

International Journal of Engineering, Science and Humanities

An international peer reviewed, refereed, open access journal
Impact Factor: 8.3 www.ijesh.com ISSN: 2250 3552

Effectiveness of Structured Social Skills Training on Social Interaction, Communication, and Social Participation in Children with Autism Spectrum Disorder

DR. CHARU KHURANA

Research scholar, Department of Occupational Therapy, Maharaj Vinayak Global University
Dhand, Amer, Jaipur -302028 (RAJASTHAN)

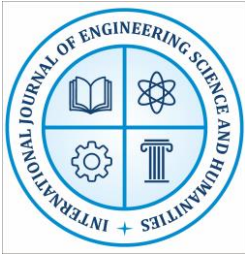
DR. PREETY VASHISHT

Department of Occupational Therapy, Maharaj Vinayak Global University, Dhand, Amer, Jaipur
-302028 (RAJASTHAN)

Abstract

Children suffering from Autism Spectrum Disorder (ASD) show notable impairments in their social interaction skills because of their inability to communicate properly. In the present study, the researcher used the quasi-methodological approach for evaluating the efficacy of the social skills training intervention on the social interaction skills of children suffering from ASD. Grouping the children suffering from the disorder and their caretakers into different groups has provided the researcher the scope for conducting an efficient study on the subject under consideration. In the present study, 100 children suffering from ASD and belonging to the aged group of 3-6 years were randomly assigned equally to both the intervention group and the control group. For the children suffering from the disorder who formed the intervention group, the researcher used the structurally prepared social skills training combined with play activities and the involvement of the caretakers for the children during the study intervention for the period of six months. Similarly, the children suffering from the disorder who formed the control group underwent the regular therapy during the same period for the intervention group of the study. The outcomes were also measured through standardized observational checklists before and after intervention. The results showed that children in the intervention group showed significant improvement in social interaction, communication skills, skill application in a natural environment, and social participation compared to those in the control group ($p < 0.001$). Children in the intervention also showed a marked improvement in pre-post scores in social interaction skills and communication skills as part of the SST. The results show that SST, as a specific intervention, is a useful method of enhancing functional outcomes in children diagnosed with ASD, thus encouraging a better sense of inclusion in society.

Keywords: Autism spectrum disorder; social skills training; social interaction; communication skills; social participation; early intervention



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Introduction

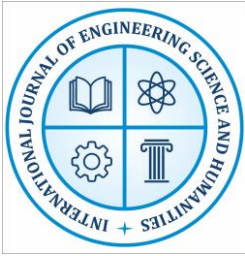
Autism Spectrum Disorder (ASD), a complex disorder of brain function, has been described as a condition that involves limited and repetitive patterns of behavior, interests, and activities, as well as difficulties with social communication and social interactions that last and continue into adulthood and old age. The use of the word 'spectrum' reflects how this disorder affects skills and symptoms. In the last few decades, the prevalence of ASD has risen significantly across the globe due to enhanced awareness and early identification strategies [1]. This disorder typically begins in early childhood and persists throughout life, not only affecting the individual but also the family and social integration [2].

Among the most common issues that children with ASD experience is in the area of social interactions. Children with ASD may have difficulty understanding social cues, sustaining eye contact, interpreting facial expressions, engaging in reciprocal conversations, and making friendships with their peers, whereas children with NT can acquire social skills through observation and imitation of others [3]. Social isolation, reduction in group activities, and lack of opportunities for social interactions may arise from these problems. Social problems in children with ASD are not only behavioral but are also rooted in cognitive and neurological differences, such as differences in neural connectivity, theory of mind, and sensory perception [4]. Therefore, intervention approaches are necessary to address social development in children with ASD.

Communication challenges: Communication issues in children with ASD are the third critical component of the condition. Children with ASD have been seen to have issues with the delay of expressive and receptive language, gesture, spontaneous speech, and the use of pragmatic language [5]. Even when children have a sufficient vocabulary, they still have issues with turn taking, comprehension, and social communications. This, in turn, makes it more challenging for them to build relationships, learn in the classroom, and participate in the community. There have been clear definitions given in researches that well-structured interventions during the early life of a child have a remarkable impact on communication skills, thereby highlighting the importance of early interventions [6].

Over the years, different therapeutic approaches have been developed to deal with the social and communication problems in ASD. Among these, Social Skills Training (SST) has been identified as a widely researched and applied intervention. SST is a systematic teaching of social skills like eye contact, turn-taking, initiating a conversation, understanding emotions, problem-solving in a social situation, and peer interaction [7]. Unlike traditional therapy, which could be focused on speech or motor skills, SST is specifically focused on the functional use of social and communication skills.

