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Revista de Cercetare si Interventie Sociala

ISSN: 1583-3410 (print), ISSN: 1584-5397 (electronic)

INTERVENTIONAL ANALYSIS OF MUSIC THERAPY ON EMOTIONAL BEHAVIOR IN CHILDREN WITH AUTISM

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Revista de cercetare și intervenție socială, 2024, vol. 86, pp. 74-85

https://doi.org/10.33788/rcis.86.6

Published by:
Expert Projects Publishing House

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publishing

On behalf of:
„Alexandru Ioan Cuza" University,
Department of Sociology and Social Work
and
HoltIS Association

Interventional Analysis of Music Therapy on Emotional Behavior in Children with Autism

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Abstract

Music therapy, as an emerging field of rehabilitation, has been studied by many people. However, it only proves the effectiveness of music therapy in addressing emotional and behavioral issues in children with autism, and there are no specific strategies and methods applicable to special education schools for reference. This study attempts to address this issue. This study adopted a cross subject multi trial design in a single subject experimental method, with music therapy as the independent variable. Using the emotional behavior of these four autistic children who cried for no reason as the dependent variable, data was collected during the baseline, intervention, and maintenance periods to verify the intervention effect of music therapy on emotional behavior. The research results indicate that music therapy has immediate, sustained, and generalized effects on typical emotional and behavioral problems in children with autism. After music therapy intervention, the frequency of emotional and behavioral problems in each of the four autistic children decreased significantly, their self-control ability improved significantly, and language interaction was significantly prolonged. Based on the observation of student expressions and actions, participation statistics, and family interviews, it can be seen that students are interested in the environment of visual music, rhythm training, and situational music. The correct grasp of the core concepts of music therapy and timely feedback on intervention content play a crucial role in the treatment effect in this study.

Keywords: music therapy; children with autism; emotional behavior.

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Introduction

Based on the four teaching modules of music comprehensive teaching method, music intervention design is carried out for the social communication skills required by children with autism. Based on the potential development and ability deficiency compensation of children with autism, we aim to improve the lack of targeted music intervention, and provide reference value for special education teachers. Summarize music intervention strategies suitable for improving their social communication abilities, and provide new ideas for music intervention in children with autism (Taniguchi and Yu, 2024). The emotional and behavioral disorders of children with autism often manifest as large emotional fluctuations that are difficult to predict and control, such as sudden crying in class, which is a direct manifestation of this problem. This unstable emotional state not only interferes with normal teaching activities, but also greatly limits the development of children's own learning and social adaptation abilities. At a deeper level, this disorder may stem from fundamental difficulties in understanding and expressing emotions, as well as processing social information in children with autism. They may not be able to accurately perceive and respond to emotional signals from others like their peers, leading to failures in social interactions and the accumulation of frustration. Then beats their head; or jumps from their seat and runs around wildly; and even harms others (Fujimoto *et al.,* 2024). These emotional behaviors can have a significant impact on their personal safety and social interaction activities. Music therapy, as a nonverbal communication method, has a unique charm that transcends language and cognitive barriers. It can directly touch the emotional depths of children with autism, and stimulate their inner feelings and expression abilities through musical elements such as melody, rhythm, and harmony. Music therapy can not only promote children's emotional regulation, reduce anxiety and unease, but also stimulate their creativity and imagination, providing new possibilities for social interaction (Kim *et al.,* 2020).

In recent years, the intervention field for psychological disorders has witnessed the rise of music therapy as a non-traditional but highly promising treatment method. These plans aim to provide patients with a safe space through personalized listening, creation, and engagement experiences, promoting experience sharing, emotional expression, physical and mental relaxation, and the cultivation of positive emotions. Although music therapy as an interdisciplinary field is still constantly evolving and improving, its definition has not yet reached a complete consensus, but its core ideas have gradually become clear. In music therapy plans carefully designed by professional therapists, music is not only an art form, but also a bridge connecting the patient's inner world with the outside world. Music, as a universal language of humanity, has been an important medium for expressing emotions and conveying ideas since ancient times (Shin *et al.,* 2022). Therefore, music therapy can be seen as an innovative treatment method that cleverly integrates music with therapeutic concepts. Treatment, on the other hand,

is a process of helping others based on care and understanding, aimed at solving the problems faced by individuals and promoting their growth and development. Through music as a unique communication tool, it promotes the overall health of individuals at the psychological, physiological, and social levels.

