


A Pilot Study on the Effects of Orff-Based Therapeutic Music in Children With Autism Spectrum Disorder

Music and Medicine
5(3) 162-168
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DOI: 10.1177/1943862113491502
mmd.sagepub.com


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Abstract

Music has been used by therapists to facilitate communicative behaviors and social engagement with individuals with autism spectrum disorder (ASD). We conducted this study to determine the effectiveness of Orff music therapy on social interaction, verbal communication, and repetitive behavior of children with autism. Five children with autism who had no previous experience in music or play therapy were recruited. Social interaction, verbal communication, and repetitive behavior of the participants were scored pre- and postintervention (Orff music therapy) using Autism Diagnostic Interview–Revised. The mean scores of social interaction were 26.60 and 14 before and after therapy, respectively ($P < .001$). The mean scores of verbal communication and repetitive behavior were reduced significantly ($P < .05$). The reduction in the scores indicated a good outcome. All participants improved significantly in their social interaction and verbal communication. The Orff music therapy also helped to decrease their repetitive behavior. Using Orff music therapy at autistic children's care centers is encouraged.

Keywords

music therapy, Orff method, autism spectrum disorder, children, Autism Diagnostic Interview–Revised (ADI-R)

Introduction

Children and adolescents with autism spectrum disorder (ASD) present with significant limitations in the development of verbal language and conventional forms of nonverbal communication such as eye contact, gesture, and body language, with a correspondingly limited development of communicative skills.¹⁻⁴ Music has been used by therapists to facilitate communicative behaviors and social engagement with these individuals.⁵⁻⁷ Music therapy also promotes the development of reciprocal, interactive communication, and play.⁸⁻¹⁰

The positive effect of music on language development of children with ASD in the previous studies was attributed to increased attention, enjoyment, and optimal social context.¹¹⁻¹³ Gross et al conducted a pilot study on 18 children aged 3.5 to 6 years with delayed speech development. Both phonological capacity and the children's understanding of speech increased under treatment as well as their cognitive structures, action patterns, and level of intelligence.¹⁴ In 2004, Whipple conducted a meta-analysis of 9 studies comparing music and no music situations in children and adolescents with autism. The results indicated that all types of music intervention have been effective on increasing the communicative behaviors including vocalization, verbalization, gestures, vocabulary comprehension, and echolalia with communicative intention.¹⁵ In another study conducted by Lim on 50 children (3-5 years old) with ASD, the

results showed that the participants significantly increased their pretest to posttest verbal and speech production in both music and speech training groups; however, low-functioning participants showed a greater improvement after the music training than after the speech training.¹⁶

There are varying approaches to music therapy in this context. Approaches that have emerged from the field of education include Orff-Schulwerk, Dalcroze Eurhythmics, and Kodaly. Another model that developed directly out of music therapy is Nordoff-Robbins.¹⁷ Nordoff-Robbins music therapy (NRMT) is an improvisation-based approach that Paul Nordoff and Clive Robbins originally developed in 1959.¹⁸ The approach involves the improvisational use of music to evoke responses, develop relationships, and address emotional, cognitive, social, and musical goal areas.¹⁹ In NRMT, clients take an active role in

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creating music together with their therapists on a variety of standard and specialized instruments, requiring no special skills or prior experience to play.¹⁸⁻²⁰ Kim et al²¹ conducted a randomized controlled study to investigate the effects of improvisational music therapy on joint attention behaviors in preschool children with autism, by comparing with playing session therapy. The results indicated a better effectiveness of improvisational music therapy on facilitating joint attention behaviors and nonverbal social communication skills in these children.

Another approach, not often cited in the literature as being used in this context, is the Orff method also known as Orff-Schulwerk (schoolwork) or Music for Children, which is an approach to music education conceived by the German composer Carl Orff.^{22,23} Orff's approach was based on his belief that the easiest method of teaching music is to draw out the child's inherent affinities for rhythm and melody and allow these to develop in natural ways, leading the child by his or her intuition from primitive to more sophisticated expression.²⁴ The Orff approach combines music, movement, drama, and speech into lessons that are similar to child's world of play. It is often called "elemental music making" because the materials needed to teach are "simple, basic, natural, and close to a child's world of thought and fantasy."²⁵