Empirical support for the effectiveness of SST in enhancing the social competence of children and adolescents with ASD is gradually building. Soares et al. (2021) carried out a meta-analysis of



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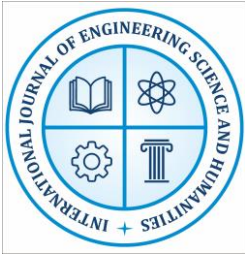
both face-to-face and technology-based interventions for enhancing social skills and found medium to large effect sizes in improving social functioning, communication, and peer engagement [1]. Their results underscore the fact that SST is not only effective in traditional face-to-face interventions but can also be effectively implemented using technology-based platforms. Alahmari et al. (2025) carried out a review of various intervention studies and concluded that well-structured SST programs are effective in improving social interaction, emotional recognition, and adaptive functioning in children with ASD [2].

RCTs have also increased the evidence base for SST. Dekker et al. (2014, 2019) carried out a number of RCTs to compare SST with treatment as usual and found that there was a significant improvement in social reciprocity, peer relationships, and classroom behavior in children who received structured training compared to those who received unstructured training [7,8]. This indicates that SST is more effective than unstructured or routine therapy. [9].

The method of delivery of SST is also an important aspect of its effectiveness. Conventional therapist-delivered interventions, such as Applied Behavior Analysis (ABA), have been conventionally applied to teach social and communication skills using reinforcement-based techniques [10]. More recently, the use of behavioral theories and developmental approaches has been integrated to form Naturalistic Developmental Behavioral Interventions (NDBIs), which place a strong emphasis on learning in natural environments such as the home, playground, and school [11]. Children who have undergone SST based on NDBI have been observed to display a strong generalization of skills, as indicated by research, which suggests that learning in natural environments improves the application of skills [12].

Recently, there has also been a rise in the interest of parent-mediated therapies. As per the pioneering work of Green et al. (2010) and Pickles et al. (2016), teaching parents communication-based strategies at home led to a marked improvement in social communication and reduced the severity of symptoms of ASD [13, 14]. The significance of involving families in therapies has been emphasized in this study, as parents are very important in motivating children to practice the learned behaviors in real-life situations.

In addition to parent and therapist-initiated (person-delivered and parent-implemented SST) interventions and therapist modalities, group-based SST interventions have shown good results in group SST interventions. Reichow et al. (2012), who conducted a systematic review on social skills groups for children and adolescents with ASD and reported that participants had superior social skills gains from group-based interventions to enhance peer communications, conversation skills, and cooperative play with others by combining with peers [3]. It is therefore well suited to the learning process as group-centred environments provide plenty of opportunities for socializing in a naturalistic context while peer-observing and providing feedback.



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Technology-assisted interventions have also emerged as new novel approaches to SST. Virtual reality, the metaverse and computer-assisted interventions allow youngsters to practice social situations in a very controlled yet exciting way. Lee et al. (2023) reported that metaverse-based SST interventions fostered higher social response and participation in children with ASD, making this a promising area of research where the digital world seems to have the promise to supplement therapy [15].

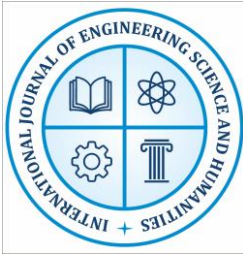
Similarly, Parsons et al. (2019) found that video-based and web-based SST interventions were successful for rural and remote communities, which exceeded geographic barriers to access. Nevertheless, although there have been huge advancements, some challenges remain in SST. Perhaps the single biggest concern is the individual variability of how people respond to interventions. Not all children respond equally to SST, for various factors could influence results, such as age, symptoms level, cognitive ability, language skills, and family support [16-17]. More importantly, many studies have short-term follow-up, and it's hard to ascertain whether the gains carried in long-term terms. Long-term investigations are required to observe the long-term effects of SST on academic achievement, employment opportunities, and overall quality of life.

Another important consideration is the generalization of skills to other contexts. Although many children demonstrate gains during therapy sessions, the ability to generalize these gains to natural environments such as school and playgrounds has been a problem [19-21]. The use of naturalistic learning, peers, and parent training has been found to be more effective in generalizing skills. This highlights the need to develop SST programs that are contextually embedded.

The current study is based on this developing literature and aims to add to the existing evidence base on SST for children with ASD. In contrast to previous studies that mainly used test scores, the current study focuses on functional social outcomes, application of skills, and social participation [6]. Through the comparison of an intervention group that received structured SST and a control group that received regular therapy, the current study aims to investigate the direct effect of SST on social interaction, communication, generalization of skills, and social inclusion.

Methodology

In this research, a quasi-experimental pretest and post-test control group design was employed to determine the effects of structured social skills training on social interaction, communication, and social participation in ASD children. The reason for using the current study design was to compare the intervention group that received specific training with the control group that received standard care. The research was carried out in special education schools and developmental therapy centers that had multidisciplinary teams consisting of speech therapists, occupational therapists, special educators, and psychologists. A total of 100 children with ASD, aged 3 to 6 years, was selected through clinical referrals and screening programs. The diagnosis was confirmed using the DSM-5



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criteria and clinical assessment. Written informed consent was sought from the parents or guardians of the participants.

