

# Emphasizing Parent Child Interaction in Children with Mild Autism Spectrum Disorder - A Longitudinal Study

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**Abstract:** *The pandemic has led to increased screen time in children, resulting in minimal play or no play with others. Parental involvement in their children's language development is crucial, and evidence - based approaches like parent child interaction therapy have been used to improve communication skills. A study included 12 parents of children with mild autism aged 2 - 5 years. The Parenting Interactions with Children: Checklist of Observations Linked to Outcomes (PICCOLO) tool was used to evaluate parent - child interaction via tele - mode. Parents were trained and counseled on the importance of parent child interaction and were followed up for six months. The study found significant short - term and long - term changes in parent - child interaction in parents of children with mild ASD, as well as a positive correlation between PCI post - training scores and language scores. The study emphasizes the importance of parent child interaction therapy in improving communication in children with ASD.*

**Keywords:** Parent child interaction and ASD, Parent training, Social communication, Telepractice

## 1. Introduction

Parents are the architects who mould and construct the basis for all of a child's concepts throughout his or her life. The stimulus provided at home by parents and caregivers has a significant impact on children's communication skills. The pandemic has caused children to spend more time on screens, which has led to them playing less or not at all with others due to social distancing measures. Hence there is a lack of interaction and language stimulation in the home environment.

According to a literature review on the impact of COVID - 19 on children with Autism spectrum disorder by McKinney et al. (2021) found an increase in Autism like features, behavioral issues, emotional problems, hyperactivity, poor social communication skills and language problems in children. Despite the staggering rise in ASD prevalence, interventions available to children and families in the ASD community are not expanding at the same rate. An evidence - based approach in ASD intervention includes Parent child interaction therapy (PCIT) which was found effective in reducing behavioral problems and building social communication in children with ASD [1].

Masse et al. (2016) studied the efficacy of PCIT on children with ASD aged 2 - 7 years and their scores were compared at 3 time periods that are pre, post and follow up (3 months) where they found there were reductions in child disruptive behaviour, and improved parenting skills also they found there was a reduction in children's Childhood Autism Rating Scale (CARS) scores at 3 months follow up. Despite the fact that PCI is crucial for assessing children's speech language and communication skills, it is rarely considered during the

assessment.

“Evaluations of ASD interventions often overlook the influence of parental and familial factors, which can significantly impact both immediate and long - term therapy outcomes” [2]. Currently, there is a scarcity of Indian literature on PCI in children with ASD. Hence there is a robust need to assess PCI in children with autism. In the present study we investigate the short - term changes and long - term changes in PCI scores of parents of children with ASD. This study also explored the correlation between PCI scores and the language skills in children with ASD.

## 2. Method

This longitudinal study involves parents of children with mild autism spectrum disorder (ASD) aged between 2.1 – 5.0 years. All families were recruited from a multi - specialty clinic (from December 2021 to June 2022). Informed consent was taken from each parent who participated in the study. Participants were from Pune city of Maharashtra state in India. The study was carried out in line with the ethical guidelines as per WHO guidelines (2011). The study was approved by the Institutional Ethics Committee of Bharati Vidyapeeth (Deemed to be University) Medical College (BVDUMC/IEC/66, 04/01/2022). They were informed that their information will be kept confidential, their participation in the study is voluntary, and that they can withdraw themselves from the study whenever they would want to. The parents then signed a written consent form before the study began. The study was a single blind study to avoid respondent bias.

Due to limited study duration and stringent inclusion

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criteria, the study recruited 20 participants initially. But due to cost, time, and availability, only 12 parents of children with autism spectrum disorder (ASD) aged 2.1 - 5.0 years were included, with all being male and scoring between 70 - 106 on the Indian Autism Scale (ISAA) (National Institute for Mentally Handicapped, 2009, Chakraborty et al.2015). The study included children recently diagnosed with ASD and no prior therapy, with consent for videotaped PCI and research data. Parents with bachelor's degrees, nuclear families, and adequate literacy exposure were included. Children with hearing loss, sensory issues, or medical disorders were excluded.

