to develop skills robotically. This helps change the minds of people and parents to accept the change in society and centers. The purpose of the current study was to show ABA's effect on children with autism and how ABA works to develop social interaction skills in children. With ABA treatment, researchers help behavior therapists develop social interaction skills in children with some strategies and techniques. The current study explores many questions: firstly, social interaction skills in the pre-test show the same results in a post-test on children with autism social interaction skills. Secondly, is there any significant difference in an ABA to develop social interaction skills in autistic children?

To find out all these above questions' reliable answers, this study was restricted on age, gender, diagnoses of children, level of autism, children's IQ level, and apply ABA treatment. All the selected children in this study were aged between 3 to 6 years old. All the children diagnosed with mild autism level from a doctor. All the children are not non-verbal.

## Method of the study

The study's method was designed as an experimental study divided into two groups (control group & experimental group) and uses pre-test and post design. The approach of the research was quantitative, and the design of the study was experimental research. Pre and post-research designs were used in this experimental study.

## Participants

The selected sample was divided equally into two groups (control group and experimental group). The selected research group includes 30 participants (both male and female without any discrimination). The random sampling technique was used for data collection without gender discrimination; data were assembled from the Autism Institute of   Pakistan, Lahore. The selected center was found through Google. Many clinics and centers search in Google and get numbers. After call information, many centers may not run the ABA method. Few centers or clinics are highlighted for this, and only Behavior and Special Needs Services (BASES) are highlighted who run proper ABA in their clinic, where ABA is already implemented in children with autism with ABLLS-R and AFLS protocol. Thirty children, both male and female gender participated selected in the current study. Thirty children selected on behalf of the same IQ level (60-75), ages between 3 to 6 years old, and children who have mild symptoms of autism were selected for this study.  All the children were diagnosed with autism. All selected participants are not non-verbal.

Psychiatrists or doctors who diagnosed the child with autism recommend a special center or clinic for behavior therapy selected for this study and meet the criteria of autism mentioned in DSM-IV (Vahia, 2013). All the selected participants were already diagnosed, and assessment was taken personally head of the center through the portage guide of early education. Four participants were excluded from this study because these participants have comorbidity disabilities. Selected children speak 4 to 5 phrases, word sentences and follow the command of a therapist. The study was delimited to the only Lahore centers and only those clinics that already do not run ABA therapy in their clinics and centers. Only those students selected who came newly and started ABA very first time. All the selected participants start ABA during this research. At the start, the children's assessment was taken and sees at which level the child has. With the help of assessment, show how much child has social skills develop and where child lack. All the points note down and start work on the next level of the child with reinforcement. All children came to the center Monday to Friday. This dependability coefficient introduced that this instrument was solid for use. The got information of the investigation was dissected factually utilizing mean and standard deviation and factor investigation.

Before starting the setup, the researchers adhered to the approval meeting with parents and the head of the center in which research shares the purpose of the research and all the process of the study in detail. At the start of the treatment, approval letters were signed by parents and the head of the center. After the approval letters, the researcher designed all the research and divided it into two control and experimental groups.

**Design**

All the children were diagnosed through pediatricians, clinical psychologists before enrolling in the center. After diagnosing the child, In child evaluation report mentions the child's autism level, age, delay milestones in which area, and all behavioral functions after this child was recommended for behavior therapy and enrolled in a special center or clinic.

Four social-interaction factors (social group skills, peer interaction, social communication and interaction, and appropriate behavior of a child) were figured out using portage guide early education and ABLLS-R. All the experimental group children attended the Applied Behavior Analysis treatment. All the selected participants' referred to develop social interaction skills that proper target and for intervention by Board Certified Behavior Analyst (BCBA) mentioned in ABA structured way. All the sessions of this study were conducted in a selected Autism Institute of Pakistan, and the area of the room was suitable to conduct three sessions at a time in a room. All the sessions' material and selected toys were included with the help of a preference assessment. With the help of preference assessment, therapists know the preferred item edible like any food and tangible like any object or item/activity childlike. One helper or observer was also higher with the therapists who help to enter data in a file of each trial of goal. Also, help to provide material and during group activities. The experimenter used a data entry sheet, pen, all selected material baskets of each child, and a goals list in each session. Observer also makes video at the end of the week or after every 15 days and save the child's behavior and conditions. In the selected center sample size of the

participants was more as compared to other clinics. Therapists went and took a survey that many centers in Lahore hired behavior therapists and psychologists that deal with the behaviors of autistic children in an unstructured way that is not effective compared to ABA. The researcher first took a session almost one year in the BASES clinic and worked with almost 25 children with autism. The BASES CEO trained the researcher on implementing ABA treatment and giving Registered Technician Certification (RBT) training for command and professional knowledge. In the government center researcher choose 30 participants who already enrolled and traditionally taken therapy. In this study, social interaction skills check through both ABA and traditional method. Social interaction skills were given to the subjects to see the effect of ABA treatment. Skills checked into selected all participants and gave treatment for this.

