Research Paper:
The Effects of Children's Pedagogical Songs on Social, Linguistic, and Written Skills Development in Children With Autism Spectrum Disorders

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ABSTRACT

Background: Children with Autism Spectrum Disorder (ASD) lack sufficient language and writing abilities and experience delays in the development of their social activities. Thus, this study aimed at determining the effects of children's pedagogical songs on the development of social as well as writing and speaking abilities in children with ASD.

Methods: This was a quasi-experimental study with a pre-test, post-test and a control group design. The study sample consisted of 30 children aged 8-10 years with ASD referring to the Welfare Organization in 2018. The necessary data were collected by the Vineland Social Maturity Scale (VSMS) and the Test of Language Development (TOLD). The collected data were analyzed by descriptive statistics as well as Multivariate Analysis of Covariance (MANCOVA) and one-way Analysis of Covariance (ANCOVA) in Manhwa Text using SPSS.

Results: The present research results suggested that rhythmic poetry training was effective on the development of social activities (P<0.01), linguistic skills (P<0.01), and writing abilities (P<0.05) in the explored subjects.

Conclusion: Based on the obtained results, poetry therapy increased using appropriate language skills, social skills, and written activities in children with ASD. We suggest implementing this method, as an effective intervention, in schools, health centers, and speech therapy centers for children with ASD.

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Highlights

● Rhythmic poetry training was effective in the development of social activities in children with Autism Spectrum Disorder (ASD).

● Rhythmic poetry training was effective in the development of linguistic skills in children with ASD.

● Rhythmic poetry training was effective in the development of writing abilities in children with ASD.

Plain Language Summary

A growing number of questionable scientific treatments are available for children with Autism Spectrum Disorder (ASD); however, intervention programs using the principles of pedagogical songs are recognized as the treatment of choice. This study aimed to investigate the effects of children's pedagogical songs on the development of social, linguistic, and written activities in children with ASD. The collected results revealed that rhythmic poetry training was effective in the development of social activities, linguistic skills, and writing abilities among these children.

1. Introduction

Autism Spectrum Disorder (ASD) is a pervasive developmental condition that begins before 6 months of age and always manifests before 4 years of age. Due to the neurological origins of autism, brain disorders affect the ability to communicating, as well as relating to others and responding to the external environment (Mohammad Zaheri et sl., 2013). ASDs are a heterogeneous set of developmental neurological conditions, characterized by deficits in social communication and interactions as well as stereotyped behaviors. According to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5), children with ASD are diagnosed with such major symptoms as, impaired reciprocal social interaction, restricted, repetitive, and stereotyped patterns of behaviors or interests, and impaired communication (Sadok et al., 2015).

Autism affects three major behavioral domains, including social interaction, verbal communication (language), and writing activities. Therefore, among different groups of children with special needs, children with developmental disorders, including those with ASD encounter numerous problems in language, social relations, behavioral patterns, and written activities (Prinz, Roberts & Hantman 2000).

One of the most consistent social deficits in children with ASD is the lack of non-verbal social gestures, such as pointing, showing, and giving. Children with ASD also face multiple issues concerning social skills. Social skills significantly impact individuals' success and life; accordingly, these children experience significant difficulties in learning and applying such skills. Social skills include behaviors that assist an individual in effectively interact with others and avoid undesired responses (Rangani et al., 2015). Children with ASD belong to the group of those with Pervasive Developmental Disorders (PDD). PDD is characterized by sustained impairment in interactive social skills and limited repetitive communication patterns. The disease onset is from birth to about 3 years of age (Sadock & Sadock 2007). Studies revealed that children with ASD encounter multiple disorders in social interaction (Salmani et al, 20O6).

Children with ASD often have problems in initiating, organizing, and maintaining social relationships; they often face limitations in social communication, and attempt to socialize in rigid manners. These problems should not be viewed as a lack of interest in or reluctance to socialize; they rather result from their inability to use appropriate social, communication, and language skills. The main problem of children with ASD is social interaction disorder, i.e. related to their inability to use social skills (Sullivan, Winner & Hopfield 1995). A child with ASD may be isolated, become self-absorbed, or refuse help from others while performing activities (Salmani et al, 2006). Therefore, as the prevalence of children with ASD has increased, it is important to find a cost-effective therapy for the development of their language and social skills. In this respect, poem therapy a treatment that has not received significant attention.

