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Impact Of A Musical Intervention Program On Social Skills In Persons With Autism Spectrum Disorder

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ABSTRACT
Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by persistent impairments in social communication and social interaction, along with challenges in speech, motor functioning, and intellectual abilities. Core deficits include limited social reciprocity, difficulties in using and understanding nonverbal communicative behaviors, and challenges in developing and maintaining interpersonal relationships across various contexts. The present study aimed to examine the effectiveness of music therapy in enhancing social skills among children with autism. The sample comprised six children diagnosed with mild autism, aged between 8 and 12 years, selected from the Child Guidance Clinic (CGC), Department of Paediatrics, SVRR Government General Hospital, Tirupati. The intervention involved a structured music-based social skills training program consisting of forty sessions, each lasting 45 minutes, conducted over a period of three months, with active involvement of both therapists and parents. Social skills were assessed pre and post intervention using the Autism Social Skills Profile (ASSP), focusing on two key components: responding to greetings and turn-taking. Statistical analysis using mean scores, standard deviations, and paired t-tests revealed a significant improvement in overall social skills as well as in both assessed components following the intervention. The findings indicate that music-based intervention is an effective and engaging approach for improving social skills in children with autism, highlighting the therapeutic potential of music as a complementary intervention in autism management.
Keywords: Autism, Social Skills, Music Therapy

1. INTRODUCTION:

Autism Spectrum Disorder (ASD) is a lifelong neurodevelopmental condition marked by persistent difficulties in social communication and social interaction, along with restricted and repetitive patterns of behavior, interests, or activities. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), individuals with ASD exhibit deficits in social-emotional reciprocity, impairments in verbal and nonverbal communicative behaviors, and challenges in developing, maintaining, and understanding relationships across multiple social contexts (American Psychiatric Association, 2013). These characteristics typically emerge in early childhood and vary considerably in severity, resulting in heterogeneous developmental and functional outcomes.

Social competence is a critical domain of adaptive functioning that enables individuals to participate effectively in interpersonal relationships and social environments. Social skills such as responding appropriately to greetings, turn-taking, joint attention, empathy, and reciprocal communication are foundational for peer acceptance, academic engagement, and emotional well-being. In individuals with ASD, impairments in these skills are among the most pervasive and functionally limiting features of the disorder. Deficits in basic social behaviors often lead to social withdrawal, peer rejection, reduced participation in educational settings, and long-term psychosocial difficulties. Evidence from developmental research highlights that social skills acquired during childhood have a significant influence on later social adjustment and mental health, emphasizing the importance of early and targeted intervention (Ladd, 2005).

Traditional social skills interventions for individuals with ASD commonly employ structured behavioral techniques, modeling, and direct verbal instruction. Although these approaches have demonstrated effectiveness, they may pose challenges for children who have limited verbal abilities, reduced intrinsic social motivation, or heightened sensory sensitivities. Research has consistently shown that children with autism exhibit deficits in executive functioning, including difficulties in working memory, inhibitory control, and cognitive flexibility (Jagruth, 2025). Research indicates that toddlers with over two hours of daily screen exposure exhibit significantly reduced eye contact, joint attention, and symbolic play compared to those with minimal exposure (<30 minutes/day). These results suggest that excessive early screen time may impede socio-communicative development and functional play, emphasizing the need for parental guidance and careful regulation of screen use during early childhood (Mallikarjuna et al., 2025). These impairments have been linked to challenges in academic performance and social

functioning, highlighting the importance of understanding executive processes in this population. As a result, researchers and clinicians have increasingly explored alternative and complementary interventions that are engaging, emotionally meaningful, and capable of facilitating social interaction in a more naturalistic and motivating manner. Music-based interventions have emerged as one such promising approach.

Music therapy is defined as the systematic and evidence-based use of musical experiences by trained professionals to achieve individualized therapeutic goals within a therapeutic relationship. Music is uniquely suited to support social engagement because it integrates rhythm, melody, and movement—elements that naturally encourage attention, emotional expression, and interpersonal synchronization. Importantly, many individuals with ASD demonstrate a strong interest in music and relatively preserved or enhanced musical perception abilities, such as sensitivity to rhythm and pitch. These characteristics allow music to serve as a motivating medium through which social interaction and communication can be facilitated.

A growing body of empirical evidence supports the effectiveness of music therapy in improving social communication and interaction skills in individuals with ASD. Systematic reviews and meta-analyses have reported positive effects of music-based interventions on social responsiveness, emotional expression, and communicative behaviors when compared with standard care or non-musical interventions (Geretsegger et al., 2014; Ke et al., 2022). A large-scale randomized controlled trial by Bieleninik et al. (2017) demonstrated that improvisational music therapy led to improvements in social communication skills among children with ASD, highlighting its clinical relevance. Similarly, neuroimaging research has shown that music-based interventions can enhance social communication and auditory–motor connectivity in children with ASD, suggesting a neurobiological basis for observed behavioral improvements (Sharda et al., 2018). One study found that high early screen exposure is strongly associated with language delays, social withdrawal, and repetitive behaviors. Regression analysis further identified daily screen duration and limited parental engagement as key predictors of virtual autism symptoms, emphasizing the importance of parental awareness, digital hygiene, and early intervention (Vidhupriya et al., 2025).

