

**Effectiveness of TEACCH-based approach for the development of social communication skills, general and dental approach in children with Autism Spectrum Disorder**

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**Abstract**

**Introduction:** The key features of autism spectrum disorder (ASD) include difficulties with social interaction, repetitive behaviors, and communication. The effectiveness of Treatment and Education of Autistic and Communication-related Handicapped Children (TEACCH) therapies in addressing the particular difficulties experienced by people with ASD is examined in this study. The goal of the research is to improve understanding and offer evidence-based recommendations for successful therapies by investigating both dentistry and educational contexts.

**Methodology:** A systematic review of nine chosen studies over the years 2012 to 2020 was carried out. The research used TEACCH-based techniques to enhance social communication skills, language competence, and adaptive functioning in children with ASD, while also taking into account a variety of demographic

characteristics. The research also looked at how TEACCH interventions affected dental experiences, such as improved cooperation and decreased anxiety during treatments. Strict evaluation methods, such as the Newcastle Ottawa Scale, were used in the approach to guarantee the caliber and dependability of the included studies.

**Results:** The research that was analyzed showed that TEACCH therapies consistently had favorable results in dentistry and educational settings. The language development, adaptive behaviors, and social communication skills of children with ASD showed notable gains. TEACCH-based strategies improved oral cleanliness, decreased anxiety, and increased cooperation in dental settings, which improved the entire dental experience for people with ASD. The fact that parents and teachers reported feeling less stressed further

highlights the all-encompassing advantages of TEACCH interventions.

**Conclusion:** The outcomes highlight the efficiency of TEACCH therapies in tackling the complex issues related to ASD. Children's development was greatly aided by early and customized therapies before the age of 40 months. In addition to increasing social communication abilities and adaptive behaviors, TEACCH-based techniques changed dental experiences by reducing fear and promoting cooperation. Parents and teachers also saw good effects, highlighting the all-encompassing advantages of TEACCH therapies. While the results are encouraging, additional study is required to investigate long-term impacts and improve therapies for a variety of ASD populations. Successful TEACCH implementation fosters a supportive environment for individuals with ASD and improves their overall quality of life. Collaboration among educators, healthcare providers, and families is essential.

**Keywords:** ASD, TEACCH, LEO.

### **Introduction**

Autism spectrum disorder (ASD) is a neurodevelopmental disorder described by a group of three deficiencies: correspondence, proportional social interaction, and confined and monotonous ways of behaving, interests, and activities [1]. LEO Kanner first described ASD in 1943 [2]. This disorder influences individuals depending on the seriousness degree and the potential co-occurrence with different problems, one way or the other; it includes a specific approach to understanding and acting the world, known as the 'Culture of Autism.' Several treatments have been proposed to improve social and adaptive behavioral function in children with ASD. Most of the literature reports two main approaches: 1) Focused intervention practices and 2) a Comprehensive treatment model [3].

Education intervention is one approach that aims to promote personal independence and social responsibility [1].

Patients with ASD have comparable dental requirements to those of other patients. Dental experts may know nothing about the challenges with tactile handling, which is typical for patients with ASD. Dental treatment can be performed with a higher likelihood of coming out on top once the clinical signs of ASD are perceived, for example, conduct changes, anxiety toward the commotion, apprehension about the obscure, and an inclination for isolation [2]. Hence, the utilization of routine dentistry materials and procedures is very troublesome and complex due to correspondence shortfalls, tactile modulation changes, and the connection to invariable environments. This present circumstance deteriorates if other comorbid conditions are available such as ADHD, epilepsy, or intellectual incapacity. For this large number of reasons, these patients are submitted to general sedation or pointless high portion sedation, which might prompt different secondary effects, for example, sickness, retches, and deterrent of the unrivaled respiratory conduct and other normal sedation-related risks. Because of the hardships mentioned above, these patients get less dental consideration, which could bring about different dental deformities and a high risk of losing permanent teeth [4]. Two treatments are broadly used to treat ADS, 1) TEACCH and 2) ABA. Among these two, this study focuses on TEACCH intervention, the most effective education program for children with autism. This approach centers around working correspondence, discernment, insight, impersonation, and coordinated movements. It was generally utilized in isolated, self-contained classrooms for children with ASD. However, it is being used comprehensively, demonstrating how it