Orff accomplishes this by means of a carefully planned program, beginning with speech patterns, rhythmic movement, and 2-note tunes and then moving logically into pentatonic melody.^{22,24} The generated music is largely improvisational and uses original tonal constructions that build a sense of confidence and interest in the process of creative thinking. Music is chosen with strong nationalistic flavor, being related to folk songs and music of the child's own heritage.²⁶ The emphasis in this methodology is placed on child-centered, creative, active music making that allows children to express themselves.²⁶ Orff designed a special group of instruments, including glockenspiels, xylophones, metallophones, drums, and other percussion instruments, to fulfill the requirements of the Schulwerk courses.²² The simplicity of the technique allows all ranges of disabled children to participate in the learning process.²⁷

To the best of our knowledge, this study is one of the first to evaluate the effect of Orff-based music therapy in children with ASD. Previously, 2 studies did evaluate the Orff approach and its effects on grieving processes and a second on hospitalized children. Both of these studies had significant outcomes in symptom improvement of children with ASD.^{28,29} The purpose of this study is to determine the effectiveness of Orff music therapy on social interaction, verbal communication, and repetitive behavior of the children with autism.

Methods and Participants

In this interventional case study, 5 children with a mean age of 3.8 years with autism who had no previous experience in music or play therapy were recruited from the Behara autistic patients' research clinic at Shahid Beheshti University, Tehran, Iran. All of the participants were examined independently by an experienced child and adolescent psychiatrist and met the *Diagnostic and Statistical*

Manual of Mental Disorders (Fourth Edition [*DSM-IV*]) criteria of autistic disorder. All of the children's parents gave informed consent for their children to be involved in this study. The study has been approved by the ethics committee of Tehran's Islamic Azad University, and all the researchers of the study were committed to the Declaration of Helsinki. Since this study had no control group, investigators and patients were not blinded.

Outcome Measurement

Symptoms of the participants were scored by Autism Diagnostic Interview-Revised (ADI-R) before and after the Orff music therapy, and the results were analyzed using paired *t* test of SPSS program version 16. The level of significance was .05. The data analysis was done by an outside statistician.

The ADI-R is a structured interview conducted with the parents of individuals who have been referred for the evaluation of possible ASD and measures behavior in the areas of reciprocal social interaction, communication and language, and patterns of behavior.^{30,31} The ADI-R has also been used in some other studies as an outcome measurement.¹⁶ The interview is divided into 5 sections: opening questions, communication questions, social development and play questions, repetitive and restricted behavior questions, and questions about general behavior problems.³¹ An autism diagnosis is indicated when scores in all 3 behavioral areas exceed the specified minimum cutoff scores that are 10 for social interaction, 8 for verbal communication and language, 7 for nonverbal communication and language, and 3 for restricted and repetitive behaviors. Therefore, reduction in the scores indicated a positive and good outcome.

Orff Music Therapy Intervention

Before the Orff therapeutic music sessions began, a preliminary assessment session was held to evaluate how engagement would occur between the therapist and the participant. The session was considered independently for each child. All children were treated by the same experienced Orff music educator. The educator had completed the master's degree in psychology of exceptional children. Since there was no official training for music therapists in the University or in other educating facilities in Iran, the woman providing the interventions was trained using Orff music therapy guidelines and also using the e-courses of American Music Therapy Association. She also followed the recommendations from American Orff-Schulwerk Association.

The intervention was done in 3 phases, which took about 5 months. Each phase contained 20 sessions. Each individual participated in separate Orff music therapy sessions, 3 times a week, 20 minutes per session (Figure 1).

The Sessions and Phases of Intervention

At the beginning, there was a concentration on developing communication between the therapist and the participants to enhance their communicative skills. The music instruments