Music-based interventions are particularly effective in addressing specific components of social interaction, such as turn-taking, joint attention, eye contact, and reciprocal engagement. Group music activities provide structured opportunities for shared attention, imitation, cooperation, and social synchrony—skills that are often impaired in individuals with ASD. Rhythmic and melodic structures support predictability and reduce anxiety, thereby increasing willingness to engage in social exchanges. These features make music-based interventions especially suitable for targeting foundational social behaviors that underpin broader social competence.

Despite the growing evidence base, there remains a need for focused research examining the impact of structured musical intervention programs on clearly defined and measurable social skill components. Skills such as responding to social greetings and engaging in turn-taking represent fundamental aspects of social interaction and are essential for successful participation in everyday social contexts. Strengthening these skills through engaging and developmentally appropriate interventions may significantly enhance social functioning and quality of life for individuals with ASD.

In this context, the present study investigates the impact of a musical intervention program on social skills in persons with Autism Spectrum Disorder, with particular emphasis on response to greetings and turn-taking behaviors. By employing a structured, goal-oriented musical intervention, the study aims to contribute to the growing body of evidence supporting music-based approaches as effective adjunctive interventions for enhancing social competence in individuals with ASD.

2. METHODOLOGY

Research Design

The present study employed a pre–post intervention research design to examine the impact of a structured musical intervention program on selected social skills in children with Autism Spectrum Disorder (ASD).

Sample Size

The sample comprised six children diagnosed with mild Autism Spectrum Disorder, all of whom were male and aged between 8 and 12 years. Participants were recruited from the Child Guidance Clinic (CGC), Department of Paediatrics, SVRR Government General Hospital, Tirupati.

Sampling Technique

A purposive sampling technique was employed for participant selection. This method was chosen to ensure that children who met the specific diagnostic and functional criteria relevant to the study objectives were included.

Inclusion Criteria

The study included children aged between 8 and 12 years who had been clinically diagnosed with mild Autism Spectrum Disorder. Participants were required to be regular attendees of the Child Guidance Clinic (CGC) at SVRR Government General Hospital, Tirupati. Additionally, children selected for the study exhibited observable deficits in social skills, with particular difficulties in responding to greetings and engaging in turn-taking behaviors. These criteria ensured that the sample was both age-appropriate and representative of children with mild social skill challenges within the autism spectrum.

Exclusion Criteria

Children who were diagnosed with Autism Spectrum Disorder (ASD) but also had comorbid neurological or psychiatric conditions were excluded from the study. Additionally, participants exhibiting severe behavioral disturbances that could interfere with the intervention or

assessment were not considered. Children with intellectual disabilities accompanied by significant visual or hearing impairments were also excluded, to ensure that all participants could fully engage with the music therapy activities and accurately participate in social skills assessments.

Assessment Tools

The present study assessed the severity of autism and social skills using standardized, validated instruments. The Indian Scale for Assessment of Autism (ISAA) was employed to confirm the diagnosis and determine the severity level of Autism Spectrum Disorder among the participants. To evaluate social functioning, the Autism Social Skills Profile (ASSP) was administered, with particular focus on key domains such as responses to greetings and turn-taking behaviors. The ASSP was completed by the parents of the participants both prior to and following the intervention, allowing for the assessment of changes in social skills as a result of the music therapy program.

Procedure

The study was conducted in three phases:

Phase I: Pre-Intervention Assessment

Prior to intervention, permission was obtained from the Child Guidance Clinic, and informed consent was secured from the parents of the participants. Detailed background information regarding the children's behavioral and social functioning was collected through parental reports.

Participants who met the inclusion criteria were assessed using the Autism Social Skills Profile (ASSP). The assessment focused on baseline levels of response to greetings and turn-taking behaviors. The pre-intervention assessment was completed within a single session for each participant.

Phase 2: Intervention:

A structured musical intervention program was developed by the researcher to target specific social skills. The intervention incorporated musical activities designed to promote social interaction, including rhythm-based exercises, instrument play, clapping activities, and guided musical exchanges aimed at enhancing response to greetings and turn-taking.

The intervention was delivered over 40 sessions, each lasting 45 minutes, conducted across a three-month period. Sessions were conducted either individually or in small groups, depending on the child's comfort level and social responsiveness. Both the therapist and parents were actively involved to facilitate consistency and generalization of learned social behaviors.

Music Activity Package

The Music Activity Package (MAP) was developed as a structured intervention program designed to enhance selected social skills in children with Autism Spectrum Disorder (ASD) through purposeful musical engagement. The program integrates rhythmic, auditory, visual, and motor components to promote social interaction, attention, eye contact, and turn-taking. The selection of activities was informed by clinical experience and existing literature on music-based interventions for ASD. Prior to implementation, the intervention package was reviewed and validated by experts working in the field of autism and developmental disorders to ensure content relevance, developmental appropriateness, and clinical applicability.

The MAP comprised four core musical activities: spinning drum play, mouth organ (harmonica) play, video modelling, and structured clapping methods. Each activity was systematically implemented either in individual or small group formats, depending on the child's responsiveness and comfort level.

Spinning Drum Activity

The spinning drum is a percussion instrument consisting of a tightly stretched membrane over a circular frame, producing rhythmic sound when struck. Percussion-based activities were incorporated to facilitate motor coordination and rhythmic synchronization, which are closely linked to social engagement and joint attention.