can benefit children with ASD and standard kids. There are four main components of this structured education; the first component includes the physical organization of the environment by putting visual boundaries and limiting interruptions. Second is the visual timetables to permit students to be aware of and anticipate the event of occasions; third is the working framework that empowers working freely, following a grouping of exercises. The fourth component is the visual design inside practices, showing students steps and utilizing visual guidance and organization to complete a task [3].

In the past, to give suitable dental treatment, trials of clinical activities to be performed at home and in instructive foundations have been proposed to expect and acquaint patients with the tools and essential dental strategies. The use of modeling with in vivo models, image and visual pedagogy-based TEACCH model, and the technique of Tell-Show-Feel-Do are effective methods to anticipate and improve the performance of clinical dental examination in these children [4]. This study speculates that the TEACCH intervention will work on children with ASD and lessen parents' and educators' stress levels. It will also enhance compliance and quality of life in these patients in dental settings.

## Methods

**Protocol Development:** This review was conducted and performed in according to the preferred reporting items for systematic review and meta-analysis (PRISMA) statement. The Cochrane Handbook for Systematic Reviews guided the methodology used to carry out this investigation. The PRISMA statement rules were followed during the literature selection procedure.

## Information Source and Search Strategy

Two independent researchers found articles by manually looking for pertinent published studies and published system reviews as well as conducting an electronic

database search. Four electronic databases were searched: Google Scholar, PubMed, Web of Science, and ScienceDirect. The search term used in all databases were TEACCH, autism, autistic disorder, ASD; applied behavior analysis, ABA, Autism Spectrum Disorder (ASD), and Dentistry. It only covered depending on the scope of each database's search capabilities, the title, abstract, or topic may be used. A survey of the modified works of recognized examinations was utilized to decide the consideration of a review. The reference arrangements of the included investigations were additionally analyzed. Hand looks were finished for every one of the journals in which the recognized examinations were published.

## Eligibility Criteria and Study Selection

This study is based on a five-step integrative review process that includes problem identification, literature search, data evaluation, data analysis, and presentation and interpretation of the findings. The articles included in this review were selected taking into account the following inclusion criteria: 1) empirical articles published in English whose goal was to evaluate TEACCH effectiveness, 2) the inclusion of samples with children with an ASD diagnosis, 3) the search is limited to the period from 2009 - 2022. The exclusion criteria were: commentary reports, legal studies, books, unpublished material, dental practitioners' and patients' opinions, editorials, and attitudes toward TEACCH studies. As a result of these search procedures, 22 articles were selected. The total number of TEACCH-based General approaches includes 12 articles, and the dental aspect includes ten articles. When there were several publications on the same project, the most up-to-date or the most complete report of the study was selected, and other versions were excluded. Studies that were limited to describing the feasibility or technical

evaluation of a certain system were also excluded. All the citations that were imported into the bibliographic software Mendeley were double-checked, and duplicates were eliminated. The following information was gathered using a standardized form: (1) authors' names and publication year; (2) study design; (3) study goal; (4) methods; (5) main findings; and (6) conclusions.