The tools used in this study are The *Indian Scale for Assessment of Autism* (ISAA; National Institute for Mentally Handicapped, 2009) is an objective assessment tool for people with autism that gives the severity of ASD. The ISAA scores were obtained from the psychologist. The *Communication DEALL developmental checklist* (CDDC; Karanth, 2007) was used to evaluate the baseline scores of the children's language age. This is a criterion - referenced checklist that examines a child's holistic development in eight domains.

The *Parenting Interactions with Children: Checklist of Observations Linked to Outcomes* (PICCOLO; Roggman et al., 2013). This tool aids in the assessment of parenting skills, the guidance of parenting interventions, and the tracking of program outcomes. This tool is divided into four areas; these domains indicate better child development outcomes. The affection domain is described as physical proximity and communication towards the child of the parents, and greater school readiness in the child. Responsiveness is described as responding to a child's cues, emotions, language, interests, and behaviors, which is associated with improved cognitive and social development. The encouragement domain is described as active support of a child's exploration, efforts, abilities, initiative, creativity, and play, which is associated with the child's desire to do difficult activities, and improved social and linguistic development. The teaching domain is characterized as shared conversation and play, cognitive stimulation, explanations and questions linked to greater cognitive and linguistic development. The study lasted six months, with the first month serving as the baseline visit and the final as the post - baseline visit. The remaining four sessions were training sessions. Twelve parent - child dyads who took part in the parent training program were videotaped to get baseline PCI scores. The mothers were asked to spend 10 minutes on carefully programmed activity to explore PCI with their children. The first visit was the baseline, during which the parents were asked to send videos via e - mail of them interacting with the child, which were then rated by three professionals to obtain PICCOLO baseline scores. CDDC and ISAA scores were also obtained for the first visit.

The parents were given a complete explanation of each domain of the PICCOLO tool and its subdomains, as well as demonstrations of various parenting behaviors. To become acquainted with the tool, parents were trained to score the PICCOLO through professionals by rating the videos. Parents reviewed their own videos in order to better identify

which areas they lacked. The parents were briefed about parent training techniques that aid in the improvement of PCI, as well as the child's speech, language, and communication skills. The feedback of all the professionals was combined and given to the parents through online mode via zoom meeting.

For the post training scores activities were the same as the first visit and the parents were rated on PICCOLO tool again by the same professionals. The CDDC was re - administered to gather data on children's language development progress. To acquire post - baseline autism scores, the ISAA scores were obtained.

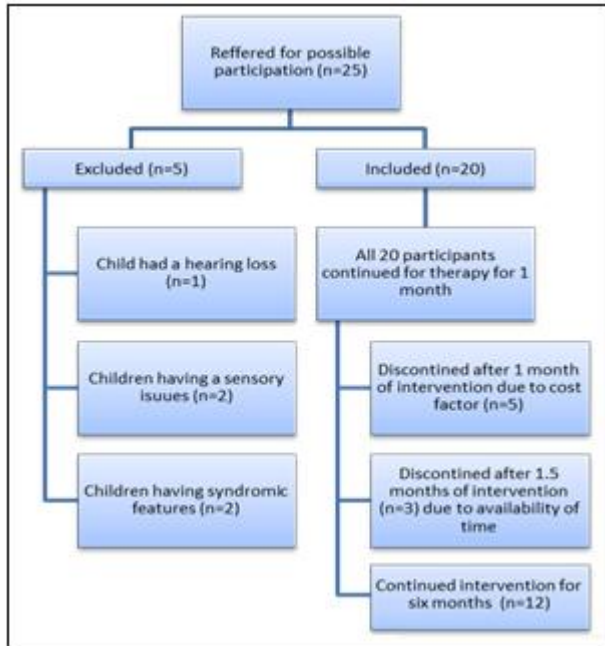
### Statistical Analysis

Statistical analysis was carried out using Statistical Package for Social Sciences (SPSS), version 28.0. The PICCOLO and ISAA scores were compiled in terms of mean and standard deviation. Shapiro - Wilk's test of normality was done for all the groups which showed a non - significant difference ( $p > 0.05$ ) for all variables, indicating that the sample was homogeneously distributed.