Purpose of the Activity:

Enhancement of eye contact

Development of upper and lower body coordination

Promotion of rhythmic synchronization and social responsiveness

Materials Required:

Spinning drum

Procedure:

The child was seated or positioned opposite the therapist. The therapist initiated a rhythmic pattern by beating the drum while simultaneously demonstrating coordinated body movements such as marching or stepping in place. The child was encouraged to imitate the rhythm and movement, maintaining synchrony with the therapist. Verbal and nonverbal prompts were used to elicit eye contact and appropriate responses. The activity was conducted for a few minutes per session, with gradual increases in duration based on the child's tolerance and engagement.

Level of Difficulty:

Some children exhibited sensitivity to the intensity or quality of drum sounds. In such cases, sound intensity was modulated, and gradual exposure techniques were applied.

Mode of Application:

Individual or group sessions

Mouth Organ (Harmonica) Activity

The mouth organ, commonly known as the harmonica, is a free-reed wind instrument that produces sound through controlled inhalation and exhalation. This activity was selected to support breath regulation, attention, and rhythmic internalization, which are essential for organized motor control and social interaction.

Purpose of the Activity:

Rhythmic internalization

Enhancement of attention and sustained focus

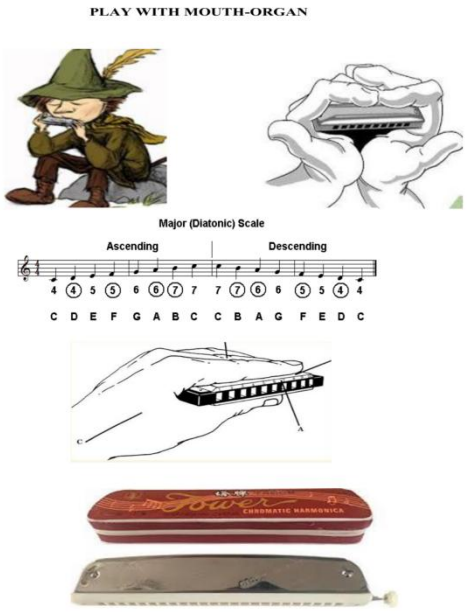
Improvement of eye contact and breath control

Materials Required:

Mouth organ (harmonica)

Procedure:

The therapist demonstrated simple rhythmic patterns using the mouth organ, encouraging the child to observe and imitate the sounds. Children were guided to regulate their breathing while producing musical tones. Interactive exchanges were introduced by alternating turns between the therapist and the child, thereby reinforcing turn-taking and shared attention. Positive reinforcement was provided for sustained engagement and appropriate responses.



Video Modelling Activity

Video modelling is a visual instructional strategy that involves observing a modeled behavior through video demonstrations and subsequently imitating the observed behavior. This method was integrated into the MAP to support social learning in a structured and engaging format.

Examples of Video Modelling Scenarios:

Block-building activity: Encouraging turn-taking, eye contact, cooperative play, and enjoyment

Colouring activity: Demonstrating requesting materials, interaction, verbal exchange, and peer engagement

Purpose of the Activity:

Enhancement of eye contact and attention

Development of listening skills

Appropriate social responses and communication

Interpretation and response to social cues

Improvement in verbal and nonverbal communication

Materials Required:

Computer system

Speakers or headset

Supporting musical instruments

Procedure:

The child was seated comfortably in front of the screen, and short video clips incorporating musical elements were played. Each video demonstrated specific social behaviors within a naturalistic context. The videos were repeated three to five times based on the child's interest and attention span. Following observation, the child was encouraged to imitate the modeled behaviors with guidance from the therapist. Immediate feedback and reinforcement were provided to strengthen learning.

Level of Difficulty:

Some children displayed a tendency toward excessive screen engagement. To address this, viewing time was strictly regulated, and transitions from video observation to real-life practice were systematically implemented.

Mode of Application:

Individual or group sessions

Structured Clapping Methods

Structured clapping activities were used to reinforce rhythm, coordination, and reciprocal interaction. These activities emphasized imitation, turn-taking, and shared attention within a predictable rhythmic framework.

Purpose of the Activity:

Development of turn-taking skills

Enhancement of social reciprocity

Improvement of motor coordination and timing

Procedure:

The therapist initiated simple clapping patterns, which the child was encouraged to imitate. Gradually, interactive clapping games were introduced, requiring the child to wait for their turn and respond appropriately. These activities fostered anticipation, engagement, and social synchronization.

The Music Activity Package was designed as a flexible yet structured intervention aimed at improving social skills in children with ASD. By integrating auditory, visual, and motor components within a musical framework, the program provided meaningful opportunities for social engagement, communication, and reciprocal interaction. The MAP was delivered in a supportive therapeutic environment, allowing for individualized pacing and adaptation based on each child's sensory preferences and responsiveness.

Phase 3: Post Intervention Assessment:

Following the completion of the intervention phase, which comprised forty sessions of music-based activities lasting 45 minutes each, a one-day interval was provided to minimize immediate practice or fatigue effects. Subsequently, the post-intervention assessment was conducted to evaluate changes in targeted social skill domains.

The assessment procedure mirrored the pre-intervention phase to ensure methodological consistency. The Autism Social Skills Profile (ASSP) was re-administered to assess the effectiveness of the music therapy intervention in enhancing social skills among children with mild autism. Parents of the participants completed the ASSP based on their observations of the children's social behaviors in natural settings. The completed checklists yielded post-intervention scores for the selected social skill components, namely response to greetings and turn-taking.

Analysis of Data

Following the post-intervention assessment, the collected data were systematically organized and subjected to statistical analysis to determine the impact of the music therapy intervention on social skills in children with mild autism. Pre- and post-intervention ASSP scores were tabulated and analyzed using the Statistical Package for the Social Sciences (SPSS), Version 20.0.

