

# Application of music therapy in rehabilitation of children with autism spectrum disorder

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**Abstract:** Objective: To explore the effect of music therapy in the rehabilitation of children with autism spectrum disorder. Methods: A total of 50 children with ASD who received rehabilitation treatment in the Child Health Department of Shenzhen Baoan District Maternal and Child Health Hospital from October to December 2021 were selected, and the scores of social ability, speech level and movement of the children before and after music therapy were compared to analyze the rehabilitation effect of music therapy on the children with ASD. Results: The social behavior, speech, fine motor, gross motor and developmental quotient of the children after music therapy were improved compared with those before treatment. Conclusion: Music therapy has a positive effect on the rehabilitation of children with ASD.

**Key words:** music therapy; Autism spectrum disorder; Rehabilitation therapy

## 1. Foreword

autism spectrum disorder, also known as autism, is a neurodevelopmental disorder that affects the structure of the brain. Existing research has shown that music can improve the functional connectivity of the brain in children with ASD, which activates brain regions and allows the nervous system to do its work more efficiently. Among all children with ASD, speech development disorder is very prominent, and the daily communication of children with ASD is obviously limited. Therefore, speech development disorder is an important reason for many parents to find children with ASD. In addition, there are typical clinical manifestations such as narrow interest range, social communication disorder, rigid and repetitive behavior. Domestic and foreign reports show that the incidence of autism is on the rise. The data released by the U.S. Center for Disease Control and Prevention (CDC) in 2014 shows that the prevalence rate of ASD is 1/68, and the male/female ratio is about 4.5:1. Among the children's mental disability diseases in China, autism occupies the first place, about 5 million, and is on the rise, the survey results in some areas are 2.8-12.25/ 10,000. In the present society, the rehabilitation of children with ASD is not only related to their families, but also related to the development of the country and society, which has become a daily concern of people.

Foreign studies have shown that music therapy can promote children's expression ability. In China, music therapy has received more and more attention in the special education industry. As a new and effective means of early intervention, music therapy can affect limbic system and other brain regions through hearing, regulate cerebral cortex, improve mood and excitement level, and have unique therapeutic effects[6-7] on ASD children's understanding of the world, emotional expression and daily behavior. Therefore, this study explores the application effect of music therapy in the rehabilitation of children with ASD on the basis of previous studies.

## 2. Methods

### 2.1 Rehabilitate the subject

Inclusion criteria: ① Children diagnosed with autism spectrum disorder with Autism Rating Scale (the latest version of pep3); ② children aged  $\geq 1$  year and  $\leq 3$  years; ③ Family members and children are willing and able to cooperate with rehabilitation training.

Exclusion criteria: (1) Children who do not have ASD. (2) Children with ASD who do not require music therapy to assist rehabilitation; Parents who have psychological resistance to the disease of children to avoid causing secondary damage to their psychology.

Exit criteria: (1) Children who are discharged from hospital or suffer from other sudden diseases, resulting in a continuous recovery time of 14 days; (2) Children who do not want to continue to participate for any reason during the course.

According to the inclusion criteria and exclusion criteria, 50 children with ASD who received music therapy rehabilitation treatment in the Child Health Department of Shenzhen Baoan District Maternal and Child Health Hospital from October to December 2021 were selected. The children were classified according to the rehabilitation project, and the children participating in the music therapy course were selected for the effect study. The children were all 1-3 years old, including 41 males, 9 females and 9 males. All the children with ASD were treated by professional music rehabilitation therapists with daily music rehabilitation therapy sessions of 30 minutes each for 14 consecutive days.

### 2.2 Music Therapy

#### 2.2.1 Listening Music Therapy

Listening to music is a relatively common and easy to implement intervention mode. The main form is playing music. The rehabilitator first plays a piece of music that the child likes to quickly attract his or her attention. For children who can speak, the rehabilitator will guide them to slowly sing along with the music. Children with good speech function can sing along with music, and exercise their concentration and language ability while listening to music. When children hear favorite music passages, they will generally make corresponding performances according to changes in mood, such as: laughing, clapping and other expressions.

#### 2.2.2 Read the drawing Method

The therapist gives the child a picture book while playing soothing music, and leads him to read in the musical atmosphere. Music

melody can effectively stimulate children's hearing organs and improve their language acceptance and expression ability. When the rehabilitator teaches children to read or point and draw to understand things word by word, he is exercising children's speech expression ability and concentration. Generally, children are allowed to read familiar picture books by themselves in the first time, learn picture books together with children in the middle time, and finally let children choose their favorite educational toys for entertainment, and exercise relevant functions of children while giving children rewards.

#### 2.2.3 Music game method

In the music therapy class, the rehabilitator uses the games that children are interested in to engage them, such as playing drums together, circling in circles, playing different instruments together, etc., to train children's hearing ability in the music surround. Music game therapy not only exercises children's hearing, but also plays a role in training attention, speech and movement, and can also correct their stereotyped behaviors and bad habits.

#### 2.2.4 Improvisation method

The method of improvisation includes: improvisational performance, improvisational singing, improvisational painting in music listening, etc. Impromptu Musical Instruments are usually taught together with listening to music. In the first half of the class, children are first allowed to listen to music, and then the rehabilitator and the child each hold an instrument and ring the instrument at will in the original music playing atmosphere. The rules are mastered by the children themselves. Improvisation can allow children to enter a safe musical mode and help them express their feelings and behaviors that cannot be freely and independently expressed in language through music, thus eliminating their bad emotions. At the same time, improvisation is a good window to vent inner emotions.

#### 2.3 Observation indicators

By comparing the final scores of relevant indicators of the Pediatric Heart Scale before and after music rehabilitation therapy for 50 children with ASD, the therapeutic effect of music rehabilitation therapy for children with ASD was obtained, and the conclusion analysis was further made on the therapeutic effect.