Children acquire language through social interaction, i.e. tools only peculiar to humans; they ensure communication with others and facilitate learning about

the world (Kuhl 2007). Language, as a great function of the human mind, has been the subject of extensive scientific research. It is among the most high-level cognitive activities in the human brain. It is also regarded as one of the most effective instruments for expressing thoughts and emotions. Delay in language development is among the most frequent application reasons and distinctive features of cases diagnosed with ASD. ASD negatively affects language skills and social interactions. Thus, the linguistic and communication characteristics of this group of disorders must be studied by language and communication experts (Sobhani & Muuhami 2013). Research has revealed that a major characteristic of children with ASD is lacking the right verbal ability to speak properly. Besides, the linguistic domains of these children, mainly pragmatics and semantics, are problematic (Sobhani & Muuhami 2013). A problem observed in children with ASD is encountering a delayed onset of speech or problems in speech development (Miri, Sharifi & Staj 1997). Thus, it is essential to explore the linguistic and speech aspects of this disorder and find a solution for improving such skills in children with ASD.

Furthermore, the main skills in academic performance include basic academic skills, including reading, writing, and mathematics. These skills should be included in the curricula of numerous students with ASD. Moreover, writing is the most complex and excellent skill that aims to transfer thoughts, feelings, and emotions to the reader (Janmohammadi 2015). Children with ASD have difficulty in abstract thinking, social cognition, communication, and attention; thus, providing an intervention to help the development of these skills can be expected. Such approaches could help to develop writing skills, and affect the development of social activities and language skills in these children.

The actual number of psychotherapies and methods remains unclear. Some of these interventions have gained popularity; however, other treatment methods, like art therapy and its various methods remain unintroduced. Artistic methods, such as painting, music, theater, storytelling, photography, sculpturing, and poetry greatly impact individuals and can present a healing effect. Pedagogical songs are a group of creative art therapies that use poetry and other stimulating forms of literature to achieve therapeutic goals and personal growth (National Association for Poetry Therapy, 1993). Some scholars have studied poetry and rhythmic games in terms of their effects on different aspects of social life; others have studied the effect of poetry on emotional development or children's psychomotor and cognitive development.

Schmidt Peters argued that pedagogical songs are effective in reducing depression (Mohammad Zaheri et al., 2013). However, the effect of using rhythmic speech (poems), as a game, on the social and linguistic skills of children, especially those with developmental and neurodevelopmental disabilities, like ASD has not been significantly considered. Given the importance of the subject and the lack of sufficient studies in this field, it seems necessary to conduct surveys with appropriate interventions for developing social activities and language skills in children with ASD. Therefore, this study aimed to investigate the effects of pedagogical songs on the development of social skills and linguistic and written activities among children with ASD.

2. Materials and Methods

This was a quasi-experimental study with a Pre-test-Post-test and a control group design. The statistical population of the study included all children with ASD (aged 8-10 years) referring to the Welfare Organization, Exceptional Children's Schools, as well as healthcare centers and clinics of Ardabil City, Iran from March to September 2018. A total of 30 participants were selected by convenience sampling method (considering population heterogeneity, the distribution of traits in the population, & available facilities) and randomly assigned to the experimental and control groups (n=15/group).

The main study inclusion criteria are were as follows: children with ASD in the age range of 8 to 10 years; a definitive diagnosis of ASD per Gilliam Autism Rating Scale (GARS) and psychiatrist approval; the lack of oral and maxillofacial disorders; the lack of anatomical disorders of speech organs; the absence of oral apraxia; the absence of audiovisual problems and cranial nerve disorders; the lack of depression, and the parents' satisfaction with their children's participation in the research. Besides, the language environment (the language they use in speaking with another individual) of all research participants was Persian.