Descriptive statistics, including mean scores and standard deviations, were computed to summarize participant performance before and after the intervention. To examine the significance of changes in social skills across the intervention period, the paired samples t-test was employed. This statistical technique was selected as it is appropriate for comparing related measures obtained from the same participants at two different time points. The level of statistical significance was set to assess the effectiveness of the music activity–based intervention in improving targeted social skill domains.

Ethical Considerations

The study adhered strictly to established ethical guidelines for research involving human participants. Ethical approval was obtained from the institutional ethics committee before data collection. Informed written consent was secured from all primary caregivers after clearly explaining the study's objectives, procedures, and voluntary nature of participation.

Confidentiality and anonymity were ensured through unique participant codes, with all data securely stored and accessible only to the research team. Measures were taken to minimize any physical or psychological discomfort, allowing children to pause or withdraw from tasks if distressed. Parents were informed of their right to withdraw at any time without penalty.

After assessments, caregivers were provided with feedback on their child's developmental profile, along with guidance and referrals for intervention services when necessary. These procedures ensured the study upheld respect, beneficence, and integrity, prioritizing the well-being of both children and their caregivers.

3. RESULT AND DISCUSSION

Sample Characteristics

The study sample consisted of six male children diagnosed with mild Autism Spectrum Disorder (ASD), with ages ranging from 8 to 12 years. All participants were recruited from the Child Guidance Clinic (CGC), Department of Paediatrics, SVRR Government General Hospital, Tirupati, ensuring a consistent clinical referral context and standardized diagnostic evaluation. The diagnosis of ASD and the classification of severity as *mild* were established prior to inclusion in the study using standardized clinical assessment procedures.

The selection of participants within a narrow age range and with a homogeneous diagnostic profile was intentional, as it minimized developmental variability and enhanced the internal validity of the study. Focusing exclusively on children with mild autism allowed for a clearer examination of the effects of the music therapy intervention on specific social skill domains without the confounding influence of severe behavioral or cognitive impairments.

Table 1: Demographic and Clinical Profile of Participants

S. No	Participant	Gender	Age (Years)	Level of Autism
1	P1	Male	9	Mild
2	P2	Male	10	Mild
3	P3	Male	9	Mild
4	P4	Male	11	Mild
5	P5	Male	10	Mild
6	P6	Male	8	Mild

As shown in Table 1, all participants satisfied the inclusion criteria, exhibiting a uniform diagnosis of mild autism and a comparable developmental stage. The age distribution reflects middle childhood, a critical period for social skill acquisition and intervention responsiveness. The absence of female participants reflects the referral pattern during the study period and aligns with epidemiological evidence indicating a higher prevalence of ASD among males.

Graphical Representation of Sample Characteristics

To enhance clarity and visual interpretation, the demographic characteristics presented in Table 1 can also be illustrated using graphical figures.

Figure 1: Age Distribution of Participants

Figure 1 depicts the age distribution of the participants. The ages range from 8 to 11 years, with two participants each at ages 9 and 10 years, indicating a clustered distribution around mid-childhood. This relatively narrow age span supports developmental comparability across participants and reduces age-related variability in social skill performance.

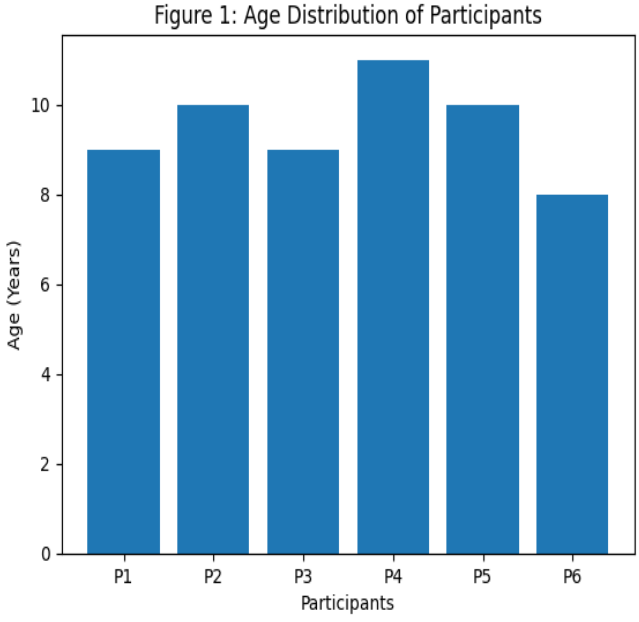


Figure 2: Gender Distribution of Participants

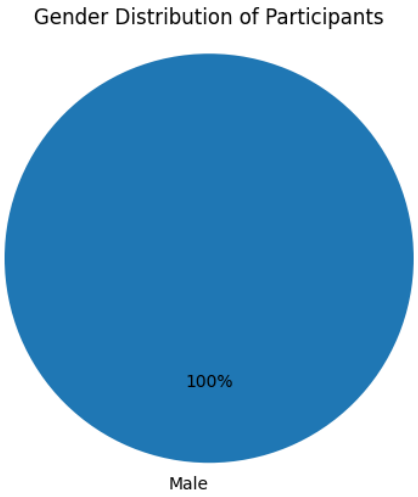


Figure 2, a pie chart, illustrates the gender composition of the study sample. All six participants included in the study were male, representing 100% of the sample. This uniform gender distribution reflects the characteristics of the available clinical population at the time of recruitment and ensures consistency in examining the effects of the music therapy intervention without gender-related variability.

