

Music therapy: An effective approach in improving social skills of children with autism

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Abstract

Background: The existing methodological weakness in conducted researches concerning music therapy (MT) for children with autism led to ambiguity and confusion in this scope of studies. The aim of the present research is to identify the effectiveness of MT method in improving social skills of children with autism and its stability, as well.

Materials and Methods: In the form of a clinical trial study with design of pretest/posttest/follow-up with control group, among the children with autism in community of Tehran city, on the basis of childhood autism rating scale, 27 children with mild to moderate autism were chosen and were divided into two groups of experiment ($n = 13$), and control ($n = 14$). Social skills' level of both groups was measured and recorded with the help of social skills rating system scale. The children of the experiment group participated in MT programs of Orff-Schulwerk for 45 days in 12 sessions (two sessions of 1-h/week), whereas the control group received no intervention. The data were analyzed with Statistic Package For Social Science (SPSS) software *t*-test and analysis of covariance was used to compare groups.

Results: In posttest, the results of covariance analysis showed a significant increase in social skills' scores of the experiment group ($P < 0.001$). Also, results of the paired-sample *t*-test showed that the effectiveness of MT has been persistent up to the follow-up phase.

Conclusions: The study showed that MT is an effective method with deep and consistent effects on improving social skills of children with autism.

Key Words: Autism, music therapy, social skills

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INTRODUCTION

In Diagnostic and Statistical Manual of Mental Disorders (DSM-V), "autism spectrum disorder (ASD) is characterized by persistent deficits in social communication and social interaction across multiple contexts, including deficits in social reciprocity, nonverbal communicative behaviors used for social interaction, and skills in developing, maintaining, and understanding relationships. In addition to the social communication deficits, the diagnosis of ASD

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requires the presence of restricted, repetitive patterns of behavior, interests, or activities”.^[1]

One of the main reasons for the worry of parents, instructors, researchers and policymakers is that in the last four decades, the rate of the children suffering ASD has grown 10 times. Recently, among all ethnic and socioeconomic groups in the United states, 1 out of every 88 children (in boys 1 out of every 54, and in girls 1 out of every 252) has ASD.^[2] This increasing trend has been confirmed in different places of the world, and early diagnosis of the disorder’s onset has challenged the psychologists and psychiatrists to be able to take a scientific step for confronting the disorder.^[3]

Socialization deficits are one of the central characteristics of ASDs, and they are a main source of impairment regardless of cognitive or language ability for individuals with ASD.^[4]

Social skills are the specific behaviors that individuals use for performing social tasks competently.^[5] This definition is to a great extent on the basis of the individual, context, and the people around the individual.^[6] Regardless of this, social skills are those behaviors which are exhibited in specific situations and lead to social competency, while, social competency refers to individuals’ perceptions about social behavior.

Researches on social skills of children with autism showed that these children are less likely to offer the start of an interaction; in conversations, when it comes to their turn of talking, lesser they continue the conversation, and they show less sympathy and interest to those who have established a social interaction with them.^[7-10]

Also, social skills’ deficits of these individuals don’t remit with their development. In fact, because of the milieu gets more complex and their awareness about their social inabilities increases, impairment and distress of these children may increase in the period of getting close to adolescence.^[11,12]

On the other hand, lack of social skills and interactions in childhood can have many negative consequences such as declines in employment, independent life and life expectancy, and also exacerbation of mental health problems (like depression, suicidal thoughts, anxiety).^[13] “Social interaction skills are vital to successful social, emotional and cognitive development. Most importantly, social skills’ deficits impede the ability to establish meaningful social relationships, which often leads to withdrawal and a life of social isolation”.^[14]

For training social skills to children with autism, many interventions were used, such as social stories,^[15] peer-mediated strategies,^[16] video modeling,^[17] cognitive-behavioral training,^[18] pivotal response training,^[19] and theory of mind.^[20]

But beside the above-mentioned methods, currently, in most countries of the world, because of some reasons like attractiveness, cost-effectiveness, ease of use, noninvasiveness, safety, easiness and minimal side effects, music therapy (MT) has gained much attention. According to the definition of American Association of MT,” MT is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved MT program.^[21] Meadows believes that MT has 6 main goals for the children with severe and profound multiple deficits. First, fulfilling the child’s basic needs; second, developing the child’s sense of self; third, establishing or re-establishing interpersonal relationships; fourth, developing specific skills; fifth, dispelling pathological behavior; and sixth, developing an awareness and sensitivity to the beauty of music (P. 4–6).^[22] The literature of the research suggests that MT is an effective therapeutic method for improving social skills of the children with autism.^[23-39] MT uses the music as a therapeutic means to address developmental, adaptive, and rehabilitative goals in the areas of psychosocial, cognitive, and sensory motor behavior of individuals with disabilities.^[40] This action has brought about many useful changes in children behavior, especially in the children with autism.^[41]