Participants were equally allocated into two groups: the intervention group (n = 50) and the control group (n = 50). The intervention group received six months of social skills training involving 15 hours of interactive and reinforcement-based activities per week aimed at improving eye contact, turn-taking, peer interaction, communication, and social participation using play. The training was carried out in the classroom and therapy rooms, in addition to parent training to facilitate generalization of skills in the home setting. The control group continued with the normal occupational and speech therapy sessions without any formal social skills training.

The assessments were carried out at baseline (pre-intervention) and after six months (post-intervention). The criteria for the measurement of the outcome of the intervention were carried out using behavioral rating scales and checklists in relation to social interaction, communication skills, generalization, and social participation. The data analysis was carried out using the relevant statistical tests to establish the differences in the within-group and between-group comparisons, with significance set at $p < 0.05$. The study ensured that it was ethical by getting approval from the institutional review board and that the confidentiality of the data of the participants was maintained.

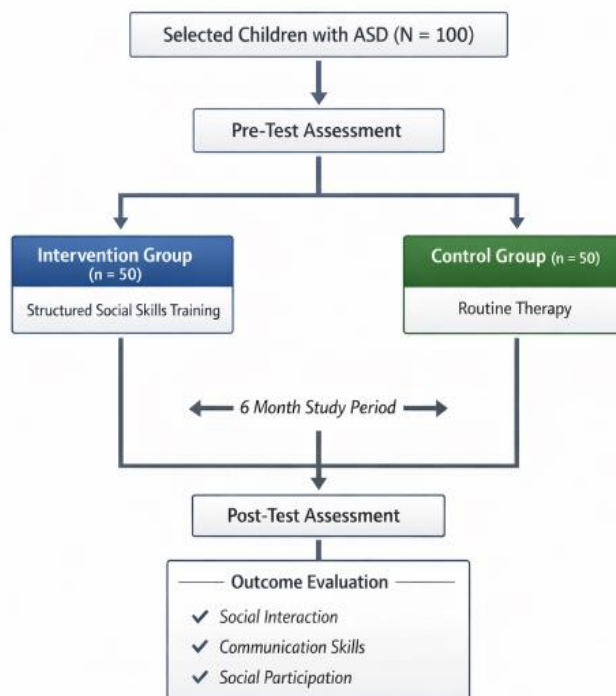
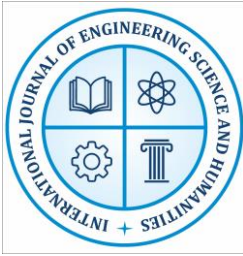


Figure 1: Flow diagram of study design and Participant allocation



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Results

Table1: Effect of social skills training on social interaction

Parameter	Intervention (n=50) Mean ± SD	Control (n=50) Mean ± SD	t-value	p-value
Eye contact	7.8 ± 1.2	5.1 ± 1.4	9.87	< 0.001
Turn-taking ability	8.1 ± 1.1	5.3 ± 1.5	9.64	< 0.001
Peer interaction	7.6 ± 1.3	5.0 ± 1.6	8.73	< 0.001
Initiation of social contact	7.9 ± 1.0	5.2 ± 1.3	10.21	< 0.001
Overall social interaction score	7.85 ± 1.15	5.15 ± 1.45	9.86	< 0.001

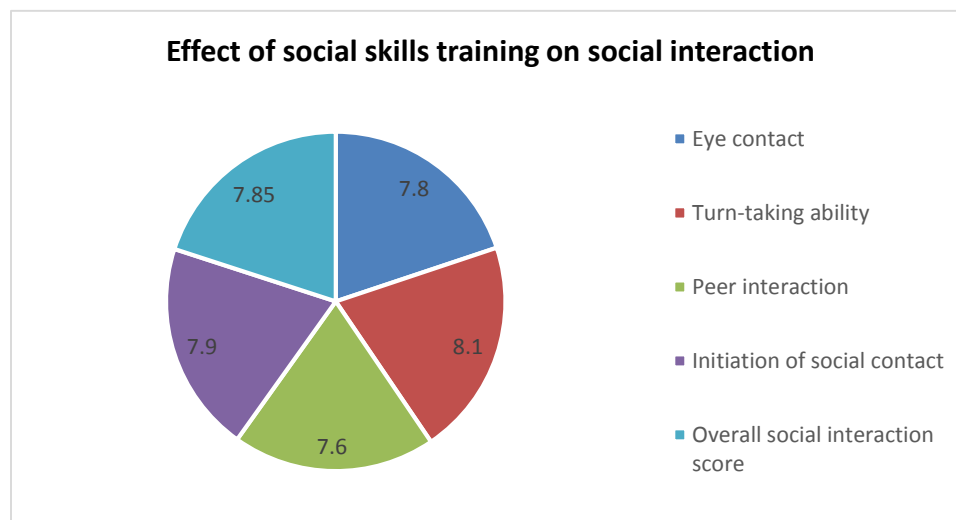
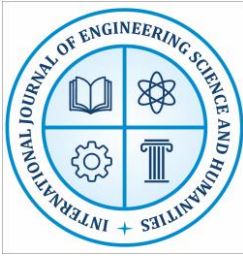