Figure 3: Severity Level of Autism

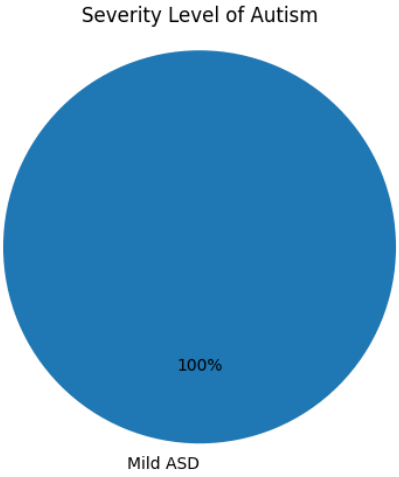


Figure 3 illustrates the distribution of autism severity levels among the study participants. All six children included in the study were diagnosed with mild Autism Spectrum Disorder, indicating a homogeneous clinical profile with respect to severity. This uniformity strengthens the internal validity of the study and allows for clearer interpretation of the effects of the music therapy intervention.

Overall, the sample characteristics demonstrate a clinically homogeneous group in terms of age, gender, and severity of autism, providing a stable foundation for examining the effects of the music therapy intervention on social skills. Such sample consistency enhances internal validity and allows observed changes in social behavior to be more confidently attributed to the intervention rather than to extraneous demographic or clinical factors.

Effect of Music Therapy on Response to Greetings

The first hypothesis of the present study posited that participation in a structured music therapy intervention would result in a significant improvement in children's ability to respond appropriately to social greetings. Responding to greetings is a foundational social behavior that reflects social awareness, recognition of others, and initiation of reciprocal interaction. Deficits in this skill are commonly observed in children with Autism Spectrum Disorder (ASD) and often contribute to social isolation and reduced peer engagement.

Table 2: Pre- and Post-Test Comparison for Response to Greetings

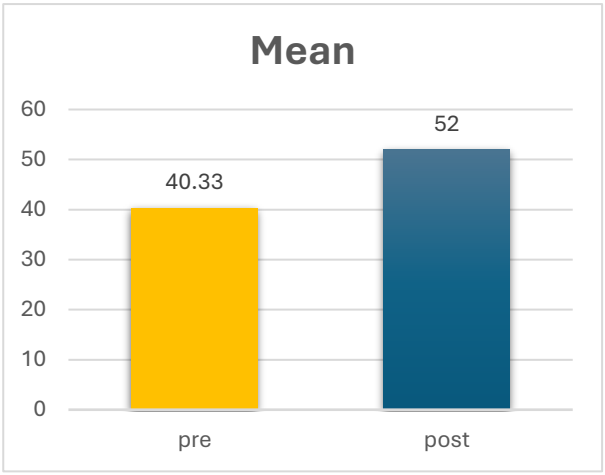
Measure	Pre-Test	Post-Test
Mean	40.33	52.00
SD	2.58	4.73
t-value	4.295	
df	5	
Significance	$p < 0.01$	

As shown in Table 2, the statistical analysis revealed a marked improvement in the *Responds to Greeting Others* domain following the intervention. The mean score increased from 40.33 (SD = 2.58) during the pre-test phase to 52.00 (SD = 4.73) at post-test, indicating a substantial enhancement in participants' greeting responses. The obtained t-value of 4.295 (df = 5) was statistically significant at the 0.01 level, demonstrating a highly significant effect of the music therapy intervention. These findings provide strong empirical support for Hypothesis 1, which was therefore accepted.

The magnitude of improvement observed suggests that music-based activities were particularly effective in fostering responsiveness to social cues. Musical interactions inherently involve initiation, acknowledgment, and reciprocal exchange—elements that closely parallel greeting behaviors. Activities such as rhythmic clapping, call-and-response singing, and instrument-based turn exchanges may have provided repeated and meaningful opportunities for children to practice acknowledging others in a structured yet enjoyable context. These experiences likely strengthened social attention and increased awareness of interpersonal cues.

Moreover, music therapy offers a non-verbal and emotionally engaging medium, which may reduce the communicative demands often associated with traditional social skills training. For children with ASD, who may experience anxiety or difficulty with verbal communication, musical cues can serve as accessible prompts for social engagement. The predictability and repetition inherent in musical routines may have further supported learning by reducing uncertainty and increasing confidence in social interactions.

Figure 4: Mean Pre-Test and Post-Test Scores on Response to Greetings among Children with Autism



The graphical representation presented in Figure 4 visually reinforces the statistical findings, clearly depicting the improvement in mean scores from pre-test to post-test. The upward shift in post-intervention scores reflects the positive influence of the music therapy program on children's ability to respond to greetings, highlighting its role in enhancing everyday social functioning.

Overall, the results indicate that music therapy is an effective intervention for improving greeting responses in children with autism, a skill that serves as a gateway to broader social participation. By embedding social behaviors within structured musical contexts, music therapy facilitates naturalistic learning and promotes meaningful social engagement, thereby addressing one of the core social communication challenges associated with ASD.

Effect of Music Therapy on Turn-Taking Skills

The second hypothesis of the study proposed that participation in a structured music therapy intervention would result in a significant improvement in turn-taking behavior among children with Autism Spectrum Disorder. Turn-taking is a fundamental social skill that underpins reciprocal interaction, cooperative play, and conversational exchange, and is often impaired in children with autism due to difficulties in social reciprocity, impulse control, and joint attention.