This study is divided into five parts:

– The first part is the introduction, which explains the research background and significance of this topic. A research method and implementation plan for this topic were proposed by reviewing domestic and foreign literature on the social communication ability of children with autism.

– The second part elaborates in detail on the multidimensional aspects of social communication abilities in children with autism, as well as the concept, theoretical basis, and widespread application of music intervention as an innovative treatment strategy. This section not only focuses on the specific challenges faced by children with autism in social interaction, such as nonverbal communication disorders, emotional resonance loss, and difficulty maintaining and initiating conversations, but also delves into the complex mechanisms behind these disorders, including neurobiological factors, cognitive processing abnormalities, and environmental adaptation challenges.

– The third part proposes a music intervention method and intervention objectives based on the comprehensive music teaching method. In response to the social communication ability needs of children with autism, music intervention forms and links are developed to enhance their social communication ability, and music intervention cases are designed to enhance their social communication ability.

– The fourth part is a music intervention practice conducted at Shaanxi Rehabilitation Hospital, which elaborates on the social interaction behavior of children with autism in the early, middle, and later stages of music intervention, and reflects on the teaching of music intervention. Based on the data from the Autism Treatment Evaluation Form and communication with parents and attending therapists, analyze the effectiveness of music intervention and explore music intervention strategies to enhance the social communication ability of children with autism.

– The fifth part is the conclusion and outlook. Interventions such as nursery rhymes, singing and choir, music and action, and music games can cultivate common attention and enhance their imitation ability; Although this study has achieved certain results in the field of music intervention for children with autism, there are still some limitations, such as limited sample size, short intervention period, and insufficient long-term effect tracking. Future research should further expand the sample size, extend the intervention time, and adopt more rigorous experimental designs to verify the effectiveness and sustainability of music interventions. At the same time, attention should also be paid to the specific manifestations and needs of children with autism

in different age groups and severity of symptoms in music intervention, in order to provide more personalized and precise intervention plans.

Literature review

Lack of social interaction ability is one of the core defects and diagnostic criteria for children with autism. This viewpoint has been recognized by scholars, but there are different views on the definition of social communication abilities in children with autism. Social communication ability is the ability of people to interact and interact in order to achieve or satisfy a certain purpose (Esfahlani *et al.,* 2019). Social communication ability includes three basic elements, namely social communication ability, social control ability, and social cognitive ability. Some people believe that social interaction ability includes social participation, social initiation, and social response. Social participation ability includes not only social initiation ability and social response ability, but also communication skills, turn taking, conversational behavior, game behavior, social interaction maintenance, and social participation. Some scholars believe that children with autism find it difficult to use appropriate language and behavior to express their own needs and thoughts. Their shortcomings in social communication abilities are mainly reflected in the fact that many foreign experts have provided different interpretations of music therapy from different perspectives (Chen *et al.,* 2021). Some scholars believe that music therapy is the artificial application of music to children or adults with physiological, psychological, and emotional disorders, which helps with treatment, rehabilitation, education, and training. It proposes that music therapy is the application of the therapeutic function stimulated by music to change or correct the abnormal psychology or behavior of the treated object. Some experts believe that as long as music is used in a planned and controlled manner, it can have an improving effect on the treated object, which can be called music therapy. The use of music and its elements in the plan to help patients achieve physical, emotional, and emotional integration during the treatment process is called music therapy. And researchers believe that this renowned music therapist has provided a more comprehensive and precise definition of music therapy (Manjunatha *et al.,* 2021). This definition mainly includes three points: (1) Music therapy is not a random and simple music activity, but a planned and strategic process, it is a scientific and systematic process. (2) The fundamental difference between music therapy and other forms of treatment is that the catalyst for therapeutic change is the music experience. (3) There are three essential elements: a specially trained music therapist, music, and therapeutic subjects. The music therapy used in this study refers to a rehabilitation training music therapy package that includes various music related methods and techniques such as visual music therapy.