The research exclusion criteria were the occurrence of depression, aggression, and severe self-injury in the study participants during the study, and non-participation in any training session (Table 1) The following instruments were employed in the present study:

Gilliam Autism Rating Scale (GARS-2): The GARS-2 is a 42-item norm-referenced screening instrument. It is used for assessing individuals ages 3-22 years with severe behavioral problems that may be indicative of autism. Its purpose is to assist professionals to identify

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ASD. The GARS is based on the definitions presented by the American Autism Society (1994), the American Psychological Association (APA), and the DSM-5. Parents and professionals can complete it at school or at home.

The questionnaire consists of 3 subscales (stereotyped behaviors, communication, & social interaction); it also contains a developmental history. Each subscale consists of 14 statements with a score of 0-3 for each question. The first subscale describes repetitive behaviors, motor disorders, and strange behaviors. The second subscale, which addresses communicative skills, covers items 15 to 28. It describes verbal and nonverbal behaviors, i.e. symptoms of autism. Social interaction is the third subscale covering items 29-42. Developmental history includes items 43-56 and raises key questions about the childhood development of individuals. The maximum and minimum score for the subscales of repetitive behaviors, communication, and social interaction is 42 and 0, respectively. Each child's overall score ranges between a maximum of 140 and a minimum of 0. A higher score indicates a problem in that specific subscale.

Studies suggested a Cronbach's alpha coefficient of 0.90 for repetitive behaviors; 0.89 for communicative skills; 0.93 for social interaction; 0.88 for developmental disorders, and 0.96 for autism semiology. Additionally, the test's validity has been confirmed by its comparison with other autism diagnostic tools; it also has been demonstrated through several reviews (Gillam 1994). Regarding the reliability of this test in Iran, the Cronbach's alpha coefficient for repetitive behaviors was measured as 0.74, communicative skills as 0.92, social interactions as 0.73, developmental disorders as 0.80, and the total score equaled 0.89 (Ahmadi et al., 2012). The GARS-2 was normed entirely in individuals diagnosed with ASD. Standard scores and percentiles are provided and the odds of autism can be determined.

Vineland Social Maturity Scale (VSMS): This 117-item scale assesses the ability of individuals to meet their practical needs and accept responsibility. The information required in each item is not obtained by test, but through interviews with informants (parents, nurses, siblings, or anyone who knows the child well). VSMS is based on what the individual is capable of performing in daily life.

It includes 8 subscales, as follows: General self-help ability; self-help eating; self-help dressing; self-direction; occupation skills; locomotion skills; communication skills, and socialization skills. In the present study, among the social development subscales, only three categories of general self-help ability, self-direction, and communication skills

were used. Besides, the scale has been standardized on 620 males and females per age group (from birth to age 30 years) with the validity and reliability coefficients of 0.88 and 0.92, respectively, in Iran (Nasiri 2016). In the present study, the parents of children with ASD assessed the scale of autistic behavior in their children; however, the researcher scored the scale.

Test of Language Development-Primary, Third Edition (TOLD-P:3): The TOLD-P:3 assesses spoken language in young children. The TOLD-P:3 was designed and developed by Newcomer and Hamil (1998). This test was adapted and standardized by the Exceptional Education Organization of Iran, in 2001. The TOLD-P:3 has 6 core subtests, consisting of picture vocabulary; relational vocabulary; oral vocabulary; syntactic understanding; sentence imitation; morphological completion; word discrimination; phonological analysis, and word production. This test is based on a Two-Dimensional (2D) model. One dimension consists of linguistic systems with listening components (reception), organization (composition), and speech (expression). Moreover, the other dimension includes linguistic features with semantic, syntactic, and phonological components.

This 2D model provides the theoretical basis for the preparation of 9 subtests, out of which, 6 subtests are related to semantics and syntax and are part of the main subtests. These subtests are also related to phonology and regarded as complementary. In the present study, only 3 categories of understanding relational vocabulary, syntactic understanding, and word discrimination were used. Based on the Cronbach's alpha coefficients of the test manual for all individuals, the mean Cronbach's alpha coefficients of various age levels were obtained using the z-transform method. Testing follows the order outlined in the test record with administration beginning with the sentence combining subtest. Examiners can choose to omit certain subtests as long as the order is maintained. Administration begins with the first item for all age groups.

