Research Article

The inactive music therapy and reduction of the signs of the autism spectrum disorders

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ABSTRACT

The current research aimed to examine the effectiveness of music therapy in reducing the signs of autism disorder, including stereotyped behaviors and impaired communication in children with autism spectrum disorder. The research method was a quasi-experimental design with pre- and post-test and control groups. As the population of the research was a clinical one and because of the limited number of patients, available sampling method was used. The participants included 50 children with autism spectrum disorder ranging from mild to moderate. They were randomly assigned into control and treatment groups each including 25 children. Data were gathered using Garz test 1994 and were analyzed using the covariance method. The findings showed that music therapy may lead to increased communication and language skills and decreased stereotyped behaviors. Thus, music therapy is an effective treatment in reducing signs of children with autism spectrum disorders.
Keywords: autism spectrum disorder, music therapy, communication skills, stereotyped behaviors.
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INTRODUCTION

Autism is a disorder which interrupts development of one's social and communicationl skills. The illness indicates a developmental disorder which is specified with deficits in communicational and verbal behaviors and presence of abnormal patterns in both situations. The disorder has different signs in different persons and the term 'autism spectrum disorder' (ASD) is used to distinguish it in differential diagnosis. The reason is that there are categories of people that have autism but there is not any trace of other problems and signs, also they have similar cognitive performance with normal population and yet they have diagnostical signs of autism. Therefore, the term autism spectrum disorders is used for these disorders instead of the autism label. This classification leads to expelling autism from learning disability issue and taking it into account as a different disorder because people with autism were not subjects of studies before then as those who can have normal intellectual performance. Today, it is easy for us to believe that people with autism may have average and/or even higher than average intelligence (Samadi, 2013).

Behavior of autistic children is often problematic for parents and therapists and it could be inappropriate, repetitive, aggressive and dangerous. It may also contain frequent shaking hands, continuous movement of the fingers, shaking back and forth, putting objects in the mouth or banging their head against objects. Children with autism may have self-injurious behavior, such as damage to eyes or have a habit of biting their own hands. They also may not have any reaction to pain or burning. Though the reasons of such behavior is not exactly specified and it is very complicated, some experts believe that impairment in the five senses of the children may lead to exhibition of these behaviors and that the child wants to satisfy these feeling needs by doing such behavior (PourMohamadreza Tajrishi, 2013). The prominent characteristics of autistics are delay and destruction of social, verbal and communication functions as well as presence of limited repetitive behaviors or thoughts. These children do not have clear physical demonstrations and

only in some of them there may be ear malformation (Solarki, 2009). Intellectual evaluations of autistic children show that many of those children have mental traumas to some extent. Some may exhibit normal abilities others may specifically exhibit weakness and insufficiency, almost 75 percent of these children show intellectual ability as mental retardation, among them 30 percent have mild to average retardation and around 45-50 percent have severe to profound mental retardation (Rafei, 2006). In one of their most recent studies, Wang et al. (2009) investigated the common genetic factors in autism spectrum disorder across a group comprising of 780 families (3101 people) with children with such disorders (Samadi, 2011).