Figure 2: Effect of social skills training on social interaction

The data above shows that the children who received structured social skills training had significantly better social interaction skills than children from the control group. The differences of observed mean scores of eye contact, turn-taking, peer social interaction, and initiating social contact between the intervention and control group were also statistically significant ($p < 0.001$). The overall social interaction score for the intervention group was also significantly greater, demonstrating the effectiveness of the training intervention to enhance social interaction skills in children with ASD.



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Table 2: Effect of training on communication skills

Parameter	Intervention (n=50) Mean ± SD	Control (n=50) Mean ± SD	t-value	p-value
Use of meaningful words	8.2 ± 1.3	5.6 ± 1.4	8.95	< 0.001
Use of gestures	7.9 ± 1.2	5.4 ± 1.5	8.71	< 0.001
Response to verbal cues	8.0 ± 1.1	5.5 ± 1.3	9.12	< 0.001
Spontaneous communication	7.7 ± 1.4	5.2 ± 1.6	7.88	< 0.001
Overall communication score	7.95 ± 1.25	5.42 ± 1.45	8.96	< 0.001

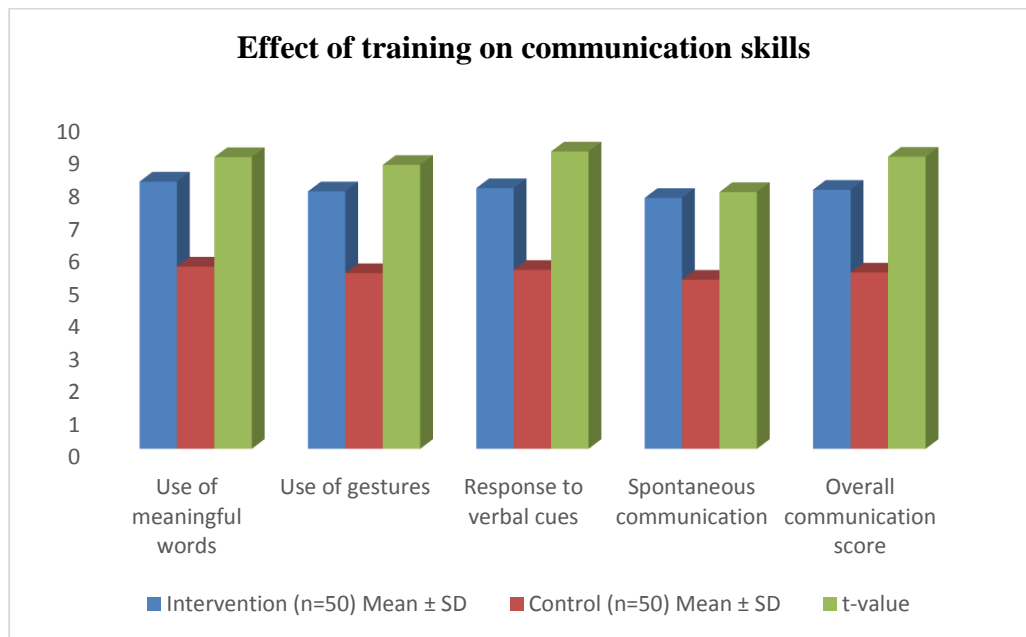
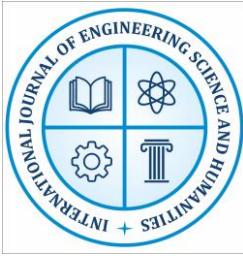


Figure 3: Effect of training on communication skills

The result reveals that there have been significant improvements in verbal and non-verbal communication skills for those who participated in the intervention as compared to those in the control group. The children were able to exhibit more meaningful words, use gestural communication, follow verbal communication, and exhibit spontaneous speech. All p-values obtained were significant at $p < 0.001$. The total score for those in the intervention group is highly



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significant compared to those in the control group, meaning that the intervention is successful in enhancing communication skills for children with ASD.