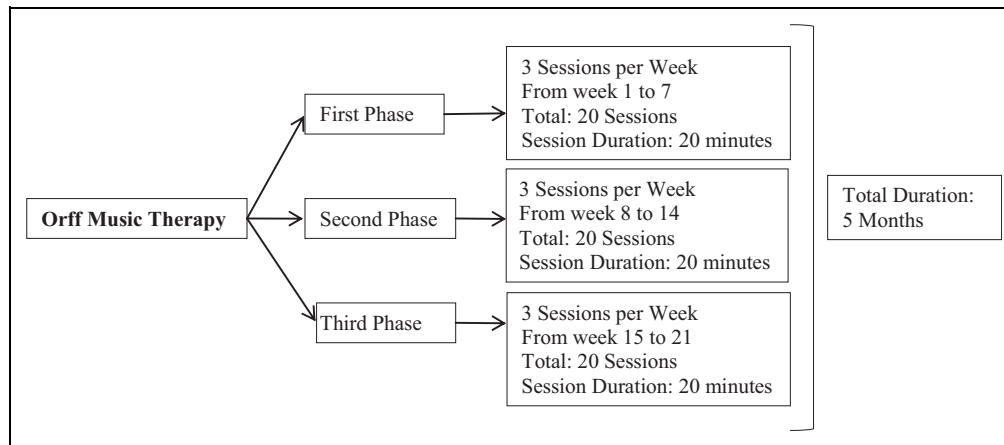


Figure 1. Orff music therapy interventions: phases' and sessions' diagram.

that were used in this study were designed for the children by Sherlock Orff in 1928,^{4,32} which included a hand drum (25 cm in diameter) and a xylophone, which were placed at 2 different sides of the office with a distance of 4 m between each other. These instruments can be played easily by children and can be played simply by beating them with a handheld mallet. They can also be easily transported and stored. On the other hand, by listening to the accompaniment of these 2 instruments, the children experience both base and treble voices at the same time. These instruments offer a sound texture of high quality and charm, with minimal instruction.

The therapeutic sessions were designed based on the child's skills and interests that were observed by the therapist at the preliminary session. The therapist initiated the therapy with simple rhythms and then developed them into more complicated ones. In this study, there was a focus on using the Orff music to develop communication between the therapist and the participant.

First Phase of the Orff Music Therapy. At the beginning of this phase, the therapist communicated with the children by focusing on music, rhythm, and also their movement. This phase included the following steps:

1. The child came to the office without the parents and listened to the music that was played live by the therapist using a piano for 5 minutes. This music was inspired by a very popular children's TV program music in Iran.
2. With the help of the guide, the child was asked to play the xylophone and the hand drum (25-cm diameter) that were placed at 2 different sides of the office with a distance of 4 m from each other. She or he was asked to walk between the instruments and beat each of them once with the mallet that the therapist gave him or her. The child was asked to repeat this task for 3 minutes without any music, and then repeat it while the therapist was playing the live music piece that she played at the first step.
3. In this step, the child was asked to play the hand drum with the mallet, first with the help of the guide for 3

minutes and without any music. And then she or he repeated the intervention for another 3 minutes while the live piano music was played by the guide.

4. The child was asked to move a stick with a ribbon (5.2×1 cm) right and left while she or he was listening to a greeting song with music for 3 minutes and then to the same greeting song without music for another 3 minutes. The greeting song that was chosen was one the most famous greeting songs in Iran, which was played in kindergartens and was also used by Iranian parents to teach their children the greeting words.

Second Phase. This phase included the following steps:

1. The child was asked to go across the 2 music instruments including the hand drum and xylophone that were used in the first phase, for 3 minutes while she or he was listening to a recorded famous Persian children's song ("My White Ball") without the music and also performing the task for another 3 minutes with the same song with music. In this step, the child got assistance from the guide.
2. While the child stood in front of the guide, she or he was asked to hold the therapist's hands and to shake them to the right and left for 3 minutes while playing the recorded famous Persian children's song ("My White Ball") with music, and for another 3 minutes while playing the song without music.
3. The child was asked to move a 50-cm long stick with two 5.2×1 -cm ribbons on to the right and left following the therapist, for 3 minutes with listening to the same greeting song that she or he heard in the last phase with music and for another 3 minutes without music. In this phase, the child was asked to repeat the greeting words that she or he heard in the played song. The purpose of this task was to focus on improving both the communication and language skills of the child.

Table 1. Preinterventional and Postinterventional (Orff Music Therapy) ADI-R Scores of the Participants.

Participant	Before Orff Music Therapy			After Orff Music Therapy		
	Social Interaction	Verbal Communication	Repetitive Behavior	Social Interaction	Verbal Communication	Repetitive Behavior
1	20	16	10	13	12	7
2	20	14	10	12	10	5
3	21	12	7	13	9	6
4	22	12	10	18	8	8
5	20	22	11	14	13	9

Abbreviation: ADI-R, Autism Diagnostic Interview–Revised.