Today, various therapeutic methods such as Early Intervention, Applied Behavior Analysis, Social Stories, Sensory Integration, Art Therapy, Picture Exchange Communication System, TEACCH, Pharmacotherapy (risperidone, olanzapine) and Music Therapy are used to work with autistic children (Samadi, 2013). Currently, music is a selective method in treatment of autistics' behavior. Due to very limited verbal communication and stereotypes, autistic children respond to the common psychiatric treatments very hard. Music with a varying world of rhythms as an influential method and by creating non-verbal, rhythmic and musical relations can establish relationship with autistic children very well and provoke their responds. When in the initial stages a sound is produced in a formation of treble sound, both Heschls Gyrus and Planum Polar areas are activated, when the treble sound takes a more complicated form of melody then other areas, i.e. Superior Temporal Gyrus and Planum Polar areas, are turned on (Patterson, Johnsord, & Uppenkamp, 2002). Basically, combination of notes, i.e. process of the melody, occurs in the inner areas and around the auditory cortex and motor areas, while the more complicated patterns of these combinations of distributed networks are analyzed in the anterior portion of the temporal and the frontal lobes (Popescu, Otuska, & Loannides, 2004). According to the evidence, the right hemisphere is involved in processing melody (Johnsrude, Pnhune, & Zatorre, 2000; Zattorre & Belin, 2001), while the left hemisphere is involved in processing rhythm (Polk & Kertez, 1993). Prefrontal is an area related to auditory cortex during music process which is also involved in the formation and interpretation of memory (Zatorre, 2000). Over the past years, neurological studies have shown that music can be a valuable tool for emotional arousal (Koelsch, 2005). Penkins, Aube, Peretz, Barrios, Armony, and Concha (2014) addressed the difference between the sound of phone and music and showed that the music impacts on the superior temporal gyrus. In a study, Lars, Lundqvist, Andersson, and Viding (2009) examined the impacts of acoustic music on children with autism spectrum disorder. The participants were randomly assigned to two groups and were put into a pilot assessment. The first group was under acoustic music therapy for 5 weeks in 10-20 minutes' sessions and the second group received the same treatment in the next 5 weeks. The results showed that the acoustic music decreased self-injury, stereotypes and destructive behaviors among participants. In their study on children with autism, Kate Simpson, Keen, and Janeen Lamp (2013) investigated the impact of music on learning output. In a randomized controlled cross-section study, 22 children (mean age 9.5) participated in reading and speaking conditions in a computer-based intervention. The findings showed that autistic children were more tended to read in singing condition in compared to task condition. In a study, Mateos, Moreno, Lidia Atencia, and Dona (2013) examined the effectiveness of music therapy on the combination of autistic adults' dance moves. The findings showed that if the music therapy was continuous and regular, it could be effective in improvement of the autistic signs of adults with severe autism. According to Maria (2015), the techniques of art and music therapy have considerable impact on education of children with special problems. Artur and Jaschke (2014) indicated that music therapy as a reversed system has impact on music comprehension in autism spectrum disorder. Group music training is effective in improvement of verbal and non-verbal communication and motor skills (CHAYNGH & GILAS, 2010). Unfortunately, there are few studies addressing effectiveness of music therapy on treatment of prominent signs of autism; therefore, the goal of the current study is to examine the effectiveness of inactive music therapy in reduction of stereotypes and communicational deficits of children with autism spectrum disorder.

Statistical population and sample

The statistical population of the research is consisted of all children with autism spectrum disorders in 2014 in Tabriz. Based on the inquiries from the Autism Society, there are 160 children with autism spectrum disorder in Tabriz. As the population of the research was a clinical one and because of the limited number of patients, the available sampling method was used. The participants included 50 autistic children and they were randomly assigned into treatment and control groups each comprising 25 children.

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Instruments

Based on American Autism Association (1994) and American Psychiatrists Association (1999), the Garz test was designed with rely on DSM-IV criteria. The test has been examined on a sample consisted of 1107 autistics from 48 states of USA, Canada, Puerto Rico and Colombia. Their subjects were selected in different ways and the subjects of the validation group were representative of different stratums of society, which means they were from many geographical, cultural, and racial backgrounds. The standard and reliability of the test were determined by Cronbach's alpha. Previous studies have shown the coefficients of .90 for stereotypes, .89 for communication which is close to .9, .93 for social interaction, .88 for developmental disorders and .96 for symptomatology and its validity has been approved through comparison with other evaluation and screening systems such as the ranking derived from ABC (related to the autism assessment instruments for the training designs provided by Eric, Crack, & Almond, 1993). This test helps to identify individuals with autism. The Garz test is suitable for people aged from 3 to 22 and can be filled out by experts or parents in school or home. Garz includes 4 subscales each one including 14 items. The first subscale is stereotypes (items 1-14), the second is communication (items 15-28), the third is social interaction (items 29-42), and the fourth is developmental disorder (items 43-56). The test has been translated in Persian by Ahmadi, Safari, Hematian, and Khalil at Isfahan autism center and its psychometric measurements have been obtained in Iranian population norms among 100 (19 girls and 81 boys) children aged 3 to 18 with the mean age 8.28 (SD = 3.5). The responses to questions are based on a 4-point Likert scale from 0 = never to 3 = too often. In Iranian population, the autism 85-higher (the subscale 7 or higher) is the possibility of severe autism, the autism 53-84 (the subscales 2-7) is the possibility of moderate autism, and the autism 52-lower (the subscale one) is the possibility of low autism. Its reliability has been calculated .92 using Cronbach's alpha and the correlation coefficient with 1-year interval was .88. Also, the reliability among the evaluators was .71. These results show that Garz is stable at every time and it can be used as a diagnostical screening instrument (Giliam, 2012).

Music therapy package

This package was provided by Hatef Dustdar (2009) which was performed during each 20 sessions.

Session 1: Familiarization of children with two main factors of movement, i.e. 1- space and -2 weight;

Session 2: Familiarization of children with two factors 1- time and 2- streaming;

Session 3: main purpose: auditory comprehension and secondary purpose: strengthening identifying organs, following orders and....

Session 4: main purpose: auditory comprehension and secondary purpose: strengthening identifying organs, following orders...

Session 5: main purpose: auditory discrimination and secondary purpose: distinguishing sounds.

Session 6: main purpose: auditory discrimination and secondary purpose: teaching rhythm through body movements.