## Measurement

Firstly 30 children were randomly divided into two groups (control group and experimental group).In the experimental group, we apply ABA treatment in all participants, and in the control group, we teach participants in the same old traditional way. First of all, the researcher develops a pre-assessment and post-assessment tool for all children with the help of portage guide early education and ABLLS-R. A protocol is utilized to score the children's presentation on the undertaking things and gives 15 reference sections that permit an assortment of explicit abilities that are remembered for the evaluation. The ABLLS-R framework is an evaluation instrument, educational plan control, furthermore, abilities following framework. It helps manage language and basic student abilities for adolescents with an autism spectrum disorder or other formative disabilities. This convention is a Practical and parent-accommodating instrument. It encourages the distinguishing proof of abilities required by a kid to successfully convey and gain from an ordinary background (Partington, 2008). This method already runs in this center and applies during the session.

Firstly, the researcher divided 30 participants into two groups, did a pre-assessment of all participants in the same way and method, and used the same tool for both groups. After the pre-assessment, the researcher put all the assessment tools in a drawer and locked them and started giving treatment; in this study, the researcher took 45 minutes for each student. The researcher follows the rules and structured way of ABA with the experimental group. Take a session with the help of developing tools for social interaction skills. In this study, the instrument was divided into five factors. The first factor consisted of demographic information. The second factor was social group skills consisting of 10 statements, the third factor was speer interaction consisting of six statements, the fourth factor was social communication, and interaction consisted of six statements. The fifth factor was the appropriate behavior of a child consisting of eight statements that develop with two protocols (ABLLS-R and portage guide of early education).

In ABLLS-R protocol Social interaction domain consists of 34 goals that run and develop social interaction skills. All the goals of both protocols merge into statements and develop the questionnaire, divided into a percentage. Suppose the child percentage is between 80 to 100% child mastered this goal and develop social interaction skills. If each goal child takes less than 80%, the child cannot move on to another goal and did not develop social interaction skills according to the percentage's division. The overall

percentage of all goals shows the result of the child. The researcher makes a sheet before starting the treatment in which all goals names are mentioned and the discriminative stimulus (SD), introduced date, and mastered date in a written form. Another sheet makes for every trial recording and percentage. In the end, this percentage help to know which goal mastered and which skill development in a child and duration. Control group treatment was traditionally used in institutes, but the environment, time, and therapists were the same for the experimental group. Experimental group treatment way was applied behavior analysis (ABA) Moreover, develops skills in a structured and proper way to follow the rules of the protocol. Every goal runs each day with five trials. Every trial mark is equal to a 20% score. Control group participants take therapy in their traditional unstructured way. The Mark sheet is shown below in table 1 to understand the criteria easily.

**Table 1 Running Goals Record for Every Trial each day**

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| Statement # | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 | Prompt Level | Total Percentage |
|---|---|---|---|---|---|---|---|
| 1 | + | + | _ | _ | _ | 2 | 40 |
| 2 | + | _ | _ | + | + | 1 | 60 |
| 3 | + | + | + | + | _ | 3 | 80 |
| 4 | + | + | + | + | _ | 3 | 80 |
| 5 | + | + | + | + | _ | 3 | 80 |
| 6 | + | + | _ | _ | _ | 2 | 40 |
| 7 | + | + | _ | _ | _ | 2 | 40 |
| 8 | + | + | + | + | _ | 1 | 80 |
| 9 | _ | + | _ | + | + | 2 | 60 |
| 10 | + | + | | | | 1 | 40 |
| 11 | + | + | + | + | _ | 1 | 80 |
| 12 | + | + | + | + | _ | 2 | 80 |
| 13 | + | + | + | _ | _ | 2 | 60 |
| 14 | + | + | + | | | 1 | 60 |
| 15 | + | + | + | _ | + | 3 | 80 |
| 16 | + | _ | + | _ | _ | 1 | 40 |
| 17 | + | + | + | _ | _ | 2 | 60 |
| 18 | + | + | + | _ | _ | 2 | 60 |
| 19 | + | + | _ | _ | _ | 2 | 40 |
| 20 | + | + | + | + | _ | 1 | 80 |
| 21 | _ | + | _ | + | + | 2 | 60 |
| 22 | + | + | | | | 1 | 40 |
| 23 | + | + | + | + | _ | 1 | 80 |
| 24 | + | + | + | + | _ | 2 | 80 |
| 25 | + | + | + | _ | _ | 2 | 60 |
| 26 | + | + | + | | | 1 | 60 |
| 27 | + | + | + | _ | + | 3 | 80 |

| 28 | + | _ | + | _ | _ | 1 | 40 |
|----|---|---|---|---|---|---|----|
| 29 | + | + | + | _ | _ | 2 | 60 |
| 30 | + | + | + | _ | _ | 2 | 60 |

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## Treatment Duration

The treatment duration was six months (September 2020 to February 2021). At the start, 36 participants were selected, of which 6 participants quit because their parents thought there is no longer a need to continue this program. The researcher gives 45 minutes for each child five days a week. In this selected, 45 minute researcher run different goals that mention in the instrument. During treatment, time and goals note each day's performance in a child file.