As the data was homogeneously distributed, parametric tests were used for statistical analysis. Repeated measures ANOVA with Bonferroni adjustment was done to check the effect of training the parents from pre, mid and post visits. Later a pairwise comparison was done between the three time periods. Pearson's correlation coefficient was used to assess the correlation between PCI scores and children's language scores (COM DEALL).

### 3. Results

A total of 20 parents of children with ASD were recruited in the study. Out of them 8 parents of the children discontinued the therapy after 1 month due to a number of reasons mentioned above. Hence, a total of 12 parents of the children with ASD were followed up for six months. The children's age ranged from 2.1 - 5.0 years. All children had delayed speech and language skills on the CDDC and mild autism on the ISAA. Most of the families (59%) belonged to the upper middle class according to socio - economic status scale given by modified Kuppusswamy by Mohd Saleem (2019). All the children belonged to nuclear families and had Marathi and Hindi language exposure at home. The Reliability analysis for the PICCOLO tool was done using Cronbach's Alpha which shows that the tool has good reliability ( $r=0.81$ ) across all domains.



**Figure 1:** Inclusion and Exclusion of the participants

### Internal consistency of the tool among raters

Pearson's correlation was done for all four domains separately and it showed a statistically significant correlation among all the four rater which were speech language pathologist (R1), Occupational therapist (R2), Psychologist (R3) and the researcher (R4). For affection domain Rater 1 (R1) had a correlation value of 0.93 with R2, 0.95 with R3 and 0.97 with R4. For the responsiveness domain Rater 1 (R1) had a correlation value of 0.90 with R2, 0.95 with R3 and 0.95 with R4. For the encouragement domain Rater 1 (R1) had a correlation value of 0.81 with R2, 0.90 with R3 and 0.95 with R4. Lastly, for the teaching domain Rater 1 (R1) had correlation value of 0.97 with R2, 0.96 with R3 and

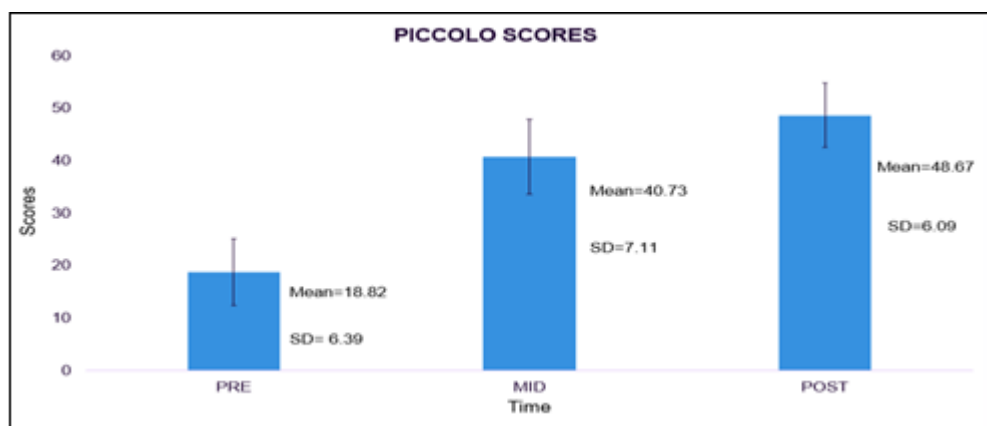
0.98 with R4. Based on the above results, the PICCOLO tool had high internal consistency and high inter - rater reliability among all the four raters. The tool was then used for further objectives i. e. to investigate short term and long - term changes in PCI scores of parents of children with ASD.