Ceiling rules are specific to each subtest and outlined in the manual (briefly presented on the record form). Ceilings range from two missed items (picture vocabulary) in a row to 3 out of 5 consecutive missed items (grammatical comprehension). The Cronbach's alpha coefficient for the subtests and the components was calculated as desirable. Higher Cronbach's alpha coefficients indicated that the test sample is quite valid and the results can be used with confidence. The Cronbach's alpha coefficients of the Persian version of the scale for picture vocabulary, relational vocabulary, oral vocabulary, syntactic understanding, sentence imitation, morphological

Table 1. The sessions contents

Sessions	Contents
1	Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the first song selected from the comment CD; in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak (a percussion instrument), wood, triangle, bells, agogo, flute, harmonica; clapping and singing the selected song in a group and individually, and continuing the practice for 1 hour. Rhythmically practicing for 15 minutes by the text of a book that the subjects had chosen based on their age.
2	Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group and individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; clapping and singing the selected song in a group and individually, and continuing the practice for 1 hour. Rhythmically practicing for 15 minutes by the text of a book that the subjects had chosen based on their age.
3	Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group and individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; clapping and singing the selected song in a group and individually, and continuing the practice for 1 hour. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age.
4	Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group and individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 1 hour. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age.
5	Practicing rhythmic talking between the examiner and the subjects for 15 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 1 hour. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects).
6	Practicing rhythmic talking between the examiner and the subjects for 15 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments such as, tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 1 hour. Rhythmically practicing for 15 minutes on the text of a book that the subjects themselves had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects).
7	Practicing rhythmic talking between the examiner and the subjects for 15 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; and singing the selected song in a group and individually, and continuing the practice for 1 hour. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects).
8	Practicing rhythmic talking between the examiner and the subjects for 15 minutes before starting the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 1 hour. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects).

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Sessions	Contents
9	Practicing rhythmic talking between the examiner and the subjects for 20 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 55 minutes. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects). The time dedicated to music and songs decreased since the ninth session, and the time for normal and non-musical conversation increased.
10	Practicing rhythmic talking between the examiner and the subjects for 25 minutes before initiating the exercise in a stretched and calm manner. Holding a breathing competition for attracting and motivating the subjects in the class. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); practicing in the next stage with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 50 minutes. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects).
11	From this session on, the time of rhythmic exercises gradually decreased and the time of rhythmic speaking increased. This included the following: Practicing rhythmic talking between the examiner and the subjects for 30 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); in the next stage, practicing with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 45 minutes. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects).
12	Practicing rhythmic talking between the examiner and the subjects for 35 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); practicing in the next stage with the help of musical instruments, such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 40 minutes. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects).
13	Practicing rhythmic talking between the examiner and the subjects for 40 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD;) practicing in the next stage with the help of musical instruments such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 35 minutes. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects, had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects).
14	Practicing rhythmic talking between the examiner and the subjects for 40 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); practicing in the next stage with the help of musical instruments such as tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the exercise for 30 minutes. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training, such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects). Practicing talking slowly in a rhythmic way; then repeating the sentences in a normal way.

Sessions	Contents
15	Practicing rhythmic talking between the examiner and the subjects for 55 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); practicing in the next stage with the help of musical instruments such as, tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 25 minutes. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects had chosen based on their age. Giving physical training such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects). Practicing talking slowly in a rhythmic way and then repeating the sentences in a normal way.
16	Practicing rhythmic talking between the examiner and the subjects for 60 minutes before initiating the exercise in a stretched and calm manner. Blowing a flute and practicing it as 2-4 and 4-2 rhythms for 10 minutes. Practicing the songs from the last session in a group or individually for 20 minutes. Practicing two new songs selected from the comment CD (played from the CD); practicing in the next stage with the help of musical instruments such as, tambourine, Khash Khashak, wood, triangle, bells, agogo, flute, harmonica; singing the selected song in a group and individually, and continuing the practice for 20 minutes. Singing a favorite song from the book based on the subjects' tastes. Rhythmically practicing for 15 minutes on the text of a book that the subjects themselves had chosen based on their age. Giving physical training such as sit-up, squat, and push-up along with rhythmic talking (to prevent boredom in the subjects). Practicing talking slowly in a rhythmic way and then repeating the sentences in a normal way.