## Instrument

The instrument was developed with the help of the ABLLS-R protocol and portage guide of early education. In both protocols, the social interaction domain was a focus and the pre-test and post-test design for participants. ABLLS-R has 34 social interaction goals for children with autism, and the portage guide of early education consists of 83 goals of social interaction. The researcher read all goals carefully and, with the help of these goals, develops an assessment tool that helps access the children in this study. A questionnaire was divided into four factors (social group skills, peer interaction, social communication and interaction, and appropriate behavior of a child). Questionnaire statements measure with 4 Likert type scale. 4 Likert type scale divided according to the percentage (1- 20%, 2- 40%, 3- 60%, 4- 80%). 1=not improvement, 2= slightly improvement, 3= Good improvement, 4= Achieved. If the child gets 80% in each goal that is considered achieved and this skill development in a child. The instrument's validity was made sure by the expert teachers of Allama Iqbal Open University and the University of the management and technology teachers and head of special needs education. After the teachers' approval, the study was started to know the effect of the ABA on children with autism spectrum disorder social interaction skills. The reliability of the instrument was calculated through Cronbach alpha statistics (0.896) which was acceptable.

**Table 2 Pre-assessment and post-assessment Questionnaire to check social interaction skills**

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| Factors | Statements |
|---------|------------|

| Social Groups Skills | 1- A child can follow imitations of rules that follow others. |
| | 2- Children verbally demand what he/she want during playing activities. |
| | 3- When offered the item to the child, the child takes the offered item from any person. |
| | 4- A child has developed the nature of sharing. |
| | 5- If the person is missing one day child remembers and calls name. |
| | 6- A child easily delivers a message to others. |
| | 7- The child asks other peers about any information. |
| | 8- A child can get and maintain another individual attention. |
| | 9- If a child does something wrong apologize for the mistake. |
| | 10- Child point or ask for help for something doing like washroom, eating, drink. |
| **Peer Interaction** | 1- children show interest and listen to conversations. |
| | 2- A child can make friends when other members or peers talk. |
| | 3- A child can play without any assistance. |
| | 4- During play activity child allows other peers to join him/her. |
| | 5- A child can know about a preferred or interesting item which he/she wants. |
| | 6- Children choose friends and play. |
| **Social Communication and Interaction** | 1- A child can show his feelings with face or verbally. |
| | 2- Children contribute to the conversation with others. |
| | 3- Children listen and follow every command when given through any person. |
| | 4- A child can play with others without any resistance or pushing. |
| | 5- A child can properly look at others to start a conversation. |
| | 6- Children follow the direction given by peers, family members, or others. |

| Appropriate Behaviour | 1- The child gives proper eye contact when calling his or her name at any time. |
| | 2- A child can develop a nature of sharing with others. |
| | 3- A child can understand social reinforcement and work for it. |
| | 4- If music plays child dance or moves his/her body. |
| | 5- Repeats songs and rhymes properly. |
| | 6- The child appropriately initiates greetings to others. |
| | 7- During the group activity, the child accepts the other peer changing behavior positively. |
| | 8- A child can tell which play or activity is most interesting to play with others and which is not. |

## Procedure

The researcher itself trained behavior therapists and worked in a private clinic as an ABA therapist. The researcher has a complete command of managing autistic children during giving behavior therapy and did a registered behavior technician (RBT) to understand ABA therapy. According to the plan, five sessions in a week were designed for children with autism for both control and experimental group participants. Five sessions consisted of five days (Monday to Friday) in a week. Every session time was 45 hours. The same criteria were used for both groups, but the ABA therapy provides to the experimental group participants and the control group participants teach in a traditional unstructured way. Three therapists provide therapies for children in the same clinic. Clinic, measurement, environment, time, assessment methods were the same for both groups, but the criteria were different. Session description was divided into 4 phases, which were described below:

## Phase 1:

At the start, therapists set the two rooms according to the need of the therapy. One room was designed according to the rule of ABA in a properly structured way. Table and chair set in the room and make a basket for each student according to the pre-assessment. At the start, first, take a pre-assessment of all selected children with the help of an instrument and then take the child's baseline line in each goal. Where the child falls therapists start working to the next level. Almost all the children fall to the same level during pre-assessment. The researcher design the goals chart and reinforcement schedule of every child included in the experimental group. After this, ABA behavior therapy therapists design a reinforcement schedule for each child and paste it into every child file. Another room was already designed according to the traditional way of session. Researcher design the body mapping of every child when the child entre the center, and when exit the center, parents sign and receive their child. In body mapping, child all behaviors are also mentioned in it and shown to the parents about behaviors and start working side by side. All behaviors data show in ABC (antecedent, behavior, consequence) form. This form helps to know why this behavior occurs, and This is only for experimental group participants.