Table 3: Learning in natural & reinforced settings

Parameter	Intervention (n=50) Mean ± SD	Control (n=50) Mean ± SD	t-value	p-value
Skill practice in classroom	8.3 ± 1.1	5.7 ± 1.4	9.32	< 0.001
Skill use at home	8.0 ± 1.2	5.5 ± 1.5	8.87	< 0.001
Response to positive reinforcement	8.4 ± 1.0	5.6 ± 1.3	10.45	< 0.001
Parent involvement score	8.1 ± 1.3	5.8 ± 1.2	8.21	< 0.001
Overall natural setting learning	8.2 ± 1.15	5.65 ± 1.35	9.21	< 0.001

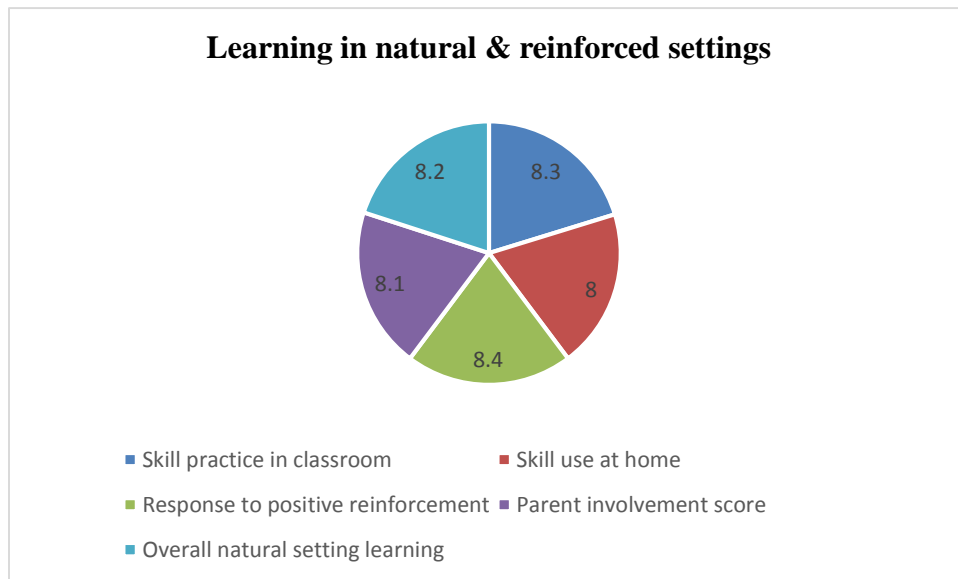
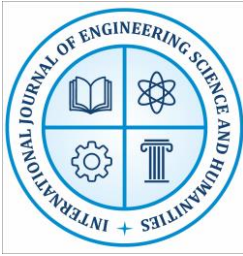


Figure 4: Learning in natural & reinforced settings

This table gives insight into the level of effectiveness in training in social skills delivered within the environment. The intervention group scored remarkably higher in skill application both in class and at home, which can be attributed to efficient generalization of skills. The children were more open to immediate reinforcement and parental participation, which was remarkably higher than in the control group ($p < 0.001$). These results indicate that training in social skills within natural



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settings coupled with reinforcement and parental participation assisted in efficient learning for children with ASD.

Table 4: Social participation & inclusion

Parameter	Intervention (n=50) Mean ± SD	Control (n=50) Mean ± SD	t-value	p-value
Participation in group play	7.9 ± 1.2	5.3 ± 1.5	8.64	< 0.001
Cooperation with peers	8.1 ± 1.1	5.4 ± 1.3	9.18	< 0.001
Classroom engagement	8.0 ± 1.2	5.6 ± 1.4	8.27	< 0.001
Reduction in social withdrawal	7.8 ± 1.3	5.2 ± 1.6	7.96	< 0.001
Overall social participation score	7.95 ± 1.2	5.37 ± 1.45	8.72	< 0.001

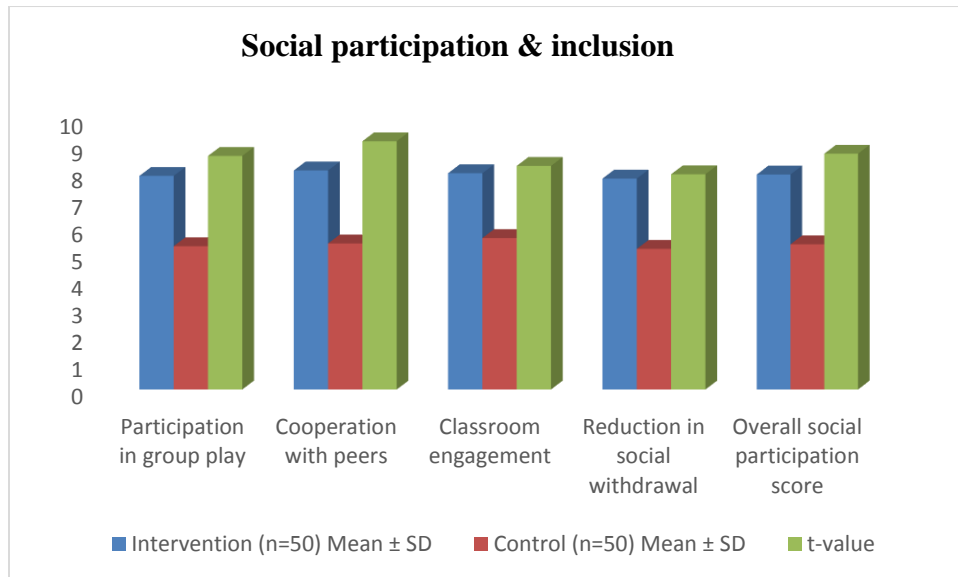
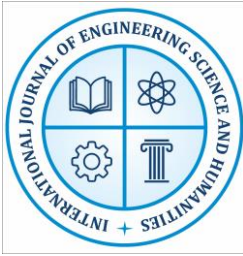