**Quality Assessment of Included Studies (Risk Bias)**

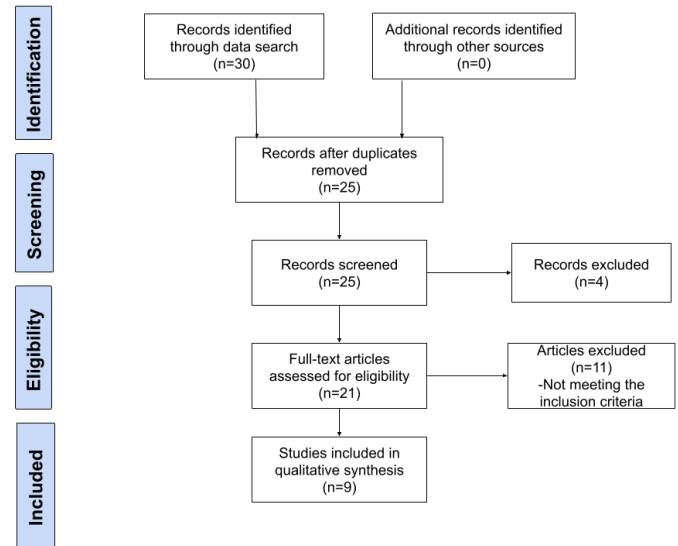
Newcastle Ottawa Scale was used to evaluate the included studies' quality in observational studies, and a numerical score was given as a result. This scale was primarily created to assess biases related to participant selection, cross-sectional study group comparability, case-control study exposure achievement, and cohort study outcome of interest. The Cochrane Collaboration for the Quality Assessment of Non-Randomized Trials supports it as a valid and reliable technique for evaluating the quality of non-randomized studies. The NOS utilizes a nine-star grading system, with up to four points—two for comparability and three for the evaluation of the outcome or exposure—available for choosing. Under selection, there are four domains: representativeness of the population that was exposed, sample size, comparability of non-respondents, and ascertainment of exposure. Comparability has two domains: appropriate statistical analysis and outcome presented, while outcome has three domains: assessment of outcome, length of study or adequacy of study, duration, and adequacy of study completeness. The instrument was deemed appropriate for cross-sectional research because an intervention's efficacy was not being assessed. The two writers evaluated the included studies' quality, and in the event of a disagreement, a third author was consulted. A study with a score of 7 to 9 will be deemed good quality, a study with a score of 4 to 6 will be deemed moderate quality, and a study with a score of

0 to 3 will be deemed low quality or a very high risk of bias.

**Results**

After duplicates were eliminated, the reference list of the included publications (n=30) was checked, and nine studies were disqualified. Then, full-text articles (n=21) were evaluated for eligibility, and those that did not match the requirements for inclusion were eliminated. Only nine papers met the qualifying requirements and were added to the qualitative synthesis. In Figure 1 below, a flowchart of study identification, inclusion, and exclusion is displayed.

Figure 1: PRISMA flowchart diagram



Information from the nine chosen articles is presented in Table 1. A summary of each study was created, including the following information: a) the study authors and the year it was published; b) the nation where the study was conducted; c) the mean age of the participants; d) the outcome of the study; and e) the findings/conclusion. The Nine research that were examined in this review investigated the TEACCH intervention's efficacy, but they did so in various circumstances.

Table 1: Characteristic details of studies.

Author, year of study	Country	Participants	Kind of Study	Procedures	Result
Sallam et al. (2012) [8]	Egypt	This study was conducted prospectively on 36 autistic children who were members of The Egyptian Autistic Society (EAS) and ranged in age from 6 to 12 years.	Randomized controlled study	A tooth brushing intervention program was implemented in children, divided into three groups based on modeling methods. The children were shown different brushing steps, and their behavior and parental attitudes towards dental care were assessed using questionnaires. The program concluded after a month.	Poor oral hygiene habits in autistic children can increase the risk of dental caries. Visual pedagogy, including technology-based interventions like video modeling, can help improve oral health behavior and teach tooth brushing, with faster acquisition of target behavior.
Welterlin et al. (2012) [6]	USA	The study involved twenty 2–3-year-old autistic children (18 boys and 2 girls) and their families. They were sorted into the waitlist or treatment groups at random.	The group study evaluated a home TEACHING program for toddlers using a randomized posttreatment design.	Families were randomly allocated to either the waitlist (WL) or treatment (Home TEACHing Program; HTP) group, with matching made on both mental and chronological age. Following the 12-week waiting period, treatment was given to the WL group. Fourteen families	This study provided strong evidence in favor of improved behavior in both parents and children. Parents' stress levels decreased and their children's capacity for independent work and environment management improved as a result of their participation in the HTP. The HTP group had medium-to-large