#### 2.4 Statistical Methods

In this study, SPSS19.0 software package was used for relevant statistical analysis. The scores of Pediatric Heart Scale in children with ASD conforming to normal distribution were analyzed with (X) paired sample  $\pm S$  T-test, and  $P < 0.05$  was considered statistically significant.

### 3. Results and discussion

#### 3.1 Correct stereotyped behavior

Stereotypical behavior is also called cautionary behavior. Studies have shown that important factors affecting the daily learning and life of children with ASD include attention deficit and stereotyping behavior, and in music therapy, the sound of music can be seen directly by the brain through the melody, which can quickly attract children's attention, making them focus and hold attention for a long time. In this study, the frequency of stereotyping in 50 children with ASD after rehabilitation treatment was significantly lower than that before rehabilitation treatment, and the warning behavior score was reduced by 1.08 ( $P < 0.01$ ) (Table 1). The frequency of stereotyping behavior gradually decreased, and even some stereotyping behaviors could be avoided.

#### 3.2 Improve interpersonal adaptability

When teaching, music therapists use images to stimulate the learning interest of children with ASD, combine music and pictures with each other, strive to let each child actively participate in music learning and performance, encourage children to interact with other children, and keep children in a happy, harmonious, relaxed and efficient learning atmosphere, which can effectively enhance their concentration. In this study, after rehabilitation treatment, 50 children with ASD showed significant improvement in their social interaction behavior ability compared with that before treatment, and their social interaction score increased by 2.72 ( $P < 0.01$ ) (Table 1), which was specifically manifested in the children's willingness to share toys with friends, play together, greet strangers, hug strangers other than their parents and other daily interpersonal interactions.

#### 3.3 Promote verbal communication

In the course of music therapy for children with ASD, the forms of rehabilitation treatment are diverse. For children with basic language expression, singing along with the rehabilitator's songs, reading picture books and poems, and communicating with friends while playing games are all good opportunities for speech exercise. In the treatment course, children can be guided to communicate more, exercise the articulation of speech and words, and master the use of vocabulary in the communication process, so as to achieve the purpose of more smooth communication. In this study, the verbal communication ability of 50 children with ASD after rehabilitation was significantly improved compared with that before rehabilitation, and the score of verbal ability was increased by 6.60 ( $P < 0.01$ ) (Table 1). The specific performance was that the children were willing to speak, communicated with others more clearly, and expressed their own needs more accurately. For example, they clearly stated their daily life behaviors such as wanting to go to the toilet, wanting certain toys, where they wanted to go to play, and wanting to sleep, and their needs were met, which also improved the happiness of children with ASD in their daily life.

#### 3.4 Expand the scope of interest

In the process of music therapy, the melody given by music and the words and colors contained in the audio picture book will increase the children's interest in things. When the children reach for the musical instrument or the audio picture book, it is the initial stage for the

children to establish interest. Gradually, the children will build up curiosity and step out of the self-enclosed circle. For the rehabilitation of children, it is a big step forward. Being able to grab a toy, pick up a book, flip through a picture book, run, jump, and feel the world can all help children establish their own interests and hobbies and their own sense of the world. In this study, the fine motor ability of 50 children with ASD after rehabilitation was improved compared with that before treatment, and the fine motor score was increased by 5.64 ( $P < 0.01$ ) (Table 1); The gross motor ability of the children after rehabilitation was also slightly improved than that before rehabilitation, and the gross motor score of the children was increased by 1.16 ( $P < 0.01$ ) (Table 1). Specifically, the children had more opportunities to experience life and the world. They could touch something they liked and even understand it more carefully. For the person they want to see, the child can go and hug him; For the inner resistance of things, children can use behavior to express rejection. These intuitive feelings of love and dislike of the expression, help parents better understand the children, but also let the children more direct contact with the things themselves, help to establish their interests.

### 3.5 Improve the level of emotion management

Relevant studies have shown that many children with ASD have problems such as irritability, easy laughter, crying and noise. However, after a period of music rehabilitation therapy, most children will basically reduce the frequency of noise and further improve their emotional control ability. Among the 50 children with ASD, the developmental quotient score after rehabilitation was significantly higher than that before rehabilitation, and the developmental quotient score was also increased by 4.40 ( $P < 0.01$ ) (Table 1). The psychological age of the children tended to be mature, closer to the actual physiological age, and the children would express their needs appropriately, effectively reducing the number of emotional loss of control and the frequency of noisy behavior.

**Table 1. Score analysis of children with ASD before and after rehabilitation treatment**

	Before and after rehabilitation	After rehab	T	P
Social behavior (N = 50)	63.82 +/- 12.97	66.54 +/- 11.33	5.25	$P < 0.01$
Speech (N = 50)	56.80 +/- 11.64	63.40 +/- 8.97	8.25	$P < 0.01$
Fine movements (N = 50)	67.98 +/- 11.37	73.62 +/- 8.27	7.77	$P < 0.01$
Large movement (N = 50)	85.32 +/- 2.87	86.48 +/- 2.77	3.96	$P < 0.01$
Developmental quotient (N = 50)	71.18 +/- 9.45	75.58 +/- 8.30	6.950	$P < 0.01$

## 4. Conclusions

All in all, this study shows that music therapy has a noticeable effect on typical symptoms of children with ASD, such as language, attention, mood, and social interaction; Sensory perception, especially hearing, is far from being affected by music therapy. Therefore, we also need to conduct an in-depth analysis of the rehabilitation training of music therapy for children with ASD, and put forward corresponding improvement measures to achieve the purpose of helping children recover quickly and get rid of the influence of the disease on their normal life.

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