Srinivasan and Bhat believe that music-based interventions are effective therapeutic means for ASD children, because along with reducing the impairments of these children, they harness musical talents of these individuals.^[42] Heaton *et al.*, found in their research that despite the problems they have in the process and control of emotions in everyday life, autism individuals can perceive emotions in the music as goodly as the nonautistic individuals.^[43]

Srinivasan and Bhat have three reasons to believe that MT interventions are particularly attractive for autism children: First, musical training may help in directing various core autism impairments in joint attention, social reciprocity, and nonverbal and verbal communication, as well as atypical multisensory perception comorbidities, poor motor performance, and behavioral problems.^[42] Second, the children with ASD find musical activities enjoyable that might be due to their enhanced musical understanding.^[44] Third, music-based activities can be nonintimidating experiences wherein a child with ASD spontaneously

explores various musical instruments, with the trainer joining in and copying the child's actions.

With experimental research, it was proved that "participation in MT sessions taught students how to observe social cues and cooperate with group boundaries, how to wait and how to transition from one activity to another."^[45]

Caltabiano studied the effect of MT on enhancing three specific social skills in four children with autism: Joint attention, imitation, and turn-taking. Development and acquisition of the mentioned social behaviors were studied in a structured outdoor inclusive setting. The data were gathered through a mixed method (observing social behaviors of the students in both situations, video recording, and measurement scales that were applicable to the research's content) within 7 weeks in Grace MT Centre and Griffith Park Public School. The results showed that MT interventions, make the inclusive experience easier for the children with autism, and leads to enhanced social behaviors.^[14]

Despite the extensive researches performed in the context of using music-based approaches in treating children with autism, results of the researches^[42-48] indicate that most of these studies possess serious methodological weaknesses. For instance, most of them included single-subject design, lacked control group or had small sample size.^[46] Besides, lack of evidence-based assessment of ASD, follow-up, standardized protocols, and randomized controlled trials (RCTs) are other weaknesses of the researches performed in the context.^[48] Therefore, according to the mentioned discussions, and also with regard to the methodological weaknesses noted in the research literature, using a design of pretest/posttest/follow-up with control group, the present study intends to examine the following hypotheses:

- Music therapy improves social skills of children with autism
- The effectiveness of MT on improving social skills of children with autism is consistent over time (2 months after the intervention period).

MATERIALS AND METHODS

Participants and design

The method of the present study is experimental, by the design of pretest/posttest/follow-up with control group. Research sample is 27 children with autism who were diagnosed to have mild to moderate autism according to childhood autism rating scale (CARS) questionnaire.^[49] For the purpose of easier access and facilitating the research's process, based on medical

records of all the children with autism between the age range of 7 and 12 years in 3 child and Adolescent Psychiatry Centers in Tehran, the disorder severity of 69 children with autism was determined using CARS scale after getting permission from their families. From among these, 34 children were diagnosed to have mild to moderate autism. Totally, 7 children couldn't participate in the research due to certain circumstances of parents, and finally 27 children were chosen (mean [m] =33.374, standard deviation [SD] = 1.878). Regarding the fact that the present research's design is pretest-posttest-follow-up with control group, in order to eliminate the possible intervening variables, we have tried to match the children of both groups by age and gender variables. Therefore, 6 girls and 7 boys were replaced in the experiment group ($n = 13$), and 7 girls and 7 boys were replaced in the control group ($n = 14$). Also, the age ranges of both groups were as follows: The experiment group children between 7 years and 4 months to 11 years and 5 months ($m = 8.96$, $SD = 1.36$), and the control group children between 7 years and 1 month to 11 years and 8 months ($m = 9.23$, $SD = 1.54$). The inclusion criteria for the study included: Mild to moderate performance level based on CARS scale, calendar age of 7–12 years, having no impairments like blindness, deafness, speaking deficiencies, and motor disabilities. Exclusion criteria from the study included: Having absence more than two sessions during the interventions and noncooperation, participating in any kind of training classes such as music, creative drama, drawing, etc., during the intervention period.