To investigate PCI, the parents were given audio and video instructions through online mode to conduct the activities like coloring, playing with a ball, cut - paste activity, book reading, and pretend play etc. (as given in the PICCOLO guidelines). The videos were collected from the parents and rated by 4 professionals (Psychologist, Occupation therapist, Speech language therapist and Researcher). Each domain included specific parenting skills that were assessed. Video was rated as per tool guidelines. The parenting behaviors were scored on a 3 - point rating scale where 0 refers to absence of behavior, 1 refers to emerging behavior and 2 refer to completely present behavior. The affection domain had a total (7 skills) with maximum score of 14, responsiveness domain (7 skills) with maximum score of 14, encouragement domain (7 skills) with maximum score of 14 and teaching domain (8 skills) with maximum score of 16.

Objective 1: To investigate short - term and long - term changes in PCI cores of parents of children with ASD. Pre (1st month) to mid (3rd month)

Mid (3rd month) to Post (6th month) Pre (1st month) to Post (6th month)

The descriptive analysis was done and calculated for the 3 time periods (Pre, Mid, and Post) as described in Figure 1, the mean PICCOLO scores increased significantly from pre to mid to post.



**Figure 2:** Mean and standard deviation of PCI scores of parents of children with autism spectrum disorder at pre, mid and post levels

Further, to compare means across variables which were based on repeated observation, Repeated measures ANOVA using Bonferroni adjustment was to investigate the impact of parent training on PCI scores. For the training effects,  $p=.665$  on Mauchly's test, hence the assumption was met. Since the sphericity assumption is met the within subject effect showed  $p<.001$ , and the effect of parent training was extremely statistically significant. It was found there was a significant effect of parent training from pre to mid and to

post, [ $F(2, 22) = 223.21, p<.001$ ]. The pair wise comparison indicated that pre phase PCI scores ( $M=18.81, SD=6.38, p<.001$ ) subsequently increased in mid phase ( $M=40.72, SD=7.10, p<.001$ ) and post phase ( $M=48.66, SD=6.08, p<.001$ ). Hence, there was a statistical improvement in PCI in parents of children with ASD from pre to mid to post ( $p<.001$ ). The domain wise results and discussion mentioned below.

**Domain 1: Affection domain**

As shown in Table 1, the descriptive analysis was done and calculated for the pre, mid and post scores of the affection domain. The mean affection scores increased from pre visit (M=5.77, SD= 2.41) to mid visit (M=12.5, SD=1.44) to post visit (M=13.3, SD=1.21).

Parenting practices that were found to be used less frequently included, praising the child, providing emotional warmth, and engaging in positive interactions. Parents were trained on the behaviors that may be improved during their interactions with their child. Modeling was also provided to obtain more understanding of the target behavior. After training, the parents started using praise with their children for the correct response and showed emotional warmth during their interaction. The parents used positive statements during the play.

**Domain 2: Responsiveness domain**

The mean responsiveness scores increased from pre visit (M=5.37, SD=1.70) to mid visit (M=11.1, SD= 1.67) to post visit (M=13.1, SD=1.36). Initially, parents were not responsive to their child's interests in activities and were inattentive to their child's actions during various tasks. They could not follow the child's lead during play and looked at the child occasionally when he/she used to speak or make sounds. Parents were trained on responsive parenting skills and their attributes in a child's development. After training, the parent paid attention to what the child is doing by making comments, showing interest, helping and following the child's lead.

**Domain 3: Encouragement domain**

The mean encouragement scores increased from pre visit (M=5.14, SD=1.81) to mid visit (M=11.18, SD=2.09) and to post visit (M=12.40, SD=1.33). In play activities, parents made suggestions to their children. They had difficulty waiting for their children's responses after making

suggestions. Instead, they supported their kids' choices less often. Parents were counseled for increasing the enthusiasm during play activities.