**Phase 2:**

In the second phase, therapists divided and took selective children from the group. Each therapist has ten children, of which five control groups and five experimental group participants include. Throughout the research, therapists were the same and took a session with a child. In the experimental group, the researcher starts working on developing pairing or repo building with the child. In this process, the researcher gives a free hand to the child, goes and picks anything that the child wants, and the researcher also continuously plays with the child. The first rule of ABA is developing trust in a child's mind that the child works for the therapist and listens to the therapist's every command. It takes two weeks to develop a repo between children and therapists. In this, therapists never force the child to work or sit on the chair. On the other side, the control group participants came and played lonely. Therapists do not pay full attention and do not engage every second with the child. During pairing, therapists run goals side by side.

**Phase 3:**

Therapists used prompt levels to run ABA therapy for experimental group participants. Prompts level is divided into four steps (complete physical, partial physical, light touch, and independent level). These steps help to develop skills in a child in a structured way. Therapists follow these steps to run goals during sessions. Therapists make sheets in which all goals wrote and properly ran goals with the help of a baseline. Therapists never repeat their commands to the child. Moreover, 45 hours physically and mentally engaged with the child.

With the control group, therapists never use any prompt level to start with an unstructured way and put the child's command. Therapists repeat the command to the child if a child gives eye contact or not give them reinforcement.

**Phase 4:**

In the last step, if the child shows no improvement in any goal in the experimental group, therapists decrease the child's level and run with the starting level. The Control group runs all goals without any proper way. If the child shows no response, therapists stop the goals and move on to the next goal.

**Table 3**

| Work according to weeks | Control Group | Experimental Group |
|---|---|---|
| Month of September | start with pairing | start with pairing |
| Last week of September and the Start of November | Start run goals without developing reinforcement Schedule | pairing also take a preferred assessment of reinforcement |

| | | |
|---|---|---|
| The third week of November | session run in any place not must sit in a table chair also start with the 15 goals | Compulsory to sit in a table chair that increases compliance level of a child and start run gaols. Select 2 to 3 goals from each domain |
| Month of December | start with the 15 goals | start with goals with a preferred item of a child Reinforcement schedule |
| The first week of January | all goals run side by side | after achieving seven primary goals, Add more goals |
| Third week of the January | use reinforcement, not proper schedule design, and work on all 30 goals | runs all goals according to the data results entered in a file |
| The second week of the February | achieved goals closed run non achieved goals run | Achieved goals add as a maintenance goal also run others goals as acquisition goals |
| Fourth week of the February | post-assessment | post-assessment |

**Analysis**

Statistical Analysis of Social Sciences (SPSS version 21) was used for data analysis. One sample t-test, paired sample t-test, and Univariate Analysis of Variance based on Difference between Control Group and Experimental Group were used for analysis.

**Table 1.1 Independent Sample t-test based on factors Experimental Group and Control Group pretest and Posttest**

| | Control Group Post-test | | Experimental Group post-test | | | |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | f | p |
| Social Group Skills | 396.00 | 134.844 | 602.67 | 50.634 | 3.835 | 0.60 |
| Peer Interaction | 277.33 | 85.479 | 380.00 | 32.071 | 1.895 | .000 |
| Social Communication And Interaction | 256.00 | 85.256 | 408.00 | 34.476 | 3.467 | .001 |
| Appropriate Behaviours | 376.00 | 98.908 | 489.33 | 40.614 | 1.022 | .000 |

Table 1.1 shows the control group and experimental group's post-test comparison based on four factors ( group skills, peer interaction, social communication and

interaction, and appropriate behaviors). Results show that there is a significant difference between the control group and experimental group treatment. ABA works more effectively;y as compared to the unstructured way of therapy. Social became more social, and behaviors appropriate through ABA treatment.

**Table 1.2 One sample t-test based on Experimental Group Posttest**

| | M | S.D | t | df | p | 95% CI Upper | Lower |
|---|---|---|---|---|---|---|---|
| **Post Test** | 66.00 | 14.994 | 23.561 | 29 | .000 | 58.90 | 70.10 |

**p < 0.05**

Table 1.2 shows the result of an experimental group posttest. Results show a significant difference between the control group and experimental group posttest results (M= 66.00, SD= 14.994, p= .000).

**Table 1.3 Paired Sample t-test based on Experimental Group pretest and Posttest**

| | M | S.D | Correlation | t | df | p | 95% CI Upper | Lower |
|---|---|---|---|---|---|---|---|---|
| **Pre-Test** | 24.00 | 24.142 | .372 | -8.981 | 14 | .000 | -39.581 | -64.418 |
| **Post-Test** | 76.00 | 8.281 | | | | | | |

Table 1.3 shows the difference between pre and post-test of experimental group participants. According to the results, ABA treatments work effectively as compared to other methods. In pretest (M= 24.00, SD= 24.142); posttest (M= 76.00, SD= 8.281); p= .000. Results show that pretest and post-test have a significant difference between the same group but using different treatments.