Childhood autism rating scale

In the present research, CARS of Schopler *et al.* was used to diagnose and select the children with autism.^[49]

The CARS scores will vary between 15 and 60 and scores are considered as follows: 15–29.5 is nonautistic, 30–36.5 is mild to moderate, and 37–60 is moderate to severe.

Each item includes these options: "There is no problem", "slightly abnormal", "moderate", and "severe", and they are scored 1, 2, 3 and 4, respectively.^[50]

Studies have shown that CARS is a useful instrument for diagnosing autism in children of 2-year-old and above,^[51] and it has very strong psychometric properties.^[52] Internal consistency reliability alpha coefficient equals 0.94, inter-rater reliability correlation coefficient equals 0.71, and test-retest correlation coefficient is 0.88.^[49]

Different reports about validity of CARS showed that this instrument has a very high validity. Eaves and

Milner found that CARS has been able to appropriately diagnose 98% of the participants, and it has had a correlation of 0.67 with autism behavior checklist.^[53] Pereira *et al.* found that the correlation coefficient between CARS and autistic traits assessment scale is 0.89.^[54] In another research, Geier *et al.* showed that the correlation coefficient between CARS and autism treatment evaluation checklist is 0.71.

Rellini *et al.* found that there a complete agreement between DSM-IV and CARS.^[55] Also, the reliability coefficient of CARS test in Iran using Cronbach's alpha equaled 0.91.^[56]

Social skills rating system

This scale is made by Gresham and Elliot; it has three specific forms for parents, teachers, and students, and it is designed for three periods of preschool, elementary and guidance school. In the present research, the parents form (social skills rating system scale [SSRS]-P) for elementary period was used. This form includes four sub-scales of cooperation, assertions, self-control and responsibility, each having 10 items. Each subscale includes 10 items, but since 2 items load on two factors, therefore, the whole form includes 38 items and as a result, the total score of this form varies between 0 and 80. In this scale, the higher the score is, the higher social skills level would be.^[57]

Some of the studies investigated the psychometric properties of SSRS. Shahim reported that the reliability of the elementary children form of this scale in research in Iran on a group of mentally retarded children was 0.77 and 0.99, and in a group of normal children these coefficients varied between 0.49 and 0.96 for teachers and parent forms.^[58] Also, this researcher, using a sample of 89 exceptional students, found that there is a positive correlation between the social skills rating of teachers and parents in SSRS ($r = 0.30$).

Gresham and Elliot reported a reliability coefficient of 0.83–0.95 for the teachers, parents, and students forms. The total correlation scores of test-retest have been 0.84–0.93 for teachers, 0.65–0.87 for parents and 0.68 for students. Also, correlation coefficients between subscales of SSRS have varied between 0.75 and 0.88 for teachers, 0.77–0.84 for parents, and 0.52–0.66 for students.^[59] In the present research, using Cronbach alpha and split-half methods, reliability coefficient of SSRS-P (parents form) equaled 0.88 and 0.85, respectively that shows a desirable reliability for the scale. To put it briefly, results of the conducted researches show that the SSRS has high psychometric properties, and it is a useful instrument for assessing problems and social skills of children.^[59]

Procedure

At first, for determining the sample, three centers were chosen among Child and Adolescent Psychiatry Centers located in Tehran, because of their availability and accordance for cooperation with the study. Based on the medical records in these three centers, all the children with autism were identified. After contacting and coordinating with the families, using CARS, the severity of the disorder in 69 children was assessed in one of the centers. For the sake of facilitating the participation and activity of the children, just those children were selected as the sample who had mild to moderate autism based on CARS ($n = 34$). From among these children, seven children couldn't attend the research due to a certain circumstance of their parents and finally 27 children were selected. In the next step, the children were divided into two groups of experiment and control. For eliminating the possible intervening variables, efforts have been made to match the children of both groups by the variables of age and gender. Hence, 6 girls and 7 boys were replaced in the experiment group ($n = 13$), and 7 girls and 7 boys were replaced in the control group ($n = 14$). In the next step, within 2 days, social skills of the children of both groups were measured and recorded using the SSRS as the pretest. Then, the children of the experiment group participated in MT Programs for 45 days in 12 sessions (2 sessions of 1 h/week). MT activities were conducted in a child care center and in a room of 55 m area. The room's space was designed in a way that children could easily access the musical instruments. Musical activities were conducted based on the Orff-schulwerk with the help of two music therapists in components of music hearing, singing songs and chants, clapping, movement and dancing, special musical drama of Orff-schulwerk method, accustoming and working with instruments (especial musical instruments of Orff like xylophone, metallophone, bells, triangle, tambourine, timpani, castanets, maracas, woodlock) and free and creative playing of instruments. Children of the control group received no intervention. At the end of the intervention period (MT), social skills of both groups were measured as the posttest, and 2 months after the intervention period in the follow-up stage, social skills were measured by the SSRS with the help of parents to investigate the consistency of the effect of MT. Data were analyzed with the help of SPSS software and using covariance analysis and independent sample *t*-test.