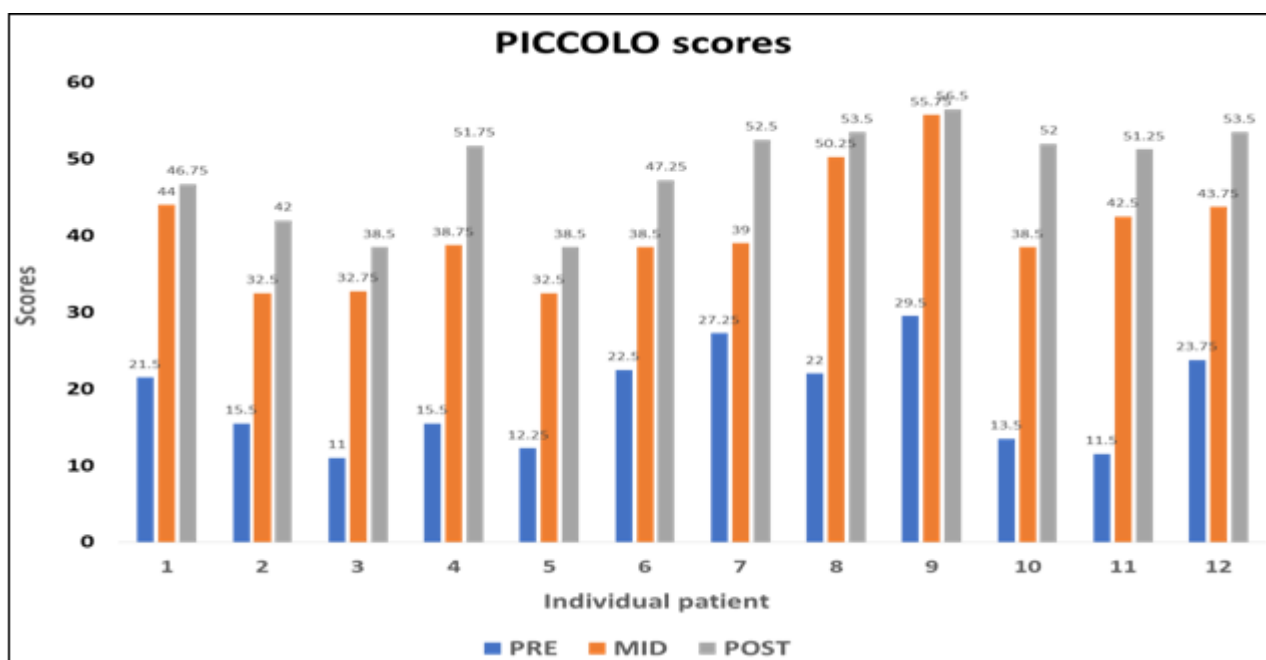
**Domain 4: Teaching domain**

Child's utterances along with explaining the reasons behind the activity. They asked information or questions to the child and described the characteristics of the object

The majority of the skills that are incorporated in this domain are connected to speech, language, cognition and communication aspects. The mean teaching scores increased from pre visit (M=3.47, SD=1.81) to mid visit (M=5.91, SD=3.44) to post visit (M=9.77, SD= 2.98). Majorly all the parents performed poor in the teaching domain as compared to the other three domains. The majority of the parents did not explain the reason behind the activities, and could not suggest activities to expand the child's utterances. The parents could not explain the characteristics of objects and underperformed in asking for information from the child. After training, the parents showed emerging behaviours for most of the skills in this domain. They started expanding the

**Table 1:** Mean and standard deviation of affection, responsiveness, encouragement, and teaching domain scores of Parents of children with autism spectrum disorder at pre, mid and post levels.