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completion, word discrimination, phonological analysis, and word production has been calculated as 0.76, 0.89, 0.89, 0.74, 0.90, 0.81, 0.90, 0.94, and 0.82, respectively (Sobhani & Mu'ayimah 2013).

After confirming the ASD with GARS-2 and performing the Pre-test, based on the study model, rhythmic poetry training was held for the individuals (60 minutes; two weekly sessions; 16 sessions in total). In these sessions, i.e. arranged using credible scientific resources (Peters 2010) and expert consultation, the researcher intervened to improve the development of social activities and language and writing skills in children with ASD using various techniques of Melodic Intonation Therapy (MIT). Moreover, all study subjects were re-evaluated in the post-test (no attrition occurred). The following notes summarize the stages of MIT adapted from the research conducted by Schmidt Peters (2010):

The study data were analyzed in SPSS. A Kolmogorov-Smirnov test was applied for analyzing qualitative variables. The Paired Samples t-test, Independent Samples t-test, and Analysis of Variance (ANOVA) were used for assessing the research hypothesis. In all statistical tests, the significance level was set at ≤0.05.

3. Results

Both study groups were homogenous regarding age and educational level. Moreover, the majority of children in both study groups had one sibling and most of them were firstborns. Besides, the educational level of the mothers of the majority of children in the experi-

mental and control groups was a diploma, and they were mainly housewives. The educational level of fathers was under diploma or diploma concerning the majority of the children in the experimental group; however, the majority of fathers in the control group held an associate degree. Furthermore, the majority of fathers were employed in both study groups. Finally, the economic status of the majority of the children in both research groups was moderate.

Table 2 presents the descriptive statistics related to the pre-test, post-test scores of social development and language skills in the study groups. The normality of the distribution of pre-test and post-test scores was confirmed in the experimental and control groups.

The Box's M test results indicated a correlation between the covariance of the experimental and control groups (P=0.052, F=2.31, Box=25.19) (Table 3).

As per Table 4, the F-value was significant for all variables of social skills development (P<0.000). Therefore, the correlation of the covariate variables (pre-tests) with the dependent variables (post-tests) was linear for each covariate.

As per Table 5, the significance levels of all tests indicated a significant difference between the experimental and control groups in at least one dependent variable (social development & language skills development) (F=12.86, P<0.000). The effect or difference was equal to 0.81. In other words, 75% of the individual differences in the post-test scores of social development and language skills development in the explored children with

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Table 2. Descriptive statistics of social and language skills in the experimental and control groups at the measurement steps

Variables	Phases	Statistical Index Groups	Mean±SD
Social skills development	Pre-test	Experimental	14.10±1.34
		Control	17.59±1.24
	Post-test	Experimental	18.29±1.17
		Control	19.17±3.12
	Pre-test	Experimental	4.81±2.10
		Control	2.21±1.27
	Post-test	Experimental	9.20±0.97
		Control	1.20±2.21
	Pre-test	Experimental	4.36±2.01
		Control	5.01±3.74
	Post-test	Experimental	5.20±1.37
		Control	1.48±2.72
Language skills development	Pre-test	Experimental	12.37±1.63
		Control	11.01±1.10
	Post-test	Experimental	21.01±1.10
		Control	12.10±2.37
	Pre-test	Experimental	11.20±1.88
		Control	12.12±1.99
	Post-test	Experimental	17.36±3.52
		Control	12.87±1.92
	Pre-test	Experimental	12.07±1.16
		Control	11.67±1.44
	Post-test	Experimental	17.27±2.77
		Control	13.22±1.32
	Pre-test	Experimental	12.07±1.16
		Control	11.67±1.44
	Post-test	Experimental	18.21±2.13
		Control	12.23±2.10

Sub-variable labels (left-to-right within each group):

Social skills development:
- General self-help (Pre-test / Post-test)
- Self-direction (Pre-test / Post-test)
- Communication (Pre-test / Post-test)

Language skills development:
- Understanding relational vocabulary (Pre-test / Post-test)
- Syntactic understanding (Pre-test / Post-test)
- Word discrimination (Pre-test / Post-test)
- Writing skill (Pre-test / Post-test)

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Table 3. The Box's M test data for the assumption of homogeneity of covariance in the experimental and control groups