Music intervention can alleviate emotional and behavioral problems in children with autism, and improve their social communication skills. After receiving music intervention, children with autism have an increased level of concentration, which in turn leads to the development of their social communication skills (Bui *et al.,* 2021). Music intervention can help children with autism understand and complete instructions, thereby promoting their social communication skills and achieving the goal of improving their quality of life. Research has shown that recreational music intervention can improve some of the social communication abilities of children with autism, but has no significant effect on their social communication abilities. Research has shown that music intervention based on the Orff system can reduce the frequency of problematic behaviors in children with autism, enhance their emotional stability, and cultivate and develop their social communication abilities. Parent-child participation in music intervention can alleviate the unfamiliarity of children with autism towards others and the outside world, increase their ability to interact with society, and develop their social communication skills.

When conducting a Chinese literature search on music, the author found that there is currently more research on implementing music, but there is relatively little research aimed at improving their social communication skills. After screening and analyzing relevant literature, the author found that such studies lack specific explanations of music intervention goals, content, and behavioral changes in children with autism, making it difficult to provide detailed reference value for subsequent researchers.

Methodology

The experiment and report reviewed the physiological and psychological mechanisms of music emotion, introduced the experimental methods of music emotion response, elaborated on the physical and mental reactions caused by music, and the experimental results of music alleviating pain, providing important theoretical basis for the study of using music therapy to intervene in emotional behavior. The nonverbal communication characteristics and affinity of music can improve emotional problems in children with special needs, and can also play an auxiliary role in other treatments. The researchers roughly summarize the intervention of music therapy in the field of special education for autism as follows:

Table 1. Summary of results of music therapy intervention in children with autism

Researcher	Research object	Application methods	Target behavior	Research effectiveness
1	N=3, 2 males and 1 female, with ASD, aged 7, 9, and 11.	Improvisation + structured music therapy	Emotional changes, attention to behavioral changes, development of autonomous consciousness and behavior	Improved emotional issues and increased the frequency of eye contact with people during activities in children with autism.
2	N=2, male, ASD, aged 6 and 5.	(Case study method)	Language response, focus, and follow instructions	Empirical evidence is effective in improving the language ability and social interaction of children with autism.
3	N=57, 50 males and 7 females, ASD, aged 3-8.	Orff music therapy	Social interaction, sensation, movement, language, self-care	The improvement of social interaction and motor ability in children with autism is more significant.
4	N=2,1 male and 1 female, with ASD, aged 7 and 6.	(Case study method)	Concentration, selectivity, and persistence of attention	Effectively reducing the frequency of inattention, improving the average time for children with autism to choose attention and sustained attention, and being able to generalize.
5	N=1, male, ASD, 10 years old	Music therapy combined with acupuncture	Social and emotional development	Effectively promote the common attention development of children with autism, enhance their social communication skills, and establish a sense of rules.

For the selection and induction of literature, the analysis of research results is as follows:

From the perspective of research objects: In the above content, there are a total of 5 experimental subjects, of which gender is marked, indicating that there are 56 male subjects. The types of experimental subjects are all children with autism, with an age range of 2-10 years, mostly concentrated between the ages of 3-8.

From the perspective of research methods, it can be divided into case study method, experimental method control group study, and single subject method. In the literature, case study method accounted for 4 articles, experimental group control study was used in 4 articles, and single subject method was used in only 1 article.

From the perspective of intervention measures, the above literature mainly adopts music therapy related measures, including Orff music therapy, with 3 articles accounting for 30%; Two pieces of impromptu music therapy, one of which combines structure; Two pieces of music game therapy; There is one article that combines music therapy with acupuncture, combining music therapy with traditional Chinese medicine; And one article on receptive music therapy.