**Table 1.4 Univariate Analysis of Variance based on Difference between Control Group and Experimental Group**

| | N | M | S.D | F | df 1 | df2 | p | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| **Control Group** | 15 | 34.67 | 19.223 | .206 | 1 | 28 | .653 | .156 |
| **Experimental Group** | 15 | 52.00 | 22.424 | | | | | |

Table 1.4 shows the variance analysis between the two groups. The results shows that experimental group shows more improvement as compare to control group (M= 34.67, SD= 19.223; M= 52.00, SD= 22.424; p= .653).

**Table 1.5 Findings of Participants of Control Group and Experimental Group**

| | Pre Test | | | Post Test | | |
|---|---|---|---|---|---|---|
| | M | SD | SE | M | SD | SE |
| **Control Group** | 26.67 | 23.503 | 6.068 | 56.00 | 13.522 | 3.491 |
| **Experimental Group** | 24.00 | 24.142 | 6.234 | 76.00 | 8.281 | 2.138 |

M= Mean, SD= Standard Deviation, SE= Standard. Error Mean (P= .001, .000; df= 14, 14; t= -8.981, -4.190)

Table 1.5 shows the all selected participants before and after result of a test. Pretest and posttest of a control and experimental group. Results show that there is a significant difference between both groups and after posttest.  Control group results (M= 26.67, 56.00; SD= 23.503, 13.522; p= .001; t= -4.190). Experimental group results (M= 24.00, 76.00; SD= 24.142, 8.28; p= .000; t= -8.981).