Box's M test	
Box's M statistic	25.19
F	2.31
df1	30
df2	1025.2
P	0.320

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Table 4. One-way ANCOVA data to test the linearity of the covariate and dependent variables

Source of Change		Total Square	df	Mean Square	F	P
Social skills development	General self-help	0.38	1	0.38	4.51	0.001
	Self-direction	12.27	1	1.27	23.12	0.000
	Communication	0.62	1	0.62	5.12	0.000
Language skills development	Understanding relational vocabulary	2.14	1	2.14	1.41	0.51
	Syntactic understanding	18.11	1	18.11	20.14	0.000
	Word discrimination	4.52	1	2.37	6.21	0.029

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Table 5. MANCOVA data on the mean Post-test scores in the experimental and control groups with the Pre-test control values

Test	Statistical Power	Effect Size	P	F	df Error	df Hypothesis	Value
Pillai's Trace	1	0.75	0.000	12.86	19	5	0.17
Wilks' Lambda	1	0.75	0.000	12.86	19	5	0.134
Hotelling's T-squared	1	0.75	0.000	12.86	19	5	2.37
Roy's largest root	1	0.75	0.000	12.86	19	5	4.10

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ASD were related to the influence of educational poems on children. Since statistical power is equal to one, there was no possibility of a second type error. Therefore, the main hypothesis of the study was confirmed.

According to Table 6, the F-value was significant for all the variables of social skills development (P<0.005). Therefore, the correlation of the covariate variables (Pretests) with the dependent variables (Post-tests) was linear for each covariate.

Table 7 suggests that the significance levels of all tests indicated a significant difference between the experimental and control groups in at least one dependent variable (writing skills) (F=8.49, P<0.005). The effect or difference was measured as 0.84. In other words, 84% of the individual differences in the Post-test scores of writ-

ing skills in the explored children with ASD were related to the influence of educational poems on them. Since statistical power is equal to one, there was no possibility of a second type error. Therefore, the main hypothesis of the study was confirmed.

4. Discussion

The present study results suggested that the children's pedagogical songs are effective in improving the development of social activities, and language and writing skills in children with ASD. Accordingly, the main hypothesis of the study was confirmed.

The development of language, speech, and subsequent social skills in children profoundly affects other aspects of their life and development. Disruption in any aspect of speech, in-

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Table 6. One-way ANCOVA data to test the linearity of the covariate and dependent variables

Source of Change		Total Square	df	Mean Square	F	P
Writing skills	Word writing	1.47	1	1.47	5.47	0.005
	Sentence writing	8.21	1	8.27	12.57	0.000
	Observe the plural and singular	1.62	1	1.62	1.46	0.005

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Table 7. MANCOVA data on the mean post-test values in the experimental and control groups with the pre-test control

Test	Statistical Power	Effect Size	P	F	df Error	df Hypothesis	Value
Pillai's trace	1	0.84	0.005	8.49	19	5	0.17
Wilks' lambda	1	0.84	0.005	8.49	19	5	0.63
Hotelling's t-squared	1	0.84	0.005	8.49	19	5	1.28
Roy's largest root	1	0.84	0.005	8.49	19	5	2.26

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cluding speech fluency, can cause various biopsychological and emotional problems in children. Therefore, strengthening language skills and expanding the social development of children with ASD are essential in therapeutic interventions for these children.

The obtained data indicated that pedagogical songs are effective in increasing social skills in children with ASD. This finding is generally in line with the results of Khanzadeh and Imenkhah (2017); they stated that music therapy combined with play therapy can increase social behaviors, and concurrently decrease isolation and repetitive behaviors in children with ASD. Furthermore, this finding is generally consistent with the results of Nasiri et al. (2016); they documented that storytelling and its related structure is effective in improving social interactions in children with ASD. In addition, this finding was consistent with that of the study by Khanjani and Khaknejad (2016).

They concluded that music therapy enhances communication and language skills and reduces symptoms of autism. Finally, this finding was in line with those of Falahi and Karimi-Sani (2016); they reported that storytelling is effective in reducing autism symptoms, and improving communication skills and social interactions in children with ASD. Performing music and reciting poetry in groups (playing musical instruments or singing) is a multi-quality activity that affects the reflections of the human nervous system. Besides, most children with ASD enjoy this practice and get actively involved in such activities. Thus, such activities can enhance

their ability to focus and interact with others; accordingly, their communication and social skills are improved.