				completed baseline and post-intervention assessments exclusively, while six families finished the multiple baseline single-subject design phase.	effect sizes. There were no statistically significant differences between the groups, according to the results.
Fornasari et al. (2012) [7]	Italy	28 children with ASD between the ages of 23 and 97 months—23 boys and 5 girls. Children under 40 months old are in Group I; those between 40 and 60 months old are in Group II; and those over 60 months old are in Group III.	Longitudinal study to determine when to begin a low-intensive, TEACCH-oriented intervention and how beneficial it is.	Children participated in 45-minute TEACCH sessions twice a week on their own. A psychologist also conducted five training sessions for parents and teachers, lasting one and a half hours each. After six and twelve months, developmental abilities were rated in addition to the baseline.	The first six months saw a considerable improvement in developmental abilities, which continued to increase over the course of the 12-month follow-up period, yielding moderate-to-large effect sizes. In terms of age, children who began the intervention earlier showed more progress than those who started later.
Ichikawa et al. (2013) [9]	Japan	The TEACH program (n = 5) or the waiting-list control group (n = 6) was assigned at random to 11 children with high functioning autism (HFA) (9 boys; 2	A pilot randomized controlled trial (RCT) is being conducted here.	Over 6-month period, the program comprised 22-hour sessions.	With moderate effect sizes, the outcome measurements improved more in the TEACCH program group than in the control group. The outcomes demonstrated that

		girls), ages 5–6 years, and their mothers.			mothers with low levels of stress and children with high IQs would benefit most from this program.
Orellana et al. (2014) [4]	Spain	The following 72 ASD participants, either with or without intellectual disabilities, took part in the study: 38 kids, ages 4 to 9 (33 boys and 5 girls), 34 adults, ages 19 to 41, are represented by 29 men and 5 women.	This study assessed the efficacy of a brief TEACH program in facilitating a 10-component oral evaluation using a PrePost quasi-experimental methodology.	A complimentary basic clinical oral examination was provided to parents of individuals with ASD for their sons or daughters. A baseline oral evaluation, five training sessions, and a final oral assessment comprised the study. Over the course of three weeks, there were five 20-minute training sessions, held twice a week.	The TEACCH program increased participants with ASD's compliance, which made it easier to do a complete dental assessment. This technique can help both those with high functioning autism and those with related intellectual difficulties because the improvement was unaffected by the individual's cognitive level of development.
D'Elia et al. (2014) [1]	Italy	30 pre-schoolers with ASD between the ages of 2 and 6.11 years (24 boys and 6 girls) and their parents participated in the study; 15 of them were assigned to the TEACCH group and the remaining	This is longitudinal research designed to analyze the possible advantages of the TEACCH program by measuring various child	The study had a 24-month duration. At T0 (Baseline), T1 (after 6 months), T2 (after 12–15 months), and T3 (after 24 months), all individuals underwent four assessments. One therapist who	Children with Autism Spectrum Disorder benefited from the TEACCH program because it lessened their maladaptive behaviors and symptoms of autism. Over time, there was a noticeable improvement in

		15 to the control group. Parents choose which children to place in each group; this was not a randomized trial.	and parent factors four times.	worked one-on-one with each kid provided treatment to participants in the TEACH program group for two hours at home and two hours at school.	language proficiency in both understanding and production. With time, adaptive functioning also got better.
Boyd et al. (2014) [11]	USA	The study comprised 198 children with ASD who were approximately 4 years old, along with their families: 54 children from the LEAP group (165 males and 33 females); 85 children from the TEACCH group; and 59 children from the control group. There were a total of 27 control teachers, 22 LEAP, and 25 TEACH instructors enrolled.	Comparing high fidelity LEAP and TEACCH programs with a control condition that employed non-model-specific practices was the aim of this quasi-experimental study.	The study fled for one academic year. Teachers received official training in either TEACCH or LEAP methodology prior to the study. This 12-hour course was spread out over two days. Moreover, prior to the study, they had been teaching for at least two years in the relevant classroom type (TEACCH or LEAP).	Children's performances, regardless of the type of programming, got better over time. However, regarding sensory and repetitive behavior, as reported by parents and teachers for any of the models, there were no changes over time. Using the LEAP methodology, parent reports of social interaction did not show a significant change over time. Children attending TEACCH classes demonstrated greater reductions in the severity of their autism.
Turner-Brown et al. (2016) [5]	USA	50 ASD children under the age of three (42 boys and	In order to compare the effects of FITT	A six-month intervention involved kids and their	The results of the study indicated that there were noteworthy