Table 3: Pre- and Post-Test Comparison for Turn-Taking

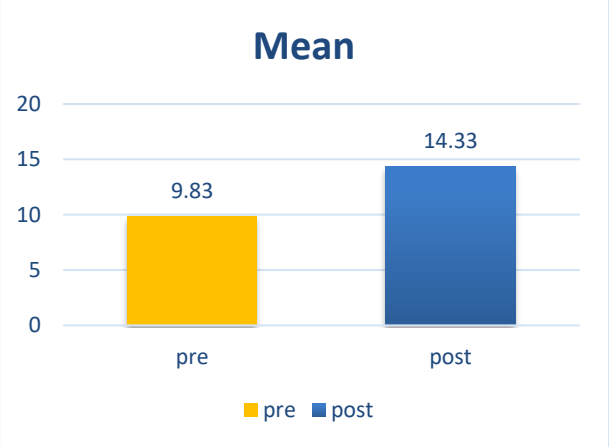
Measure	Pre-Test	Post-Test
Mean	9.83	14.33
SD	1.84	4.18
t-value	2.058	
df	5	
Significance	$p < 0.05$	

As presented in Table 3, the statistical analysis revealed a meaningful enhancement in turn-taking abilities following the intervention. The mean score increased from 9.83 (SD = 1.84) at pre-test to 14.33 (SD = 4.18) at post-test, indicating a substantial improvement in participants' ability to wait, respond appropriately, and engage in reciprocal interaction during social activities. The obtained t-value of 2.058 (df = 5) reached statistical significance at the 0.05 level, thereby confirming the effectiveness of the music therapy intervention in improving turn-taking behavior. On the basis of these findings, Hypothesis 2 was accepted.

The observed improvement may be attributed to the intrinsic structure of musical activities, which naturally require sequential participation, waiting for cues, and coordinated responses. Musical tasks such as instrument play, rhythmic clapping, and group-based musical games provide clear temporal boundaries and predictable patterns, enabling children with autism to understand when to initiate or pause their actions. This structured sequencing likely facilitated the internalization of turn-taking rules in a manner that was both engaging and non-threatening.

Furthermore, music-based activities promote shared attention and synchronization, key processes that are closely associated with social reciprocity. The rhythmic and repetitive nature of music may have reduced cognitive load and anxiety, allowing participants to focus on social cues rather than verbal instructions alone. Over repeated sessions, these experiences may have strengthened participants' capacity to regulate impulses and coordinate their behavior with others.

Figure 5: Mean Pre-Test and Post-Test Scores on Turn-Taking Skill among Children with Autism



The graphical representation shown in Figure 5 further illustrates the marked difference between pre- and post-intervention mean scores, visually reinforcing the statistical findings. The upward trend in post-test scores clearly demonstrates the positive impact of the music therapy program on turn-taking skills.

Overall, the results suggest that music therapy serves as an effective and developmentally appropriate intervention for enhancing turn-taking behavior in children with autism. By embedding social rules within enjoyable and predictable musical contexts, music therapy offers a practical and motivating approach to fostering foundational social skills that are essential for successful peer interaction and social participation.

Overall Social Skills Improvement

To examine the cumulative effect of music therapy on overall social skills, total ASSP scores across domains were analyzed. Table 4 presents the individual participant scores, percentage gains, and improvements.

Table 4: Overall Social Skills Pre- and Post-Test Scores

Participant	Pre-Test (%)	Post-Test (%)	Gain (%)
P1	42.3	60.2	17.8
P2	35.7	53.0	17.3
P3	39.7	55.6	15.8
P4	41.8	45.9	4.08
P5	39.2	41.3	2.04
P6	41.8	48.4	6.63

Table 4 illustrates the individual pre- and post-intervention total scores, corresponding percentages, and gain scores for all six participants across the assessed social skill domains. A consistent pattern of improvement was observed following the music-based intervention, indicating its positive influence on social skill development among children with mild Autism Spectrum Disorder.

Participant 1 demonstrated the highest overall improvement, with scores increasing from 83 (42.3%) at pre-test to 118 (60.2%) at post-test, reflecting a substantial gain of 35 points (17.8%). Participant 2 showed a comparable level of progress, improving from 70 (35.7%) to 104 (53.0%), with a gain of 34 points (17.3%). These marked improvements suggest that participants with lower baseline social skill performance benefited considerably from structured musical engagement.

Participant 3 also exhibited notable progress, with scores rising from 78 (39.7%) to 109 (55.6%), corresponding to an improvement of 31 points (15.8%). This finding further supports the role of music-based activities in enhancing multiple aspects of social functioning, including engagement, reciprocity, and responsiveness.

Participants 4 and 5 demonstrated relatively smaller yet positive gains. Participant 4's score increased from 82 (41.8%) to 90 (45.9%), yielding an improvement of 8 points (4.08%), while Participant 5 showed a modest increase from 77 (39.2%) to 81 (41.3%), with a gain of 4 points (2.04%). The comparatively limited improvement observed in these participants may be attributed to individual differences such as baseline social competence, attention span, or responsiveness to musical stimuli.

Participant 6 exhibited a moderate level of improvement, with scores increasing from 82 (41.8%) to 95 (48.4%), reflecting a gain of 13 points (6.63%). This suggests that even when gains were not as pronounced as in other participants, the intervention still contributed positively to social skill enhancement.