RESULTS

Table 1 contains the scores of the CARS for participants of both groups of experiment and control. As it can be observed, there is an insignificant difference between the CARS scores of both groups, and it shows the equality of autism disorder's severity in children of

both groups. In Table 2, mean and SD of social skills scores of both intervention and control groups in the pretest, posttest (after controlling the covariates), and follow-up phases are shown.

Taking a look at the mean of the SSRS scores of the groups clearly shows that, social skills improvement in the experiment group children in the posttest phase has been significantly greater than the children of the control group, while there is an insignificant difference between scores of posttest and follow-up in both groups.

Before performing the covariance analysis, the test assumptions were examined. The assumption of equal variances (posttest and follow-up) was examined by Leven's test. This assumption was approved in both phases of posttest ($F = 1.46, P = 0.23$) and follow-up ($F = 1.42, P = 0.24$). Homogeneity of the regression slope was not significant as well ($F = 0.37, P = 0.54$), and given the lack of significance, homogeneity between two groups was found. Also, the results of normal distribution test using Kolmogorov–Smirnov test showed that the assumption of the normal distribution of the variables' scores is established.

For testing the intervention's effect (MT) on social skills of children, the effect of pretest as an effective factor was adjusted and the results showed that the effect of

the group or intervention on social skills ($F = 32.492, P < 0.001$) has been significant [Table 3]. Therefore, by considering the means of both groups [Table 2], it can be concluded that MT has been able to increase social skills of children with autism. In order to compare the mean scores of the follow-up phase with posttest and determine the consistency of the intervention's effect, dependent *t*-test was performed, and the results are shown in Table 4.

The lack of significant difference between the mean scores of social skills in posttest and follow-up shows that the effectiveness of MT has been consistent up to the follow-up period. In other words, the superiority of the intervention group over the control group subjects has been consistent for up to 2 months after the intervention.

DISCUSSION

The goal of this research is to identify the effect of MT on social skills of children with autism. As observed, the analysis results showed that MT intervention has been able to enhance children's social skills significantly, and this is consistent with similar researches' results.^[23-39] Children with autism have difficulties with direct social engagement; hence, musical activities of the socially embedded group provide extraordinary opportunities for engaging in predictable and comfortable inter-actions with social partners.^[42]

As cited by Chou, while children with ASD acquire social communication skills through music and begin to apply them independently, music can be eliminated gradually; and then children might be able to use these acquired skills without any facilitation by music.^[60]

Musial activities in MT environment are conducted in order to create a lively and happy environment that encourages the child to establish a logical and dialectical relationship with other individuals who are engaged in the music performance process, and to perceive others' emotions better. During the performance of the music activities, the child is encouraged to react to the music and to examine and

Table 1: Mean and SD of the CARS scores of the participants

Group	n	Mean	SD
Experiment	13	33.15	1.89
Control	14	33.57	1.90

SD: Standard deviation, CARS: Childhood Autism Rating Scale

Table 2: Mean and SD of the SSRS scores of the groups

Group	Test phase	n	Mean	SD
Experiment	Pretest	13	27.69	4.76
	Posttest	13	30.55	4.00
	Follow-up	13	30.61	4.25
Control	Pretest	14	26.92	4.49
	Posttest	14	27.34	3.54
	Follow-up	14	26.85	3.82

SD: Standard deviation, SSRS: Social Skills Rating System

Table 3: Summary of covariance analysis of MT's effect on social skills of children with autism