		<p>8 girls) and their families were randomized at random to:</p> <p>32 people took part in 4 Family Implemented TEACHING for Toddlers (FITT). 4 Standard Operating Procedures (SAU): 17 individuals</p>	<p>and SAU, this study used a PrePost experimental design.</p>	<p>parents.</p> <p>Parent group sessions (n=4) and 90-minute in-home sessions (n=20) were part of FITT.</p> <p>Community interventions like speech, occupational, behavioral, and developmental therapy were part of SAU.</p>	<p>improvements in social communication skills but no significant changes in global child measures.</p> <p>There were notable variations between the groups when it came to the parents.</p> <p>Throughout time, families in the FitT group displayed reduced stress and enhanced wellbeing.</p>
<p>Smutkeeree et al. (2020) [10]</p>	<p>Thailand</p>	<p>There were 30 ASD children between the ages of 5 and 17; 21 had mild ASD and 9 had moderate ASD. Caregivers provided their informed consent and provided the subject's demographic data.</p>	<p>This study's is quasi-experiment</p>	<p>Prior to the study and at two, four, three, and six months following the application of visual pedagogy, the participants' toothbrushing abilities, cooperation, and plaque index were assessed.</p>	<p>The study found that using a toothbrushing visual pedagogy for six months improved toothbrushing ability, cooperation, and dental plaque index in children with mild or moderate severity ASD. The mild group showed significantly better toothbrushing ability and cooperation at baseline, 4 weeks, and 6 months, while the moderate group required caregiver assistance. However, there was no significant difference in plaque index</p>

					reduction between the mild and moderately severe groups.
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The analyzed studies demonstrate that many of the impacted areas in ASD children can be improved using TEACCH-based therapies, regardless of the context of the intervention. All of the studies showed improvements in developmental abilities, such as verbal and nonverbal cognitive functioning, language skills, imitation, perception, play engagement, social communication and interaction, eye-hand coordination, or fine and gross motor skills, even though in some studies the differences between the pre-post measurements were not statistically significant. A reduction in autistic symptoms and maladaptive behaviors, such as stereotyped, repetitive, or ritualized verbal or nonverbal conduct, rigid adherence to routines, intensely constrained and fixated interests, and hyper- or hypo reactivity to sensory input, was also observed in all of the studies.

The results indicated that the TEACCH method was successful in enhancing the social communication abilities of kids with ASD. Social interaction, shared attention, nonverbal communication, and general communication abilities all showed gains. The TEACCH technique has been shown to be successful in lowering anxiety and enhancing behavior in children with ASD during dental operations. Additionally, the strategy improved the cooperation of children with ASD during dental appointments and reduced the need for sedation.

**Discussion**

The findings of this study indicate that the TEACCH-based strategy has the potential to improve a number of social communication abilities, overall development, and dental care experiences for kids with autism spectrum

disorder (ASD). The chosen research showed that TEACCH interventions are successful in addressing the various difficulties that people with ASD encounter since they consistently produce positive results in a variety of settings and demographics.

Seven of the nine studies that were chosen showed a noteworthy benefit in the development of the youngster. About the other two studies where the improvements fell short of statistical significance, let's start with the study by Turner-Brown et al. (2016) [5] where treatment effects on social communication skills were substantial but no treatment effects were reported for the global child assessments. The Welterlin et al. (2012) [6] study's multiple baseline design results demonstrated strong support for children's improvement; nevertheless, the study's researchers claimed that the small sample size and brief time frame prevented the results from reaching significance.