The overall mean score increased from 78.67 (SD = 4.89) to 99.67 (SD = 13.19), with a statistically significant t-value of 3.724 ($p < 0.01$). These findings indicate that all participants benefited from the intervention, though the magnitude of improvement varied.

Collectively, these findings indicate that all participants benefited from the music therapy intervention, albeit to varying degrees. The variability in individual outcomes highlights the heterogeneous nature of Autism Spectrum Disorder and underscores the importance of individualized and flexible intervention approaches. Overall, the results provide further empirical support for the effectiveness of music-based interventions in promoting social skill development among children with autism.

Figure 6. Mean Pre- and Post-Intervention Scores Across Social Skill Domains

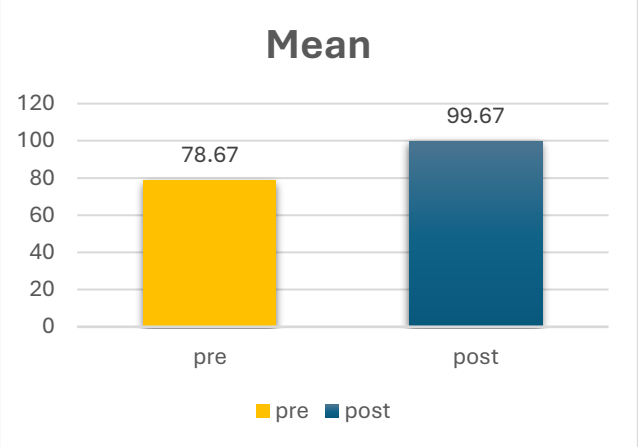


Figure 6 presents the mean pre-test and post-test scores across all assessed social skill domains—specifically, *Responding to Greetings* and *Turn-Taking*—among children with Autism Spectrum Disorder. In the pre-test, the mean score across all domains was 78.67, while the post-test mean increased to 99.67, reflecting a gain of 21 points overall. This upward trend in the graph demonstrates a significant improvement in social skills following the structured music therapy intervention. The increase in scores visually and quantitatively confirms the effectiveness of the program in enhancing social engagement, reciprocal interaction, and communication skills in the participants. The figure reinforces the statistical outcomes and highlights the positive impact of music-based interventions on children with mild autism.

4. DISCUSSION

The findings of the present study provide substantive empirical support for the effectiveness of a structured music-based intervention program in enhancing social skills among children with Autism Spectrum Disorder (ASD), with particular improvement observed in the domains of responding to social greetings and turn-taking. These domains represent foundational components of social reciprocity and are often significantly impaired in children with ASD, thereby limiting their ability to participate meaningfully in social and educational contexts. The observed improvements underscore the potential of music as a therapeutic medium capable of addressing core social communication challenges associated with ASD.

Music-based activities offer a unique combination of structure and flexibility, enabling children with autism to engage in predictable yet enjoyable interactions. The rhythmic and repetitive nature of music provides clear cues that support anticipation, sequencing, and timing—skills closely linked to turn-taking and reciprocal interaction. Moreover, music facilitates non-verbal communication and shared attention, allowing children who may struggle with spoken language to participate actively in social exchanges. Through synchronized activities such as instrument play, rhythmic movement, and imitation, participants were encouraged to attend to others, wait for their turn, and respond appropriately within a social framework.

Several factors may have contributed to the positive outcomes observed in the study. First, the regularity and intensity of the intervention, delivered across forty structured sessions, likely facilitated the consolidation of learned social behaviors through repetition and practice. Consistent exposure to musical routines may have strengthened neural and behavioral pathways associated with social engagement. Second, conducting the intervention in a familiar and controlled environment may have minimized sensory overload and anxiety, both of which are common barriers to learning in children with ASD. A predictable setting can enhance feelings of safety and willingness to participate, thereby improving therapeutic responsiveness.

Third, the selection of developmentally appropriate and individualized musical activities appears to have played a critical role in sustaining motivation and attention. Music often represents an area of intrinsic interest for children with ASD, and harnessing this interest can increase active participation and reduce resistance to social interaction. Additionally, the use of positive reinforcement following task completion likely strengthened adaptive social responses and promoted behavioral generalization beyond the intervention sessions.

The findings of this study are consistent with earlier research demonstrating the positive impact of music-based interventions on social and communicative functioning in children with autism. Ghasemtabar and Arab (2015) reported significant improvements in social skill performance following musical activity programs, while Katagiri (2009) emphasized the role of music in enhancing emotional understanding and responsiveness. Furthermore, Engwall and Duppils (2009) highlighted how rhythmic and movement-based musical activities promote social synchronization and cooperative behavior, which are essential for effective social interaction.

In line with the present results, Rao, Beidel, and Murray (2008) found that structured music and play-based activities fostered meaningful improvements in social competence among children with ASD. Nasreen (2016) further demonstrated that music-based interventions contribute to broader cognitive and executive functioning gains, including improvements in attention, working memory, and verbal comprehension, which may indirectly support social skill development. These findings collectively suggest that music serves not only as a motivational tool but also as a facilitator of multiple developmental domains that underpin social behavior.

The current study also aligns with empirical evidence supporting music therapy as a viable and effective modality for social skills training in autism. LaGasse (2014) demonstrated that group music therapy interventions significantly improved peer interaction and social engagement in children with ASD, while Gooding (2011) reported notable gains in social functioning following school-based music interventions. Although earlier literature has acknowledged the limited empirical validation of certain social skills training programs (Murray, 2008), the present study contributes meaningful data by demonstrating statistically significant improvements using a structured and replicable music activity program.