Source	Type III sum of squares	Df	Mean square	F	Significant	Partial η^2	Observed power (a)
Corrected model	251.33	2	125.66	15.60	0.000	0.565	0.99
Intercept	135.27	1	135.27	16.79	0.000	0.412	0.97
Pretest	162.69	1	162.69	20.19	0.000	0.457	0.99
Group	68.75	1	68.75	8.536	0.005	0.262	0.80
Error	193.32	24	8.05				
Total	22,978.00	27					
Corrected total	444.66	26					

MT: Music therapy, Df: Degree of freedom

Table 4: Summary of dependent *t*-test for the SSRS scores in posttest and follow-up

Variable	D	SD	SEM	<i>t</i>	Df	Significant
Social skill	0.153	1.21	0.336	0.45	12	0.65

SSRS: Social Skills Rating System, D: Difference in means, SD: Standard deviation, SEM: Standard error mean, Df: Degree of freedom

find musical, verbal and nonverbal methods of listening to others for establishing social communication.^[32,61] Often, the children with autism show some impairment in applying nonverbal behaviors that are to regulate interaction and communication.^[62] As communications in Orff groups are in the shape of songs and chants, and this method puts emphasis on the rhythm of speech and body movement, Orff–Schulwerk method can be considered somehow nonverbal.^[55] Therefore, it can also be explained that since Orff method puts emphasis on nonverbal elements of music, it has been able to improve poor nonverbal behaviors of the children with autism and lead to enhancement of their social skills.

Another variable that explains the effectiveness of MT in social skills in children with autism is that the Children MT Program was conducted in group activities. In this regard, research has shown that peers can be considered as interventional factors for social skills improvement in children with autism.^[63] Hence, group musical environments provide opportunities for learning social skills such as imitation, turn taking, social reciprocity, joint attention, shared affect, and empathy.^[64]

On the other hand, synchronous movements during rhythmic actions or music-making as well as unison singing creates a state of social cooperation, shared purposes, and a sense of togetherness which eventually brings a social connection between individuals. In fact, music is abundant with communication factors. During MT sessions, an autistic child has to communicate with the therapist, peers, him/herself, instruments, and the music; and combination of the above communication set can help to decrease or eliminate communication and social skills' impairments of these children.

Enjoyment of musical activities can be known as another reason for the effectiveness of MT for children with autism, and its reason might be their enhanced musical perception and having no impairment in processing musical feeling.^[43,44] Despite their difficulties in recognizing emotions conveyed through speech, children with autism can recognize affective signals which are conveyed through music.^[43]

In other words, for the children like autistic ones with significant impairments in their basic innate skills in communication, musical interaction provides a

context and instrument for reciprocal interaction and development that considerably ameliorates the lack of sharing and turn-taking in play, as well as repetitive, rigid and somehow unchangeable patterns, and the need for sameness. In addition, music is predictable, structured and success-oriented; these characteristics bring a sense of security, encouraging the individual to take risks and be more spontaneous in their interactions with others.

In relation to the second hypothesis of the research, as shown in Table 4, the statistical analysis results showed that the effectiveness of MT on social skills of children with autism has been consistent for up to 2 months after the intervention period. In similar study, researchers found that the effectiveness of Music Interactive Therapy in fostering interpersonal contact and joint attention of a 36-month-old child, by facilitating playful joint action, has been consistent for up to 2 years after the intervention period.^[34]

As mentioned in introduction, the methodological weaknesses of the research literature relating MT of children with autism such as using single-subject designs, lack of control group and/or small sample size,^[42] or lacks in evidence-based assessment, follow-up, standardized protocols, RCTs^[48] had the result that we could not regard MT as a definite and established method.^[46] Nevertheless, by identifying methodological weaknesses of the research literature and trying to eliminate them (using control group, using relatively large samples, random placement and using follow-up phase), the present research has been able to clearly show positive and profound effects of MT on social skills of children with autism, and this indicates the fact that MT can be considered as a definite method at least in treating social skills of children with autism because music is a medium that involves a complex range of expressive qualities, dynamic form and dialogue, and offers a means by which some form of alternative communication can be established to help achieve engagement, interaction, and relationships.^[65,66] Making use of just one of the specific methods of MT (Orff–Schulwerk MT), and a limited sample of 7–12-year-old children with autism in low to moderate levels suggests a need for caution in generalizing the results. Therefore, it is recommended that findings of the present research should be investigated in other samples with different demographic characteristics, as well. Also, there was no possibility to compare the method used in this study (Orff–Schulwerk) with other methods and approaches for social skills of children with autism, and it is recommended that this point should be put under examination in future studies, as well.

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