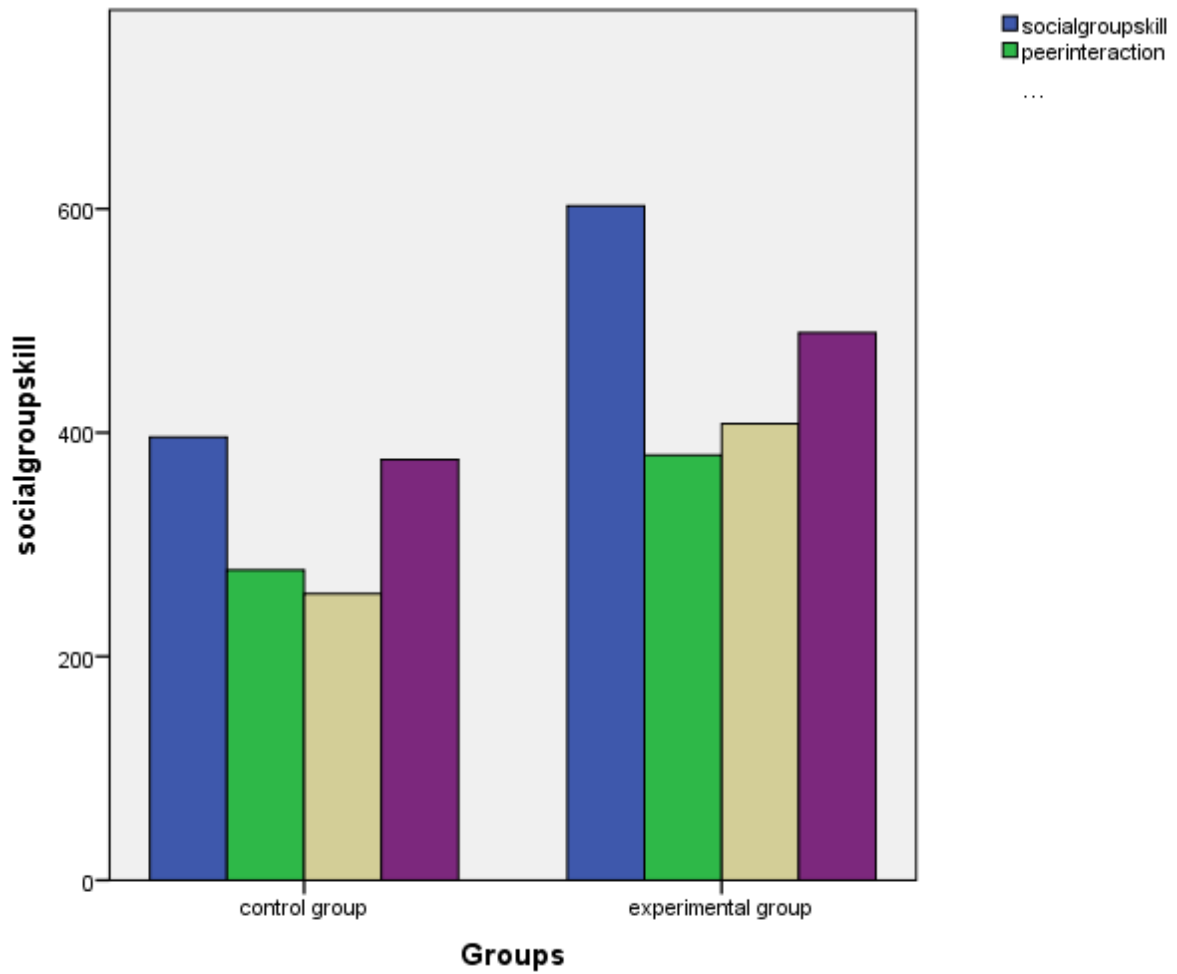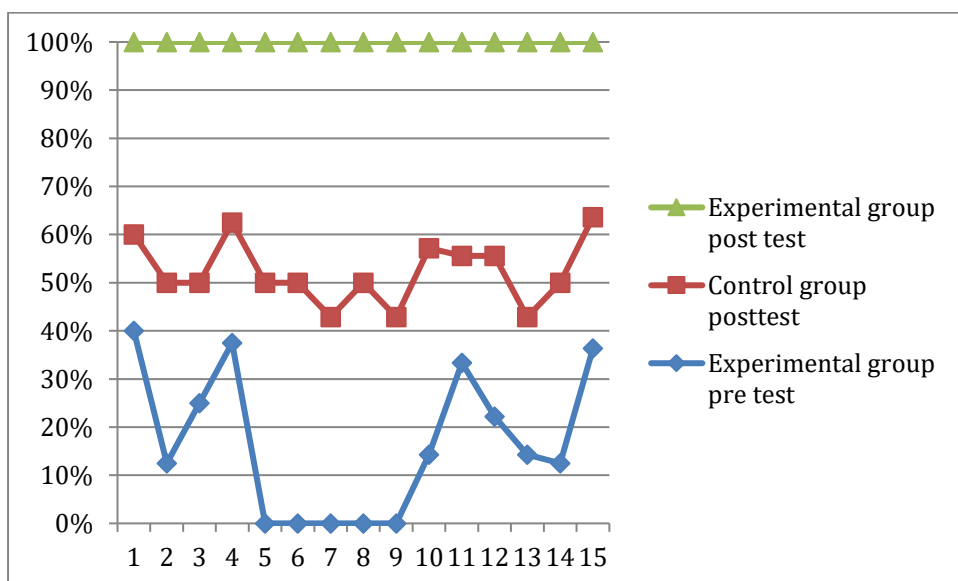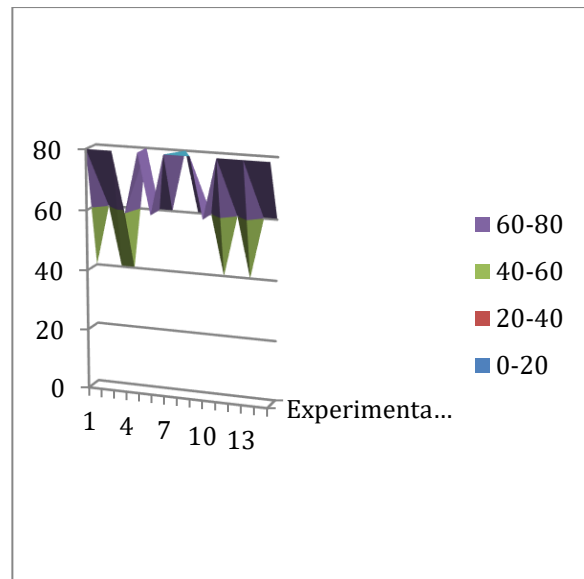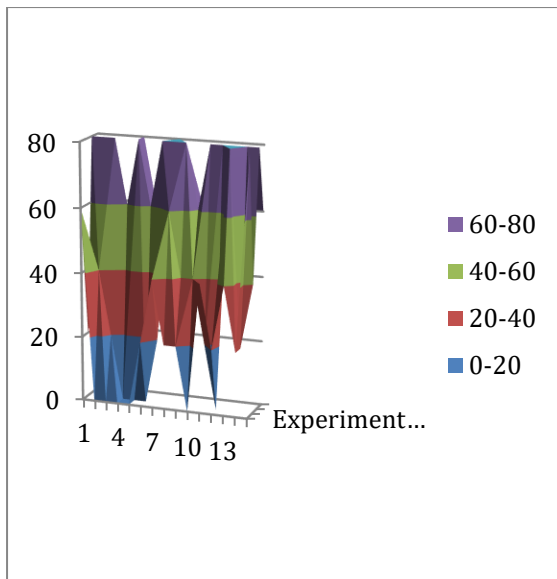
The graph shows the control group and experimental group responses difference. After implementing ABA treatment the results of the study show that social interaction skills develop in a child easily through ABA.
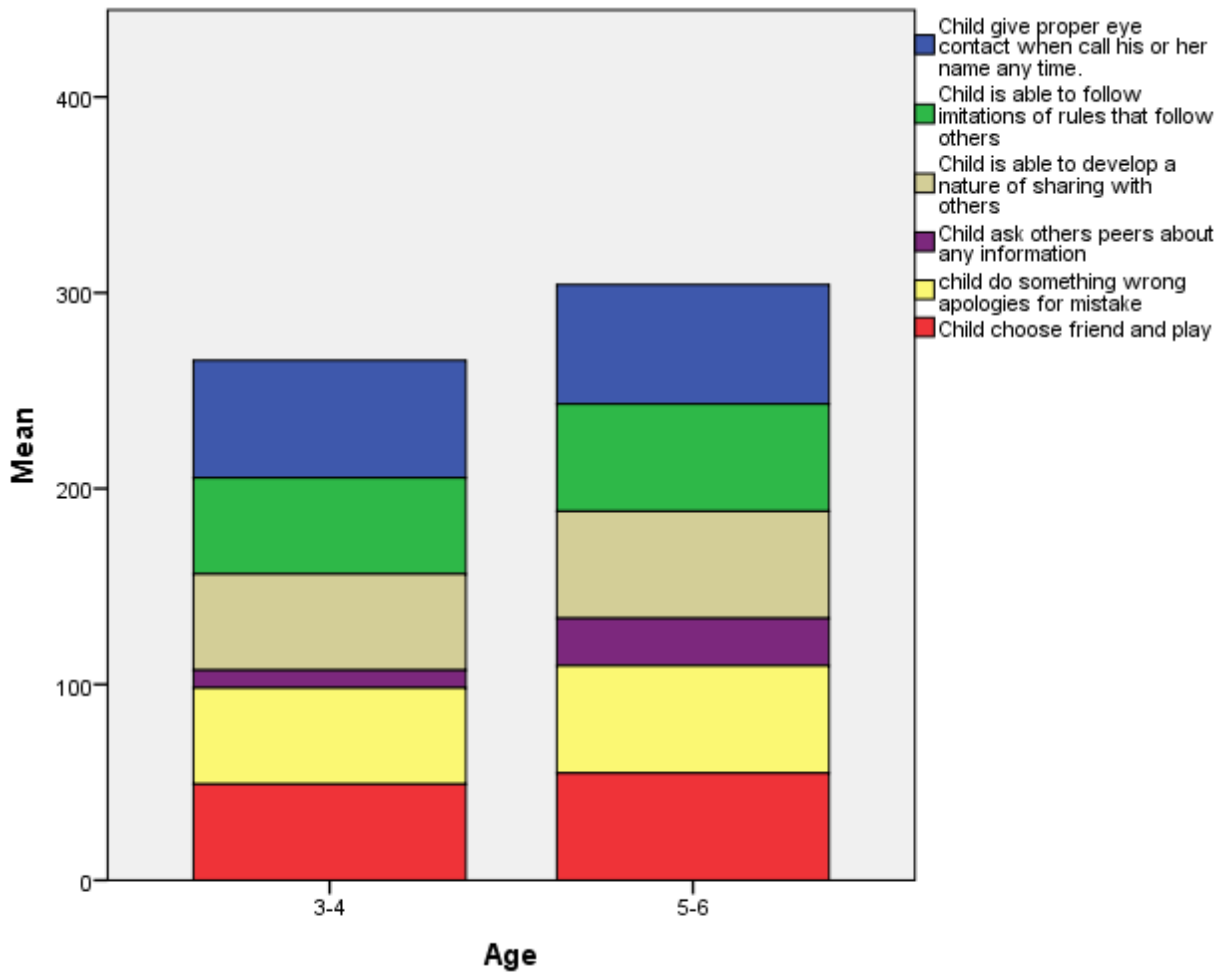
According to the age level above graph shows the level of a child in different statements. That shows which statement develops in a child in how much percent. Different color represents each statement that shows the right side of the table.