Despite its promising findings, the study also highlights the inherent variability in individual responses to intervention, reflecting the heterogeneous nature of ASD. Differences in baseline social skills, sensory preferences, and responsiveness to music may account for the variation in outcomes observed across participants. This underscores the importance of individualized intervention planning and flexible implementation when using music-based approaches.

Overall, the findings reinforce the therapeutic value of music-based interventions in addressing core social skill deficits in children with ASD. By fostering engagement, reducing anxiety, and promoting social reciprocity through enjoyable and meaningful activities, music therapy emerges as a powerful adjunctive intervention. Future research employing larger sample sizes, control groups, and longitudinal follow-up designs is warranted to further elucidate the mechanisms of change and to establish the long-term efficacy and generalizability of music-based social skills interventions.

5. CONCLUSION

The present study highlights the significant therapeutic potential of music-based interventions as an effective adjunctive approach for enhancing social skills in children with Autism Spectrum Disorder (ASD). The findings demonstrate that structured musical activities can positively influence core social domains such as responding to greetings and turn-taking, which are often impaired in children with autism. Music therapy provides a unique and motivating medium that naturally captures attention, facilitates emotional expression, and promotes reciprocal social interaction within a supportive and engaging environment.

Importantly, the therapeutic impact of music should not be viewed as abstract or incidental; rather, it operates through clearly identifiable mechanisms such as rhythmic synchronization, auditory–motor coordination, emotional resonance, and structured social participation. These mechanisms enable children with autism to engage meaningfully with others while reducing anxiety and resistance to social interaction. The use of individualized treatment goals, combined with age-appropriate and need-based musical activities, further enhances the precision and effectiveness of intervention by directly targeting specific social skill deficits.

While the outcomes of the present study are encouraging, certain methodological limitations must be acknowledged. The small sample size and absence of a control group restrict the generalizability of the findings. Therefore, future research should incorporate larger and more diverse samples, randomized controlled designs, and longitudinal follow-up assessments to examine the sustainability of gains over time. Additionally, further investigation is needed to identify which specific components of music therapy—such as rhythm, melody, group participation, or improvisation—are most influential in promoting social development in children with ASD.

In conclusion, this study contributes meaningful empirical evidence to the growing body of literature supporting music therapy as a practical, engaging, and effective intervention for improving social competence in children with autism. Given its non-invasive nature, high acceptability, and adaptability across developmental levels, music therapy holds considerable promise as a valuable component of comprehensive intervention programs for children with Autism Spectrum Disorder.

Limitations of the Study

Despite the positive outcomes observed, certain limitations of the present study must be acknowledged. First, the sample size was small and consisted of only six participants, all of whom were male and diagnosed with mild Autism Spectrum Disorder. This limits the extent to which the findings can be generalized to children with moderate or severe autism, female children, or those from different sociocultural backgrounds.

Second, the study employed a single-group pre–post intervention design without a control or comparison group. Although significant improvements were noted following the music therapy intervention, the absence of a control group makes it difficult to attribute changes exclusively to the intervention, as maturation or external environmental factors cannot be entirely ruled out.

Third, the post-intervention assessment was conducted shortly after the completion of the intervention sessions. As a result, the long-term maintenance and generalization of acquired social skills to natural settings such as home or school could not be examined. Additionally, social skills were assessed primarily through parent-reported measures, which, although valuable, may be influenced by subjective perceptions or response bias.

Suggestions for Future Research

Future studies should aim to include larger and more diverse samples, incorporating children across different age groups, severity levels of autism, and both genders. The inclusion of a randomized control group or comparison with other intervention modalities would provide stronger empirical evidence regarding the specific effectiveness of music therapy.

Longitudinal research designs are recommended to evaluate the durability of treatment effects and to examine whether improvements in social skills are maintained over time and generalized across settings. Future investigations may also explore the differential impact of specific musical components such as rhythm, melody, movement, or group-based activities to identify which elements are most effective in promoting social interaction.

In addition, combining quantitative measures with qualitative observations, teacher reports, or direct behavioral assessments could provide a more comprehensive understanding of changes in social functioning. Future research may also examine the integration of music therapy with other evidence-based interventions, such as behavioral or parent-mediated approaches, to assess synergistic effects.

Implications of the Study

The findings of the present study have important clinical, educational, and therapeutic implications. The results suggest that music therapy can serve as an effective and engaging intervention for improving social skills in children with autism, particularly in foundational areas such as responding to greetings and turn-taking. Given its non-threatening and enjoyable nature, music-based intervention may be especially useful for children who demonstrate resistance or anxiety toward conventional social skills training.

For clinicians and therapists, the study emphasizes the importance of incorporating structured, goal-oriented music activities tailored to the individual needs of children with autism. Educators and special schools may consider integrating music-based strategies within classroom routines to foster peer interaction and social participation. Additionally, the findings highlight the potential role of parents as active collaborators in intervention programs, particularly in reinforcing learned skills in naturalistic settings.

Overall, the study supports the inclusion of music therapy as a complementary component within multidisciplinary intervention frameworks for children with Autism Spectrum Disorder. Its adaptability, cost-effectiveness, and positive impact on social engagement make it a valuable therapeutic option in both clinical and educational contexts..

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