From the perspective of target behavior, the research scope of this literature covers many obvious aspects of autism in children, some of which involve attentional behavior, including concentration, selectivity and persistence of attention, eye contact, and collective attention; Part of it involves language development, including language response and expression: it involves social interaction, including autonomous consciousness and behavioral development, obedience to instructions, imitation, language communication, and nonverbal socialization; There are two designs on emotional aspects, including emotional changes and emotional development; In addition, it also involves cognition, sensation, exercise, and self-care.

From the research results, it can be seen that each article has a positive and significant effect on intervening in all or part of the target behavior, with 5 articles mentioning a certain generalization effect, while the article using the single subject method focuses on:

Based on the analysis of several aspects, the research conclusion is drawn: Male children with autism are the majority of the research subjects, accounting for 86%. The subjects using case studies are generally aged 6-10 years old, which is slightly older. The subjects using the experimental control group are all aged 2-6 years old, which is slightly younger.

In terms of research methods, there are many intervention studies on the application of music therapy in children with autism that use case studies and experimental methods. There are few studies that use a single subject method, but only a single subject study has been extensively generalized. In terms of intervention measures, the commonly used therapies in music therapy include Orff music therapy, improvisational music therapy, and music play therapy. The target behavior of music therapy intervention for children with autism is focused on two aspects: communication and social interaction, which are obvious obstacles in children with autism. However, there is relatively little research on narrow interests and stereotyped behaviors. The research results indicate that all music therapy interventions have achieved significant results, except for some target behaviors

that have all achieved good intervention effects, while others have only partially achieved significant effects and some have not changed.

Results

Lead children with autism to recognize different parts of the body and establish a vision and breathing system. By touching different body parts to sense the changes in pitch and cultivate the ability of autistic children to discern pitch, Fu's daytime movements of six, eight, eight, 52, and ten are us.

Intervention process

(1) The teacher uses the piano to play the ascending scale of c '- c in order to enhance the auditory memory of children.
(2) The teacher sings the c '- c2 scale and creates exaggerated colloids based on the pitch changes (such as standing up gradually from low to high when encountering a 1-shot P), guiding children to imitate gross movements.
(3) After children have a basic understanding of pitch, design different body touch movements according to the pitch of c '- c'. The teacher sings the song slowly to guide children to complete the action imitation.

(1) Research object A

Study subject A is a female, aged 4 years old. The symptoms manifest as no eye contact, no imitative behavior, no functional language, neglecting all social participation and interaction activities, having a clear dependence on parents, no aggressive behavior, inability to sit still, and not listening to teacher instructions. Research subject A needs to hold objects (such as glue sticks and ballpoint pens) during each class. If she takes away the objects in her hand, it will cause emotional loss, breakdown, and crying behavior.

(2) Research object B

Study subject B is male, aged 5 years old. The symptoms manifest as no eye contact, no imitative behavior, no functional language, a sense of rejection towards social participation and interaction, and a dislike for physical contact with anyone. Research subject B has significant emotional fluctuations. When their emotions are high, they will run around in the classroom. When their emotions are low, they will have empty eyes and ignore everything happening around them. Occasionally, they will also exhibit behaviors such as shouting and shaking their hands non-stop. The self preference of research subject B is very obvious. For items they like (such as the soft stick used in the activity), they will focus all their attention on the item. After taking the item, they will exhibit problematic behavior (such as shouting).

They will not even touch items they do not like, and even if the teacher hands them to them, they will immediately throw them away.

(3) Research object C

The research subject C is male, aged 5 years old. Symptoms include no eye contact, no imitative behavior, and no functional language. Research subject C has a clear reaction to music and becomes excited upon hearing it, but their emotional control ability is poor. During music activities, they suddenly throw away their instruments or teaching aids and run and jump in the classroom, leaving their seats. When their emotions fluctuate, they also engage in self aggressive behavior (such as vigorously tapping their heads with both hands). This leads to the behavior of social avoidance and withdrawal in research object C, making it difficult to interact and cooperate with peers.