Domain	N=12	PRE	MID	POST
Affection	Mean	5.77	12.5	13.3
	SD	2.41	1.44	1.21
Responsiveness	Mean	5.37	11.10	13.10
	SD	1.70	1.67	1.36
Encouragement	Mean	5.14	11.18	12.40
	SD	1.81	2.09	1.33
Teaching	Mean	3.47	5.91	9.77
	SD	1.81	3.44	2.98



**Figure 3:** PICCOLO scores of 12 children with ASD during pre, mid and post visit

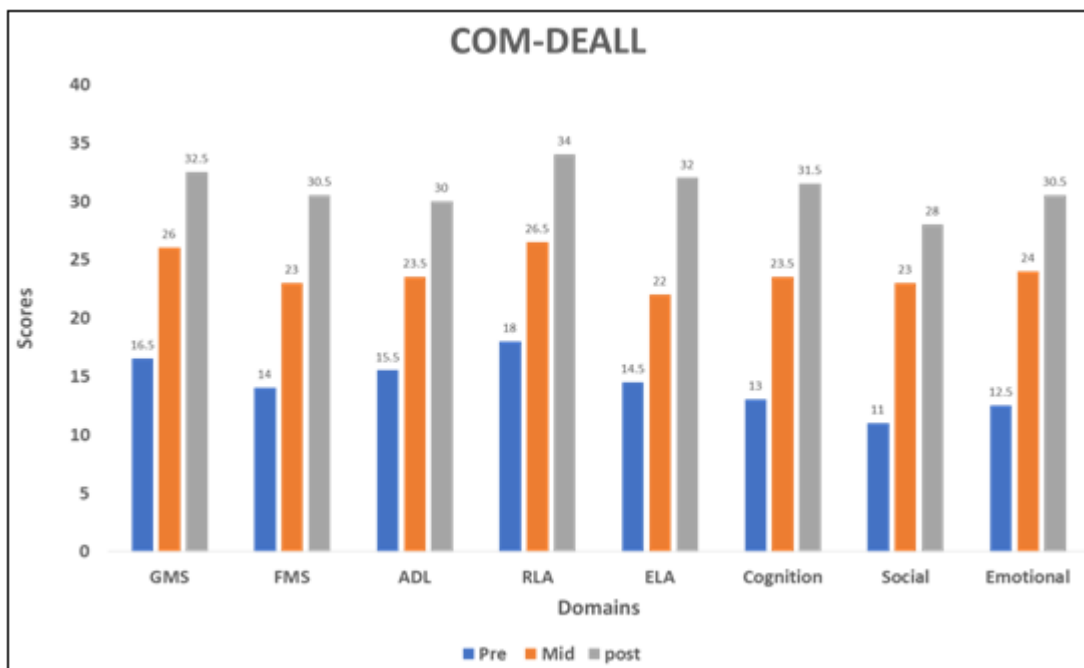
**Objective 2:** To investigate the correlation between PCI scores and language scores.

The correlation between PICCOLO (i. e. PCI) scores and COM - DEALL developmental checklist before training was done using the Pearson Correlation Coefficient.

**Table 2:** Pearson correlation coefficient of PCI scores and CDDC scores at pre visit and post visit

	PICCOLO	COM - DEALL		PICCOLO	COM - DEALL
	PRE			POST	
PICCOLO PRE	1	.411	PICCOLO POST	1	.838**
Sig.		.185	Sig.		<.001
COM - DEALL PRE		1	COM - DEALL POST		1

From the above table it can be seen there was no statistically significant correlation between PCI scores and language scores before receiving any parent training sessions to parents of children with ASD.



**Figure 4:** Mean scores on COM - DEALL during pre, mid and post visit

The post scores of both the scales i. e. PICCOLO scores and COM - DEALL developmental checklist were correlated using the Pearson Correlation Coefficient and it can be seen that after receiving the online training session there was a statistically significant positive correlation ( $p < .001$ ) between PCI scores and language scores. As the PCI scores increased, there was an increment in the child’s language scores over the period of 6 months. We observed that as the parents learnt techniques regarding good parenting skills, they showed enhancement in their parent child relationship which further improved PCI and thus improved child’s speech and language skills. Most of the skills in the teaching domain of the PICCOLO tool focus on the child’s social skill and language aspects. As the parents were trained regarding the expansion, extension techniques, explaining the characteristics of the objects and labeling items over the 4 - training session, they could spontaneously see the improvement in their children’s language skills. Out of 12 participants, 4 children with ASD (33.3%) were found to be age appropriate in their receptive and expressive language age. Their frequency of therapy sessions reduced from thrice a week to once a week.