Figure 5: Social participation & inclusion

For social participation and inclusion behaviors, there has been a marked indication as shown in the table above. The children who received formal training showed greater levels of group play, peer cooperation, and classroom engagement compared with controls, and this is highly significant for all variables ($p < 0.001$). The lower rate of social withdrawal for the trained group also indicated a positive effect as a sign of confidence and familiarity with social interactions. The result of this



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study supported the hypothesis that there has been an improvement in some skills and a positive impact on social integration and inclusion of children with autism.

Table 5: Within-group pre–post changes in the intervention group

Domain	Parameter	Pre-Intervention Mean \pm SD	Post-Intervention Mean \pm SD	t-value	p-value
Social Interaction	Overall social interaction score	5.10 \pm 1.40	7.85 \pm 1.15	12.34	< 0.001
Communication	Overall communication score	5.30 \pm 1.50	7.95 \pm 1.25	11.76	< 0.001

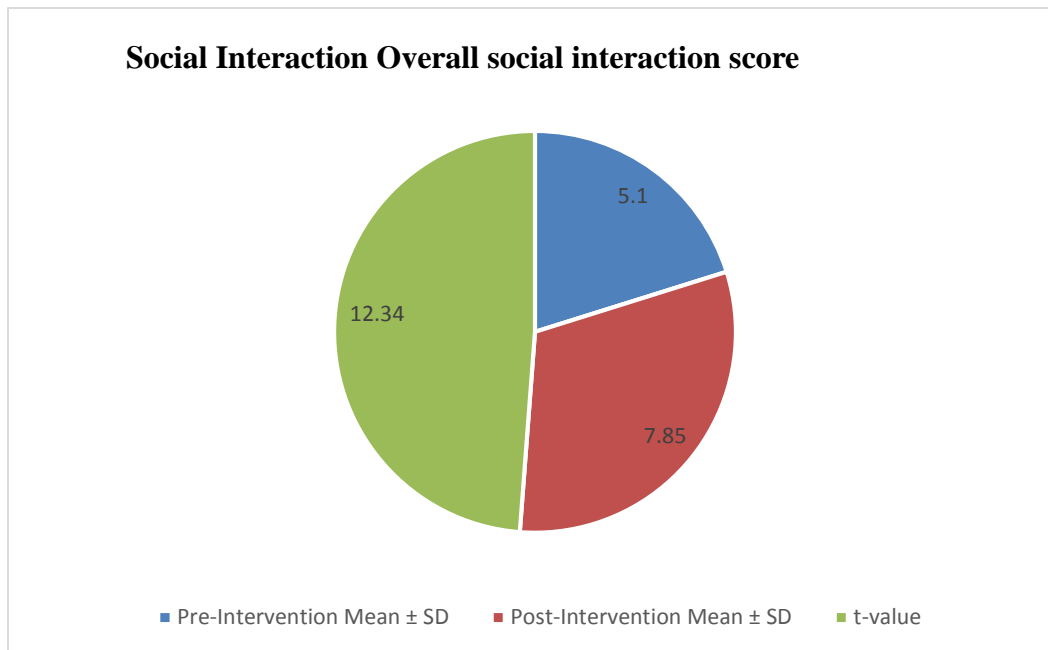
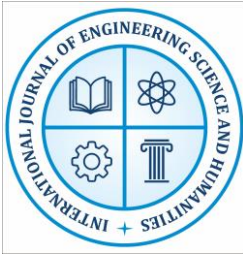


Figure 6: Social Interaction Overall social interaction score

This table shows the pre-post change in social interaction and communication scores of the children in the intervention group. A great improvement was noticed in both aspects after systematic social skills training. The increase in overall social interaction score indicates better eye contact, response, and mutual engagement, whereas the rise in communication score indicates remarkable improvement in verbal and non-verbal communication skills. The high t-values and highly significant p-values ($p < 0.001$) ensure that these changes were statistically significant and



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not by chance. These results clearly indicate that systematic social skills training was effective in bringing about positive behavioral changes in children with ASD.