(4) Research object D

The research subject D is male, aged 5 years old. The symptoms are characterized by low frequency of eye contact, weak imitation ability, inability to actively communicate with others, lack of initiative in social participation and interaction, weak concentration, and the need for teachers to call before continuing to return to the classroom to complete corresponding instructions. Research subject D prefers a fixed pattern. For example, the placement direction of the chair needs to be consistent. If the direction of the chair is changed, he will stop all actions and place the chair in the previous direction. Research subject D has strong abilities among the four research subjects, but poor behavioral and emotional control abilities. When emotions are in an excited state, they are unable to control their own behavior (such as running randomly in the classroom).

Table 2. Behavior observation table for children with autism

Eye contact	Object A	Object B	Object C	Object D
attention	Difficulty in making eye contact during social greetings, parents assist in turning the child's head towards the teacher, and A's eyes do not look at the teacher.	No eye contact, resistant to parental supportive behavior.	When making social greetings, it is necessary to call out your name multiple times to attract attention in order to complete eye contact.	Eye contact can be used during social greetings, but the duration of eye contact is relatively short.

Imitation ability	Unable to concentrate, sometimes appearing to be looking at the teacher with empty eyes and floating thoughts.	Unable to concentrate, occasionally looking up at things around, but quickly returning attention to oneself.	Unable to concentrate and immersed in one's own world, playing with oneself.	Lack of concentration and inability to sit still can lead to behaviors such as looking around and shaking the body.
Emotional expression	Unable to follow the teacher's movements independently and requires parental assistance.	Unable to imitate actions and resistant to parental assistance.	Unable to follow the teacher's movements independently and requires parental assistance.	Unable to follow the teacher's movements independently and requires parental assistance.
Eye contact	Before class, the parents briefly left the classroom, and A's emotions were in a state of collapse and loss of control. After parents come back to comfort their children and give them small snacks, their emotions gradually stabilize.	Emotions may not fluctuate much, but they may suddenly shout or shake their hands or stomp their feet during music intervention.	After hearing the music, I was very excited and developed a self attacking behavior of vigorously tapping my head with my hands.	Emotionally more excited, especially after imitating movements with music, the emotions become even more excited, resulting in the behavior of leaving the seat and running around in the classroom.

Discussion

When discussing the intervention process and its effects for children with autism, we first need to recognize the special challenges that children with autism face in social interaction, language communication, and emotional and behavioral management. By designing a comprehensive intervention plan that combines music, physical touch, and visual guidance, the aim is to promote the development of these children in multiple dimensions, particularly improving their auditory perception, physical awareness, and social skills. Firstly, using music as a medium, especially through piano playing and singing scales, not only enhances children's auditory memory, but also stimulates their interest through changes in

pitch. Music, as a non-verbal means of communication, can overcome language and cognitive barriers and directly touch the emotional and perceptual systems of children with autism. During the intervention process, the teacher combines exaggerated body movements with pitch changes to guide children to imitate these movements. This not only helps them understand the concept of pitch, but also promotes the development of body coordination and imitation ability. However, it is worth noting that there are significant differences in the response and progress of children with autism during the intervention process. For example, research subject A exhibits strong item dependence and emotional reactions, which requires the interventionist to be extra careful during the implementation process to avoid triggering their negative emotions. In contrast, although research subject C has a positive response to music, their emotional control ability is poor and they are prone to impulsive behavior during music activities. This suggests that we need to adjust our strategies more flexibly in intervention, not only utilizing their interests, but also learning to manage and guide their emotions. In addition, the ability to imitate during the intervention process is also a key indicator. Children with autism often lack imitation ability, which directly affects their social learning and language development. From the observation table, it can be seen that although all research subjects lack imitation ability, their performance varies in different contexts. For example, object D is able to make brief eye contact during social greetings, indicating a certain level of social willingness and ability, but performs poorly in other more complex social scenarios. Therefore, interveners should design personalized intervention plans based on the specific situation of each child, gradually improving their imitation ability and social skills. Finally, it should be emphasized that intervention for children with autism is a long-term and complex process that requires joint efforts from families, schools, and society. During the intervention process, it is not only important to focus on the progress of children in specific skills, but also on their overall development, including emotional, cognitive, social, and other aspects.