These findings are in consensus with Falkus et al. (2016) who studied the effectiveness of PCI therapy in eighteen

children with language delay of age one to three years. The outcomes of the study showed the enhanced mean length of utterance (MLU) of the children and the ratio of the time of child to parent speech.

#### 4. Discussion

The parent training sessions focused on improving the parents’ affection towards the child and parental speaking patterns towards the child. The training sessions also taught regarding praising the child, following his lead, responding to the child’s expressions, labeling and joint attention, which are essential for promoting child development. Positive parenting and parent–child interactions were found to be an important component of the key models used to analyses and guide the early intervention process [3]. According to Innocenti et al. (2013) findings suggest a similar trend that parenting in different domains like affection, responsiveness, encouragement and teaching can help children with disabilities improve cognitive and language skills.

Every mother of children with ASD improved in the affection and responsiveness domain of the PICCOLO tool during the second training session itself. The mothers could

easily implement the techniques in the home environment and with the child. Responsive Teaching assists mothers to improve their responsive behaviours, which is the most important parenting factor that influences the developmental well - being of children with ASD and the same was found in a study done by Watson et al. (2017). In the current study PICCOLO scores were increased in all domains and led to significant improvement in PCI, similar results were obtained by Roggman et al. (2001) where he found that, training with the PICCOLO guidelines increased positive parent - child interaction. When early intervention professionals give feedback to parents about their parenting, both parent skills and child outcomes improve [4].

Parents and their children showed improvement in language scores as well. All children's language scores improved as a result of speech and language therapy, which resulted in a significant improvement in their Com DEALL scores. Similar results were obtained in a study conducted by Hansen and Shillingsburg (2016) revealed an increase in a total number of vocalizations of children with ASD post parent training intervention treatment (10 weeks from baseline) and also an increased number of positive behaviors.

PICCOLO focuses on parenting practices that help parents engage with their kids more effectively. Additionally, it has aided in the generalization of the parenting skills that were taught. Similarly, Parent education enhances social behavior and communication skills as well as parents' knowledge and abilities in behavior management [1]. It also enables therapy to be integrated into the child's environment and aids in the generalization of learned skills [5].

## 5. Conclusion

The parents of children with ASD were identified at an early stage for PCI intervention and received professional feedback regarding parenting skills which led to improvement in both parent skills and child outcomes. The parents successively completed the online training schedule and also followed the guidelines as per the guidance as well as the practical demonstration given by the therapist. Parents could implement those techniques at the home situation with the guidance of PICCOLO ratings given timely to them by the researcher. Hence there was a significant improvement in the entire domain's post parent training which improved the child's overall language development and reduced Autism core features/scores. Therefore, this study emphasizes the importance of assessing PCI along with speech and language rehabilitation in the early intervention period for children with ASD.

This study does not claim that the improvement in the children's speech and language skills, as well as social communication skills, is solely due to the researcher's parent training program. However, the parental training definitely enhanced the chances of improved sociolinguistic aspects in children. It indicates that parent training, in addition to speech language intervention and occupational therapy, is an additional approach. Because of the training sessions, the parents realized their poor parent child interaction and were able to alter them instantly since it was in the early detection

period. When training is provided to parents early, it produces better benefits in terms of both child and parent outcomes.

It proclaims speech language pathologists to consider PCI when assessing a child with any disability. It will assist SLPs in using the PICCOLO guidelines to identify what parents are currently doing to support their children's development and how to improve those behaviors. This research will aid in the training of parents in appropriate styles of parenting and their application in the growth of their children.

## 6. Future Scope

This study had limited number of participants due to limited period of time and exclusive inclusion criteria, future cohort study can be conducted on more number of individuals for a longer duration. This study has considered only children with mild ASD in order to avoid the bias in the results. Future studies can also include the control group to check the effectiveness of the parent training program.

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