Table 6: Between-group comparison of generalization and social participation

Domain	Outcome	Intervention Mean \pm SD	Control Mean \pm SD	t-value	p-value
Skill Generalization	Classroom skill use	8.30 \pm 1.10	5.70 \pm 1.40	9.32	< 0.001
Skill Generalization	Home skill use	8.00 \pm 1.20	5.50 \pm 1.50	8.87	< 0.001
Social Participation	Overall social participation score	7.95 \pm 1.20	5.37 \pm 1.45	8.72	< 0.001

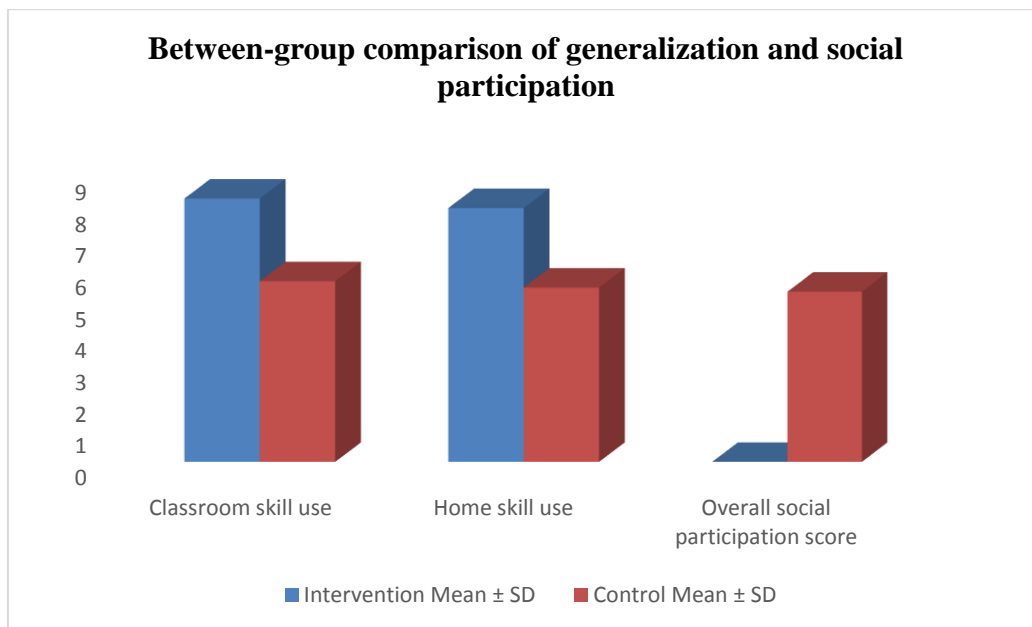


Figure 7: Between-group comparison of generalization and social participation

The generalization of learned skills and general social participation among intervention and control groups are compared. The results indicate that children in the intervention group were better able to implement their social skills as they experienced classroom and home settings. In addition, scores for social participation were statistically significantly increased among intervention group members, suggesting an increased participation in group activities, cooperative behaviour with peers, and engagement with the classroom. The p-values were statistically significant ($p < 0.001$) for every outcome, thus indicating the positive and substantial effect of structured social skills training program on generalization of skills and social inclusion among children with ASD.



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Discussion

This is in line with evidence supporting Naturalistic Developmental Behavioral Interventions (NDBIs), which combine behavioral theories with developmental learning in natural environments such as classrooms, playgrounds, and homes [22]. It has been observed that children participating in social skills training based on NDBI principles show better retention and transfer of skills than those undergoing highly structured interventions in a clinic setting alone [23]. The current results are in line with this view, as children in the intervention group were able to transfer their learned behaviors across different settings, which is not mere context-dependent performance.

The importance of positive reinforcement and parental participation was identified as an important element in maintaining gains in behavior. Children who received immediate reinforcement and whose parents were actively involved in training showed better and more reliable application of social skills. This is supported by evidence that suggests parent-mediated interventions result in long-term gains in social communication and a reduction in ASD symptom severity [24, 25]. Parent training in reinforcing target behaviors in natural routines may help improve consistency and increase opportunities for generalization.

Furthermore, the substantial discrepancies found between intervention and control groups in both classroom and home conditions confirm Carruthers et al.'s results regarding the generalization of social communication skills [35] when structured intervention is integrated into and/or within specific context across contexts and raters. These results highlight the need for social skills training to be applied not just in practice but in other contexts as well. In terms of social participation and inclusion, members of the intervention group participated significantly more in group play, displayed improved peer cooperation, were more engaged in the classroom, and showed reduced social withdrawal. Our current results show that SST not only boosts some specific social skills, but also supports social integration. In peer-mediated intervention studies, similar findings have been reported, showing that peer structured intervention positively modulated social initiations, responses and peer relationships in children with ASD [25].

Group-based SST-type interventions have also been proven to be beneficial to peer relationships, social confidence and community activities in adolescents, and young adults with ASD, such as the PEERS curriculum [22,23]. Although the younger children in this work were studied, the findings were in line with previous evidence across all child and adolescent ages, suggesting a structured social skills training program has developmental value throughout childhood and adolescence. The reduction of social withdrawal seen in the intervention group reflects confidence, ease, and readiness for social behavior. This is particularly essential as children with ASD frequently have heightened social anxiety and avoidance. Structured SST reduces levels of social isolation and positively influences psychosocial functioning, making the present findings clinically significant [26].