Conclusion

In exploring the comprehensive development strategies of children with autism, this study focuses on three core objectives: firstly, actively cultivating the self-awareness of children with autism, aiming to help them establish clearer and more stable self-awareness, thereby enhancing their self-regulation and self-management abilities; Secondly, by strengthening language proficiency training, not only can their language expression and communication abilities be enhanced, but also their comprehensive cognitive development can be further promoted; The third is to build a cooperative and interactive learning environment, aiming to cultivate a sense of cooperation among children with autism, strengthen their connections with peers and society, and significantly enhance their social adaptability.

This study concludes that music intervention can develop and coordinate the personal abilities of children with autism, enabling them to possess more survival skills. To achieve the goal of adapting to society and improving the quality of life. Music intervention creates a happy and safe intervention environment for children with autism, which can increase their sense of security and enable them to quickly integrate. Entering the environment and using music as a stimulating tool can avoid excessive stimulation on children with autism and reduce the occurrence of problematic behaviors. Secondly, music intervention can enhance the learning interest of children with autism. Music intervention is an attractive intervention method, and its rich and interesting characteristics can increase the frequency of positive reactions in children with autism. Using music as an intervention can help children with autism avoid their weaker communication skills and enable them to learn skills easily and happily.

References

Bui, J., Luauté, J., & Farnè, A. (2021). Enhancing upper limb rehabilitation of stroke patients with virtual reality: a mini review. *Frontiers in Virtual Reality, 2*(1), 595771, DOI: 10.3389/frvir.2021.595771.

Chen, P. W., Baune, N. A., Zwir, I., Wang, J., Swamidass, V., & Wong, A. W. (2021). Measuring activities of daily living in stroke patients with motion machine learning algorithms: a pilot study. *International Journal of Environmental Research and Public Health, 18*(4), 1634, DOI: 10.3390/ijerph18041634.

Esfahlani, S. S., Butt, J., & Shirvani, H. (2019). Fusion of artificial intelligence in neuro-rehabilitation video games. *IEEE Access, 7*(1), 102617-102627, DOI: 10.1088/1742-6596/1830/1/012001.

Fujimoto, K., Ueno, M., Etoh, S., & Shimodozono, M. (2024). Combined repetitive facilitative exercise under continuous neuromuscular electrical stimulation and task-oriented training for hemiplegic upper extremity during convalescent phase after stroke: before-and-after feasibility trial. *Frontiers in Neurology, 15*(1), 1356732, DOI: 10.3389/fneur.2024.1356732.

Kim, W. S., Cho, S., Ku, J., Kim, Y., Lee, K., Hwang, H. J., & Paik, N. J. (2020). Clinical application of virtual reality for upper limb motor rehabilitation in stroke: review of technologies and clinical evidence. *Journal of clinical medicine, 9*(10), 3369, DOI: 10.3390/jcm9103369.

Manjunatha, H., Pareek, S., Jujjavarapu, S. S., Ghobadi, M., Kesavadas, T., & Esfahani, E. T. (2021). Upper limb home-based robotic rehabilitation during COVID-19 outbreak. *Frontiers in Robotics and AI, 8*(1), 612834, DOI: 10.3389/frobt.2021.612834.

Shin, J., An, H., Yang, S., Park, C., Lee, Y., & You, S. J. H. (2022). Comparative effects of passive and active mode robot-assisted gait training on brain and muscular activities in sub-acute and chronic stroke 1. *NeuroRehabilitation, 51*(1), 51-63, DOI: 10.3233/NRE-230004.

Taniguchi, K., & Yu, Y. (2024). Evaluation of Short-Term Clinical Effects of a Novel Repetitive Facilitation Exercise Training Program Using a Hemiplegic Elbow Extension Rehabilitation System. *Machines, 12*(2), 85, DOI: 10.3390/machines12020085.