Session 7: main purpose: auditory discrimination, auditory memory and secondary purpose: teaching rhythm through body movements.

Session 8: main purpose: auditory discrimination, auditory comprehension and secondary purpose: teaching rhythm through body movements.

Session 9: main purpose: auditory association and secondary purpose: teaching rhythm and rhythmic comprehension.

Session 10: purpose: auditory memory and secondary purpose: teaching rhythm and rhythmic comprehension.

Session 11: main purpose: visual comprehension: auditory memory, visual precision and secondary purpose: teaching rhythm, strengthening imitation of people with intellectual disability.

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Session 12: main purpose: strengthening gross movement and secondary purpose: physical co-ordination and the perception of rhythm.

Session 13: main purpose: strengthening gross movement and secondary purpose: physical co-ordination and the perception of rhythm.

Session 14: strengthening gross movement and secondary purpose: physical co-ordination and the perception of rhythm.

Session 15: strengthening visual perception, eye-hand match and secondary purpose: the perception of rhythm.

Session 16: strengthening visual perception, eye-hand match, and lateralization superiority (strengthening the concept of left and right) and secondary purpose: the perception of rhythm.

Session 17: strengthening visual perception, eye-hand match, and lateralization superiority (strengthening the concept of left and right) and secondary purpose: the perception of rhythm.

Sessions 18: main purpose: strengthening visual perception, eye-hand match, strengthening eye movement and secondary purpose: the perception of rhythm.

Session 19: main purpose: strengthening visual perception, eye-hand match, strengthening eye movement and secondary purpose: the perception of rhythm.

Session 20: main purpose: motor skills (movement of the feet and hands). Secondary purpose: the perception of rhythm.

Findings

The results of the data description and then the data analyses are presented below.

Table 1. Covariance analysis for testing regression slope

Variables		Sum of squares	Df	Mean of squares	f coefficient	Sig.
Autism signs	Groups	3709.567	1	3709.567	14.926	.000
	Pretest	4.681	1	4.681	.019	.891
	group×pretest	804.384	1	804.384	3.237	.079
	Error	10935.219	44	248.528	-	-
Stereotypes	Groups	70.736	1	70.736	2.339	.133
	Pretest	320.593	1	320.593	10.601	.002
	group×pretest	66.344	1	66.344	2.194	.145
	Error	1391.069	46	30.241	-	-
Communicational ability	Groups	8.573	1	8.573	.15	.701
	Pretest	532.041	1	532.041	9.324	.004
	group×pretest	140.948	1	140.948	2.47	.125
	Error	1997.192	3	57.063	-	-

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Table 2. Mean and standard deviation of autism signs, stereotypes, communicational ability by pretest and posttest

Variables	Stages	Pretest		Posttest	
		Mean	Sd	Mean	Sd
Autism signs	Treatment group	60.36	20.75829	18.88	15.44701
	Control	58	11.17288	62.6522	17.29059
Stereotypes	Treatment group	15.28	6.47122	3.92	3.37787
	Control	17.04	7.39640	16.24	8.03783
Communicational ability	Treatment group	22.88	8.15639	8.32	6.95653
	Control	21.7895	9.65274	22.0556	11.91377

According to the above table, the mean of autism signs in pretest stage for treatment group and control group is 60.36 and 58, respectively, and their scores in posttest stage without controlling for the interfering variable are 18.8 for treatment and 62.65 for control groups. In the same manner, the mean score of stereotypes in pretest stage is 15.28 for treatment and 17.04 for control groups and their corresponding scores in the posttest stage without controlling for interfering variable are 3.92 and 16.24 for treatment and control groups, respectively. The mean score of communication in pretest is 22.88 for treatment and 21.78 for control groups and their score without controlling for interfering variable is 8.32 and 22.02, respectively.

Table 3. The results of covariance analysis of both groups for scores of autism signs, stereotypes and communicational ability

Variables		Sum of squares	Df	Mean of squares	f coefficient	Sig.	Squares	Statistical power
Autism signs	Groups	23231.733	1	23231.733	89.051	0	.664	1
	Pretest	564.254	1	564.254	2.163	.148	.046	.32
	Error	11739.603	45	269.88	-	-	-	-
Stereotypes	Groups	1659.991	1	1659.991	53.533	0	.532	1
	Pretest	366.986	1	366.986	11.835	.001	.201	.921
	Error	1457.414	47	31.009	-	-	-	-
Communicational ability	Groups	1678.750	1	1678.750	28.265	0	.64	.999
	Pretest	463.657	1	463.657	7.807	.058	.178	.776
	Error	2138.14	36	59.393	-	-	-	-

The results of covariance show that there is a significant difference between scores of autism signs across the two groups, 66 percent of variance of autism signs is related to group membership and there is a significant difference between stereotypes across the two groups of treatment and control and 53 percent of the variance of stereotypes score is related to the group membership. In the same manner, there is significant difference between communication scores of treatment and control groups and 64 percent of their variance is related to the group membership. The statistical power is .99 which means the precision of the analysis in discovering significant differences is 99 percent.