The above diagram shows the clear difference between the experimental group's pre and post-test results.

## Results

Data of 30 participants were analyzed (15 participants from the control group and 15 participants from an experimental group). Before applying the Applied Behavior Analysis treatment to check the social interaction skills, participants show no average difference in the pretest selected for the experimental group (M= 26.67, SE= 6.068; M= 24.00, SE= 6.234).  After applying the Applied Behavior Analysis treatment, there is a vast difference show in the control group and experimental group results (M= 56.00, SE= 3.491; M= 76.00, SE= 2.138). Social interaction skills ability was the same before applying treatment in participants. After applying the treatment, experimental group participants develop more social interaction skills in a child. Selected participants give complete eye contact and also give name responses to everyone when calling their names.  Experimental group participants show interest in a group activity and positively participate in social activities.  Results of the study show that children can develop a nature of sharing with others.  Children can understand the social reinforcement and work for it, and the child show interest and listen to

conversations with another peer.
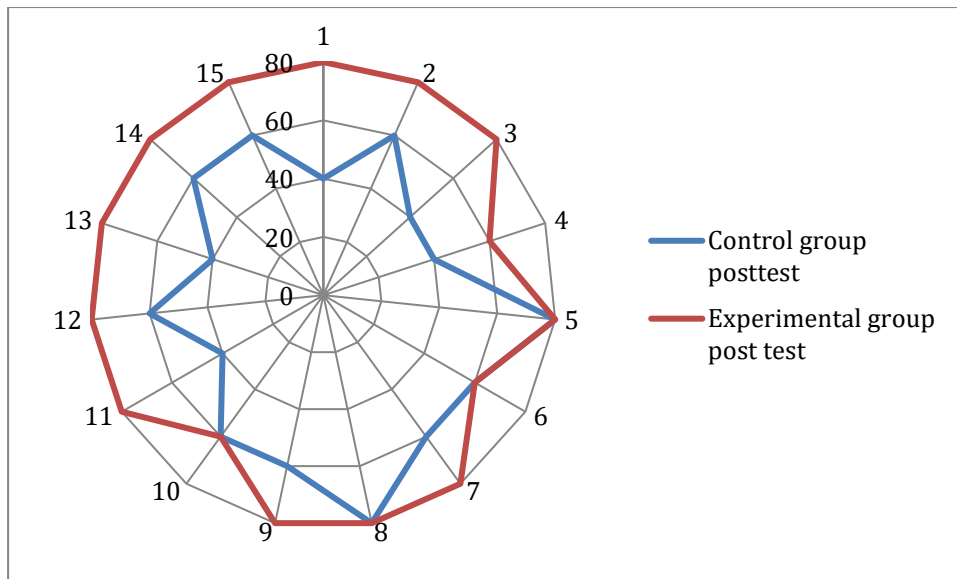
## Discussion

In this study, we check the effect of ABA on children with autism spectrum disorder's social interaction skills, and results have come after six months of treatment. After this, we access all children's behavioral related to social interaction skills before and after six months of intensive behavior therapy. This study primarily focuses on the effect of ABA programs on children with autism's social interaction skills. Different factors are checked peer interaction, appropriate behaviors, social communication, and interaction with ABA treatment. Researchers apply behavior therapy with the help of ABA. The study was planned to note the effect of Applied Behavior Analysis treatment on social interaction ability for children with autism compared to the control group and experimental group. Before starting giving treatment, the initial assessment shows no difference between selected participants on social interaction ability. All the participants have the same kind and level of social interaction. A child has no proper eye contact and no response to their name. When anyone calls the child, name child within 5 sec gives no response or any eye contact. Children are not able to communicate easily with others and prefer to play individually. Children have no sense of ability to share toys with other peers; throwing, hitting behaviors exists in children. After starting the ABA treatment, both group participants' behaviors and results after the post-assessment show a significant difference in social interaction ability. The experimental group that gives ABA more actively participates in social activity and is more energetic than other control group participants. Previous studies show that ABA treatment help for the development and social relation through different interventions for children with autism (Strain, Schwartz, & Disabilities, 2001). Many other kinds of research show the effect of ABA on children with autism. Previous studies show the ABA in a structured way to check the clinical treatment of children with autism behaviors and motivation (Mohammadzaheri, Koegel, Rezaee, Rafiee, & disorders, 2014). Before starting this study, researchers accepted the similar result and effect of ABA treatment. After the six months treatment procedure, the results revealed that ABA structured treatment is very effective and beneficial for children with autism compared to the unstructured naturalistic way. This study covers all significant aspects of social interaction which help to develop this ability in a child. Assessment tool statements are

briefly described and cover all domains of the ability to develop social interaction. After the ABA treatment, the Child point or ask for help for something like washroom, eating, and drinking. If at the center or home child does something wrong child apologies for the mistake. The child can know about a preferred or interesting item which he/she wants. During group activity child accepts the other's peer, changing behavior positively. The child gives proper eye contact and a name response within 3 to 5 seconds. With the help of ABA child have developed the nature of sharing. The child follows the direction given by peers, family members, or others.

In this study, after getting the results, it is concluded that the children in the experimental group improved primary social interaction skills (eye contact, name response, follow imitations of rules that follow others, showing his feelings with face or verbally, Child contribute to the conversation with others, develop a nature of sharing with others, understand the social reinforcement and work for it, interest and listen to conversations, Child verbally demand what he/she want during playing activity, listen and follow every command when given through any person, able to play without any assistance, offered the item to the child, child take the offered item from any person, the person is missing one day child remember and call name, play activity child allows others peers to join him/her, able to get and maintain another individual attention). This study is significant to help parents and therapists to develop social interaction in autistic children.

## Limitation and Direction for Future Researcher

The study was limited because of the unavailability of autistic children, and many private and government centers do not like the ABA. No proper tool was developed to check the social ability of a child. Thirty statements were combined researcher with the help of ABLLS-R and the Portage Guide of Early Education. All the researchers of this study believed that many other points and variables discuss other future research treatments to develop social interaction in children with autism.

## Acknowledgment

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