Third Phase. The third phase included the following steps:

1. The child played the music instruments that were used in the previous sessions for 3 minutes with, and for another 3 minutes without, the live piano music that the guide was playing.
2. While the child stood in front of the therapist, she or he was asked to follow the movement of the guide’s hands and shake the guide’s hands for 3 minutes while “My White Ball” was played and for another 3 minutes while the same song was playing with music. In this session, the child was asked to repeat the greeting words after she or he listened to the same greeting song in the previous phase.
3. The child was asked to play the drum for 3 minutes without the music and then for another 3 minutes with the music while the child was singing a famous Persian children’ song about pear. Since pear is one of the most favored fruits among Iranians, it was a tangible object for the children to relate with. Also, this song is being repetitively played in kindergartens in Iran.
4. The child was asked to focus on playing the xylophone with the assistance of the guide. The purpose of this step was to observe the child and evaluate how she or he communicates with the guide and plays the instrument.

The Participants

The characteristics of the participants before and after the Orff therapeutic music are mentioned in the following. Also, the pre- and postinterventional (Orff music therapy) ADI-R scores for social interaction, verbal communication, and restrictive and repetitive behavior of each participant are shown in Table 1.

Aria is a 3-year-2-month-old boy without any physiological problem and no family history of psychological diseases such as autism or schizophrenia, but he had the following behavioral characteristics. At the first session, he had urinary incontinuity. He had poor eye contact with severe repetitive behavior such as rubbing his ears with his hands most of the time. When stopped, he would hit his head on the floor. He was interested in climbing onto the chairs and tables and jumping off them. At the first session of Orff therapeutic music, the child went to the corner of the room and rubbed his ears; stopping him resulted in

short crying spells, and then he repeated this behavior. In the first phase, he did not obey at all and he was throwing things, such as the playing mallet, away. In the second phase, he was more attentive to the therapist’s lead. In this phase, he engaged with the therapist and seemed more interested in music. He was more receptive and no longer presented with urinary incontinuity. In the third phase of the study, his speech and verbal communication were significantly improved and he was able to repeat the greeting song words. He also started communicating with the therapist by holding her hand and following her moves as he was asked to. His ADI-R scores for all the evaluated variables were reduced significantly after the Orff music therapy, showing improvement in his verbal and social communications and also less repetitive behaviors (Table 1).

Mani is a 5-year-old overweight boy without any biological disorders, but was agitated at the first session attended. Based on his parents’ observations, his heavy weight was a barrier to him as he was not able to play easily and had reportedly poor communication with other children. He was constantly holding a loose string in his hands and was playing with it repetitively all the time. He would repeat television advertisements and would make bizarre noises such as a high-pitched *brrrr* or a knock-knock noise repetitively. However, he was interested in music from the beginning and responded to the rhythm by focusing on and listening to the music when it was played by the guide. However, he reacted to the loud sounds by sealing his ears and running around the room. In the first phase of the study, he made rhythmic movements fluidly, but in the second phase, he was not able to sing the song’s words and his verbal communication was poor. In the third phase, he made eye contact with the guide and he played the music instruments easily. His verbal communication appeared to be improving. He could repeat the word *hello* after he was greeted by the guide, but he was still not able to use other words of the played greeting song. His ADI-R scores for all the evaluated variables were reduced significantly after the Orff therapeutic music (Table 1).

Nima is a 3-year-1-month-old boy who appeared agitated in the first session of the study, did not respond to the guide, and repetitively said, “I want to be with my mother,” even in the presence of his parents. He did not appear to have control of his hands, and he was not able to play the musical instruments. In the first and second phases of Orff therapeutic music sessions, he began to achieve control of his hands. He could hold the mallet himself and play with the instruments. In the third phase, his social interaction with the guide and his verbal

Table 2. Pre- and Posttherapy Mean Scores of Social Interaction and t-Test Analysis.

Social Interaction	Mean Scores	N	Standard Deviation	Standard Error Mean	df	t	Significance
Pretest	20.6000	5	0.89443	0.40000	4	8.820	.001
Posttest	14.0000	5	2.34521	1.04881			

Table 3. Pre- and Posttherapy Mean Scores of Verbal Communication and t-Test Analysis.

Verbal Communication	Mean Scores	N	Standard Deviation	Standard Error Mean	df	t	Significance
Pretest	15.2000	5	4.14729	1.85472	4	7.7644	.011
Posttest	10.4000	5	2.07364	0.92736			

Table 4. Pre- and Posttherapy Mean Scores of Repetitive Behavior and t-Test Analysis.