Discussion and conclusion

The first finding of the research indicated that music therapy has an impact on signs of children with autism. These results are consisted with those of Mateos et al. (2013) that showed that if music therapy is continuous it will be effective in reducing autism signs. Compared with other therapies, music therapy has better effects among autistic children as the children exhibit more willingness and interest toward this therapeutic method and even their families welcome the treatment very well and urge on keeping it on. Although all autistics do not have all the musical skills, but they do like the repetition of music songs. Also, music is something through which they can join others and enjoy that even though the 'others' would be only one person (Ganji, 2009). The techniques of music therapy cause combination and integration of different sensory experiences and suitable motor reactions or responses. Music therapy causes not only the child establish unity in receiving information related to sensations but also, due to having multisensory experiences, leads the child to establish some kind of integration within sensory inputs. For example, children with difficulties in auditory sensation can be treated through auditory distinguishing practices (e.g. the child closes his/her eyes and by hearing different sounds such as sounds of cars, animals, outside people and like that tries to distinguish them). In the same manner, visual, sensory, and other disorders can also be cured through music therapy. Listening music may change child's mood and behavior. It can turn child's lethargy and apathy into passion or have quite the opposite effect. Music with quite different emotional loads may associate with nervous system and affect it. Em Freak believes that music is effective in language learning, attention, auditory sensitivity, special abilities and even enuresis among autistic children (Rafei, 2006).

The second finding of the research revealed that the music therapy may reduce stereotypes in autistic children, which is consistent with results of Lars et al. (2009). Because of special nature, music therapy atmosphere provides child with opportunities so that he/she indispensably avoid stereotypes while doing sensory-perceptual, motor activities and his/her own specific interests. The more is interesting musical activities to child and give him more positive excitement, the more his/her stereotypes will be decreased and furthermore autistic children can take steps to slow monotone speech by singing and coordinating with the rhythm of their own singing. Singing may give some expressive, non-verbal elements such as tone change and continuous reading to the sound; therefore, it is a great companionship for speech. The results of the current research indicated that music therapy tended to decrease behavioral properties of messy and defective motor and perceptual limbs and increase positive characteristics and motor--perceptual abilities among autistics. Moving with music also helps patients to reinforce the understanding of the auditory and touch-visual sense and to understand the distinction between self and non-self. In addition, singings along with movement are useful in helping to develop coordination of motor-auditory sense and further lead to reinforcement of correct mental awareness and imagery of the body. The techniques of music therapy, from basic to complicated levels, lead the person to feel his/her own gradual progress and the uniform and stereotyped patterns of behavior disappear. In addition, these techniques also allow the combination and integration of different sensory experiences and allow for right motor responses or reactions (Rafei, 2006).

The third finding of the research implied that music therapy will increase communicational capacity of autistic children. This finding is consisted with those of Simpson et al. (2013) and Chayngh and Gilas (2010). It appears that the techniques of music therapy facilitate the process of vocal speech production and activate mental processes in conceptualization, symbolization, and comprehension. DeLong (1978) and Taught (1980) stated that only the left hemisphere, which is associated with speech and language, is damaged in autistics. They considered musical skills as related to the right hemisphere and identified this as a justification for autistics' uncommon interest in music and argued that, during music therapy programs, the right hemisphere engages the left one in a nervous process and hereby leads to developed speech in autistics. In the current research, it became clear that by singing (though these singings

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were poor at the first) after a while, the children's verbal communication improved and even they kept on singing when the music was stopped, thus the child was able to take long steps in order to decrease uniform speech.

Therefore, the results of the current study showed that music therapy establishes non-verbal, rhythmic communications better than the other common therapies, as in this method the child pays more attention to the sound and tries to enjoy music as an instrument for establishing reciprocal relationship. Indeed, these children prefer musical stimuli to the visual and aural stimuli. Musical activities are effective boosters in creating reciprocal and conscious responses of autistic children such as increased speech, oral response, increased eye-contact, environmental awareness and appropriate social behavior. Music therapy also affects limbic system and amygdala (centers of emotions) which are the main problem of autistic children, and stimulate them so that autistic children respond to external emotions (Rafei, 2006).

In the current research, we were faced with limitations like age, the type of inactive music which reduce the generalization of the results. It is suggested that researchers examine the effectiveness of varied music therapies including music therapy along with autistic children playing musical instruments and compare their results with the results of the current study.

Acknowledgement

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