According to longitudinal studies, the experimental group's improvement was more pronounced during the first six months of training and gradually improved over the course of the 12-month follow-up period [7]. The optimal time to begin the intervention was also examined in this study, and the results showed that children under the age of 40 months improved more than those who began the intervention later. This outcome demonstrates how crucial early intervention is for kids with ASD. The evaluated research supports our hypothesis that using the TEACCH intervention enhances children's development while also lowering the stress levels of parents and teachers. This is a positive outcome since the intervention can enhance not only the

development of the kid but also the interaction between the child and adults as well as the wellbeing of the adults, even though in certain trials the stress reduction was not considerable [5].

The development of children with ASD's social communication abilities was one of the major findings of the studies. The TEACCH method seemed to improve social interaction, play engagement, imitation, perception, language skills, and verbal and nonverbal cognitive functioning. Children with ASD benefit greatly from these advancements because they enable them to interact with their environment and peers more skillfully, which is essential for their overall development. The importance of TEACCH-based interventions in addressing the fundamental deficits linked to ASD is highlighted by the persistently positive changes in social communication abilities that have been seen.

Additionally, after receiving TEACCH interventions, studies showed a decrease in maladaptive behaviors and symptoms of autism. Rigid adherence to routines, sensory sensitivity, and stereotyped, repetitive, or ritualized behaviors are common challenges faced by people with ASD. The observed decrease in these behaviors indicates that the TEACCH approach contributes to a more flexible and adaptive behavioral repertoire in affected children by helping to mitigate the core symptoms of ASD.

Furthermore, the TEACCH approach showed promising results when applied to dental care. Due to their sensory sensitivity and communication issues, people with ASD may find dental procedures especially difficult. Children with ASD demonstrated improved cooperation, dental hygiene, and toothbrushing skills when visual pedagogy and structured interventions based on TEACCH principles were used. Furthermore, the method improved

behavior, decreased the need for sedation, and decreased anxiety during dental procedures, all of which contributed to these kids' better dental experiences.

Notably, the TEACCH method demonstrated efficacy in relation to multiple demographic variables, such as age, gender, and cognitive capacity. This suggests that, regardless of the unique characteristics of each child with ASD, TEACCH interventions are flexible and can be adapted to meet their diverse needs. The beneficial effects of TEACCH-based interventions on parents' stress levels and general well-being also emphasize the all-encompassing advantages of this strategy, which go beyond helping the impacted children and their families. The reviewed studies have limitations that must be acknowledged, even with the encouraging results. Determining long-term effectiveness definitively is difficult due to the small sample sizes and inconsistent intervention durations in some studies. Further research is necessary to examine the subtleties of TEACCH-based interventions in particular contexts, even though improvements were noted and not all outcomes reached statistical significance in every study.

### **Conclusion**

The study concludes that using TEACCH-based strategies for kids with ASD has a lot of advantages, both in the classroom and in dental settings. TEACCH interventions, with their structured and visually oriented approach, are an effective means of mitigating maladaptive behaviors, promoting social communication skills, and improving the developmental outcomes of these children. A promising approach to encouraging positive changes and raising the standard of living for kids and their families, TEACCH interventions target the unique difficulties experienced by people with ASD.

However, it is imperative to recognize the necessity for additional investigation to delve into the enduring

impacts of TEACCH interventions and determine the most effective methods of tailoring these strategies to the unique characteristics of the ASD population. Furthermore, in order to guarantee the effective execution of TEACCH-based interventions and optimize their influence on kids with ASD, cooperation between educators, medical professionals, and families is crucial. In conclusion, the research described in this paper highlights the potential of TEACCH interventions as a useful and successful tool for promoting children with ASD's social communication abilities, overall development, and dental experiences. The integration of evidence-based interventions such as TEACCH into educational and healthcare practices can greatly enhance the quality of life and general well-being of individuals with ASD, particularly as our understanding of autism continues to grow.

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