Therefore, engaging in music-making techniques can provide a promising approach to facilitating linguistic expression in children with ASD who are unable to speak. Moreover, music therapy and poetry encourage more individuals with ASD to participate in designed social/linguistic and cognitive/motor activities. Music and poetry provide a useful context in which a sense of curiosity and exploration of environmental stimuli is enhanced in children with ASD. It encourages children through music. Poems and hymns can also be combined to create a form of musical social storytelling, i.e. useful for practicing social skills (Ferdosi et al., 2013).

Music is, above all, an emotional need; it stimulates the brain's emotional system (limbic system), leading to the emotional stimulation of the inner state. Additionally, in numerous situations without speech or expression, music can generate empathy and emotions, and most importantly expand feelings. Therefore, music is the best approach for children with ASD to interact, socialize, get out of their inner world, and pay attention to their living environments (Khanjani & Khaknejad 2016).

The collected results also signified a significant difference between the experimental and control groups regarding the development of language skills. In other words, children's educational poems increased the development of language skills in the experimental group, compared to the controls. This finding is in line with the results of Ferdowsi et al. (2013); they reported that after performing the rhythmic sing-

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ing method, continuous speech quality, the mean length of utterance, verb count, and speech rate increased, and echolalia percentage decreased in the studied children. As a result, the rhythmic singing method positively affects the speech quality indicators of children with ASD.

A language is a social contract that exists between the speakers of a community and includes semantics, word formation, syntax, and cognitive abilities of words and phrases. Language disorders include perceived and expressive disorders, such as aphasia and dyslexia; when individuals encounter difficulty understanding others, they have perceived disorders, and if they face difficulty expressing their thoughts and opinions, they have expressive disorders (Ferdowsi et al., 2013). Due to cognitive and communication problems, children with ASD usually have both speech and language disorders; speech and language skills can be enhanced by music and poetry activities. Musical activities that motivate children with ASD to follow the lyrics of the song are useful for enhancing their perceptual-linguistic skills; as group singing reduces the subjects' anxiety about speech.

Furthermore, vitality in group sessions increases the desire to speak and read. Playing wind instruments along with singing can strengthen the muscles associated with speech in children with ASD. Controlling the muscles responsible for breathing, tongue, lips, and cheeks is essential for speech; playing wind instruments enhances this ability. In addition, rhythmic singing helps children with ASD to talk in a much better manner. Finally, adapting the rhythm of the song and singing improves language skills in children with ASD (Khanjani & Khaknejad 2016).

The current research results revealed a significant difference between the experimental and control groups respecting the development of writing skills. A study employed Self-Regulated Strategy Development (SRSD) to teach children with ASD to write. The related data indicated that students with ASD believed using an SRSD approach can improve their overall quality of writing, their discourse elements (e.g. persuasive or story) used, and the length of their speech products (Asaro-Saddler 2016).

In a therapeutic activity associated with music and poetry, a child with ASD will attempt to provide a suitable, desirable, and timely response to a stimulus. For example, a child who speaks restrictedly will try to speak more to achieve his/her goals; a child who uses his/her 5 senses less, will try to use these senses more; and a child who has less control over his/her movements will learn to control and direct them. Therefore, these interventions will greatly help with the recovery of children with ASD; thus, they are recommended to be provided to this group of children in addition to the current interventions.

Teachers, therapists, pediatric nurses, and parents can benefit from the results of this research. The main limitation of this study was the lack of a follow-up stage. It is suggested that future studies use a larger sample size with children from different cultural and economic backgrounds.

5. Conclusion

According to the DSM-5, ASD is characterized by such major symptoms as impaired communication and social interactions, along with the restricted and stereotyped patterns of behaviors or interests. We observed that using children's poems was effective in improving language and social skills among children with ASD. Therefore, poetry therapy, i.e. a subset of art therapy, can be a cost-effective, novel, and the appropriate method for treating children with ASD.

Ethical Considerations

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