Repetitive Behavior	Mean	N	Standard Deviation	Standard Error Mean	df	t	Significance
Pretest	9.6000	5	1.51658	0.67823	4	3.833	.019
Posttest	7.0000	5	1.58114	0.70711			

communication were improved. He repeated the greeting words. His ADI-R scores for all the evaluated variables were reduced significantly after the therapeutic Orff music sessions (Table 1).

Omid is a 3-year-old boy with severe repetitive behavior involving his hands. Omid has the habit of constantly rubbing his hands together after exploring and touching everything in the room such as the music instruments, the camera for recording the sessions, and even the doorknob. He was running all over the room and appeared to have severe problems communicating with the outside world. He was also very aggressive. He was knocking on the door from inside and was hitting the therapist when she was trying to get close to him. In the first phase of the study, his symptoms were severe, and there was concern that even the therapy would be too threatening for him. He was not able to play the music instruments, and he was throwing away the objects such as the mallet repetitively. He was resisting communication with the therapist. At the end of second phase, his repetitive acts were diminishing, and he seemed interested in playing the music instruments. In the third phase of the therapy, he started to communicate with the therapist verbally with simple and single words, and he showed increasing eye contact. His ADI-R scores for all the evaluated variables were reduced significantly after the Orff therapeutic music (Table 1).

Saman is a 4-year-9-month-old boy who appeared agitated and sensitive at the first session of the study and was crying most of the time, as he was distracted and seemingly scared. After passing 8 sessions in the first phase, he was able to go to the music room without his parents, and he became more able to concentrate on the music. In the second phase, he seemed to be enjoying the sessions and was interested in playing music. In the third phase of the study, he was able to play with the instruments by himself. He played the xylophone in an explorative way and did not appear to need assistance from the therapist.

His ADI-R scores for all the evaluated variables were reduced significantly after the Orff therapeutic music (Table 1).

The mean ADI-R scores of all the evaluated variables were reduced significantly. The results are shown in Tables 2, 3, and 4. The reduction in the ADI-R score was determining a good improvement in the course of the disease.

Discussion

There are a variety of creative methods that may be available, which might improve the verbal and communicative skills of children with ASD. The purpose of this case study was to determine the effectiveness of Orff therapeutic music on social interaction, verbal communication, and repetitive behavior of children with ASD. The results of the study revealed that all participants improved significantly in their social interaction and in their verbal communication based on the ADI-R. The Orff therapeutic music program also seemed to help them decrease their repetitive behaviors significantly. Results of the present study are consistent with an overview of Orff music therapy that Melanie Voigt published in 2003.³³ She revealed that the Orff music increases the communication between the patients and the therapist and in addition helps the children with autism to improve their verbal communication and social interaction skills.³³

A number of reviews investigating the use of music in individuals with autism have previously been conducted.^{15,34,35} In a Cochrane report by Gold et al, 3 studies were selected, which compared the use of music with nonmusic conditions in children less than 10 years of age, and significant results for gestural and verbal communicative skills during a music condition were reported, which are consistent with the results of this study that compared music and no music conditions in children with autism.³⁵ Although other methods of music therapy reportedly also had effects on child communication skills, the results of the present study illustrated the significant effects

of Orff therapeutic music on improving the symptoms of the individuals with ASD by emphasizing on child-centered, creative, and active music making that allows children to express themselves. Also the simplicity of this method and the availability of needed musical instruments make it one of the most suitable methods of music therapy for individuals with ASD.

The limitations of this study include small sample size and the lack of a control group. The reason for this limitation was that most of the parents were not willing to let their child participate in the study because of its long duration. Another limitation was that there is no official training for music therapists in the university or in other educating facilities in Iran. Therefore, the guide trained with all of the available facilities in our country and received assistance through using the guidelines and e-courses from certified music associations. The authors believe that although music intervention has been used to facilitate social, behavioral, and communication skills, further research is required to establish the contribution of these interventions to the maintenance and generalization of these skills. The direction of future research should focus on replicating the current pilot investigation with larger samples to uncover whether similar encouraging results can be generalized beyond what occurred in this study.

The findings of this study suggest that Orff music therapy would be a vital tool to improve social interaction and verbal communication skills in the children with autism, which in turn will help them decrease their restrictive and repetitive behaviors. Therefore, using Orff music therapy in ASD children's care centers by a board-certified music therapist and also by those who train teachers and caregivers of these individuals for using music as a communicative tool is encouraged.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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