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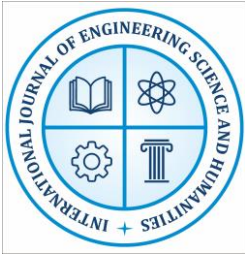
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This study also joins the growing evidence for the effectiveness of school-based and peer-delivered strategies for SST. Meta-analyses of school-based interventions have shown that when organized social skills interventions are delivered in an academic setting (such as school), positive outcomes in classroom behavior are obtained, as are improvements in peer interactions and participation among students [24]. Kasari et al. peer-assisted learning models strengthen social relations and engagement in inclusive classrooms, further establishing the value for SST as integrated within the mainstream classroom [21].

Furthermore, the adoption of play-focused and cooperative learning modalities in this intervention is in accordance with recent studies which indicate that play is significant to children's social skills development in the area of communication [32]. Play-based intervention has been shown to enhance joint attention, symbolic play, and communicative intent in children with ASD, which are the building blocks of social competence in later life. This may also have contributed to improvements in the social and communication aspects of the current intervention through the interactive and child-directed nature of the intervention.

Another key aspect to be considered is the use of technology-assisted interventions in SST. Although the current study was conducted using face-to-face training, there is emerging evidence that virtual reality, metaverse platforms, and computer-assisted interventions can be used effectively as adjuncts to traditional SST by creating a safe and controlled environment for the practice of social scenarios [15]. These interventions can be particularly useful in resource-poor environments where access to trained therapists is limited [21].

Despite these positive results, individual differences in SST response should be considered. Not all children respond to standardized intervention strategies equally; an individual treatment outcome may vary depending on cognitive functioning, language abilities, sensory sensitivities, and support systems [16]. To maximize outcomes, individualized intervention strategies are an improvement that should be investigated in future studies. The present findings also raise a number of ethical considerations for autism intervention work. The treatment approaches to autism today are informed by perspectives of neurodiversity and recommend interventions designed to promote functional communication, self-advocacy, and participation, not normalization [4]. In the current study, the model of training designed to increase social participation/confidence versus strict compliance was considered, which is consistent with person-centered and ethical intervention theories. Clinically and educationally, the results will contribute to the integration of structured SST within early intervention, special education curriculum, and community-based therapy services. Professionals to teach social skills could also be beneficial. In addition, the involvement of multidisciplinary teams, including speech therapists, occupational therapists, and special educators, may also add to the effectiveness of these interventions. In order to add to the generalizability of the findings, the upcoming studies may incorporate these findings and consider



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using randomized controlled trials with larger sample size to make these outlier studies. Moreover, the long-term relationships of SST impact on academic achievement, peer relationships, and quality of life would further be helpful in furthering our understanding of the developmentally beneficial effects of SST social skills related interventions.

Conclusion

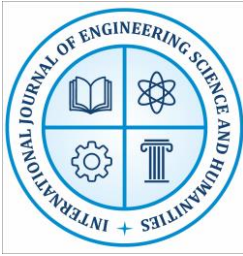
The present study provides tangible empirical evidence in favor of the effectiveness of structured social skills training interventions in improving social interactions, communication, generalization of skills acquired in the training environment to natural settings, and participation in social encounters in children with Autism Spectrum Disorder.

A great deal of improvement in eye contact, turn-taking, social interactions, effective verbal and non-verbal communicative skills, and spontaneous social interactions was observed in the children receiving special interventions in comparison to the children receiving routine therapies. These findings emphasize the effectiveness of structured training models based on the principles of reinforcement and play in accomplishing core social deficits in children suffering from ASD.

The application of the learnt behaviors in the home setting and classroom environment makes evident the need for intervention in natural settings, rather than solely in the clinical environment. The influence of parental participation and praise for positive behavior outcomes makes evident the need for the use of family-based strategies for intervention. The increased level of social interactions, reduced level of social withdrawal, and increased level of peer interactions indicate that the SST program not only facilitates the development of skills for the individual, but also helps in the induction of the individual into society. While the program had a very beneficial effect, future studies need to employ randomized controlled studies, larger populations, and long-term evaluation for the sustainability of the beneficial effects. Future studies need to examine individualized intervention procedures according to the cognitive-language profiles of children with autism.

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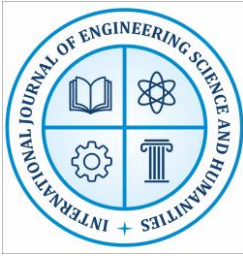
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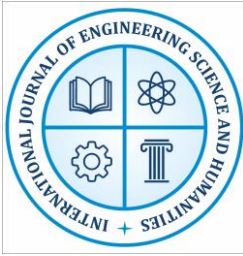
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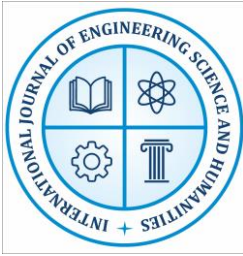
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