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Research Article

Investigating the Effectiveness of Music Therapy on Anxiety Caused by Stuttering in Children Aged 4 to 12 Years in Yazd City, Iran

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ABSTRACT

Introduction: This study evaluates the effectiveness of music therapy on anxiety caused by stuttering in children aged 4 to 12 years in Yazd City, Iran.

Materials and Methods: This is an experimental study with a pre-test/post-test design and a control group. The statistical population of the study consisted of 4-12-year-old children with stuttering referred to speech therapy centers in Yazd City, Iran, who were selected based on available sampling and divided into two equal groups, experimental and control, using a simple random method. The instrument of this research included the Spence children's anxiety scale, parent version (SCAS-P). Children with anxiety in the experimental group underwent music therapy for ten 1-h sessions. To analyze the data, the SPSS software, version 24, was used and the significance level of the tests was considered 0.05. The statistical method of covariance analysis was used to analyze the research data.

Results: Based on the results of the analysis of covariance between the two control groups and the music therapy experiment, there was a significant reduction in the average level of anxiety ($P<0.001$, $F=157.045$) of children in the post-test stage.

Conclusion: Music therapy is effective in reducing the anxiety level of children with stuttering; therefore, it can be considered a complementary method to reduce children's anxiety.

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Introduction

Children constitute a significant portion of the global population, and paying attention to their needs and problems is crucial. This is because children are the hopes of the future, and focusing on them during this period will lead to a more vibrant, healthier, and more successful future. One common childhood issue that can lead to future difficulties is speech disorder. This happens when a child has trouble putting sounds together to form words. A prominent language and speech disorder is speech fluency disorder, also called stuttering [1]. Stuttering, as a communication disorder, can create significant challenges in relationships and affect quality of life. If not addressed timely, it becomes more severe as children become adults [2]. Accumulated experiences of stuttering over several years can lead to the development of anxiety toward stuttering, avoidance behaviors associated with it, and negative emotions [3].

Language stuttering creates difficulties in speaking due to disruptions in psychological and natural speech patterns. This can lead to serious problems in interpersonal communication and impact the quality of life for individuals. Children and adolescents with stuttering often experience isolation and rejection and may have lower popularity compared to their peers. They are more likely to face communication difficulties and experience harassment [4, 5]. In preschool and elementary school children with stuttering, the prevalence of social anxiety, school avoidance, and other signs of anxiety is more common [4]. Studies have shown that anxiety and stuttering have a mutual influence on each other, with tension or anxiety exacerbating stuttering. The prevalence of anxiety disorders among individuals with stuttering has been reported to be up to 60%, and the coexistence of anxiety with shuttering leads to frustration, decreased self-esteem, and impairment in social interaction and communication skills. This causes individuals to avoid stuttering by using cognitive language tools (such as changing speech rate and avoiding certain situations that require speaking, such as speaking in front of a group or on the phone) [6-8]. In a study conducted by Iverach et al. (2016), it was reported that school-aged children with stuttering are six times more likely to have social anxiety disorder and seven times more likely to have generalized anxiety disorder [9].

Most of the time, the fear and anxiety experienced by individuals with stuttering result from negative evaluations by others, such as being teased or mocked during moments of stuttering. Stuttering tends to worsen when the individual with stuttering speaks with a stranger or a person they perceive to be superior. As a result, they try to avoid speaking in groups, leading to feelings of anxiety and fear [10].

Humans display different reactions to emotional and behavioral disorders, limitations, environmental pressures, and even physical disabilities. It is natural for some individuals, especially those with speech disorders, to be more sensitive to these issues. These sensitivities and pressures hinder their mental well-being, causing psychological disturbances, muscle tension, anxiety, and exacerbation of speech disorders [11]. These individuals may experience heightened emotional states such as irritability, generalized tension, or negative emotions like anxiety, anger, shame, etc., which disrupt the mechanisms surrounding speech [12]. Therefore, one of the areas related to this disorder that has received significant attention from researchers is anxiety disorders and anxiety-related problems in individuals with stuttering [13]. Individuals with stuttering are susceptible to anxiety and anxiety disorders [8, 14]. Research has shown that tension and anxiety worsen stuttering and its co-occurrence with anxiety leads to increased stress, decreased self-esteem, and impairment in social functioning [12].

Considering the negative psychological, social, personality, and educational effects of stuttering on children, and recognizing the role of anxiety in exacerbating stuttering, it is necessary to provide solutions to reduce the severity of stuttering and anxiety in these children. Due to the problems of stuttering in children and the prevalence of anxiety disorders among them, various therapeutic and educational programs have been developed to improve, prevent, and treat such issues. Among these non-pharmacological treatments, those without side effects have recently been emphasized. One non-pharmacological method for reducing anxiety is relaxation and music therapy. Music therapy refers to the use and application of music in therapy and rehabilitation to restore, maintain, and improve an individual's mental and physical health. Music has the potential to be used in therapy and has a powerful ability to influence the brain and body in complex and unique ways [15]. Music therapy is a form of treatment that can be used to help people deal with physical, emotional, and psychological issues. Some of the main problems that it can address include pain, anxiety, sadness, and communication difficulties [16]. Music therapy can be helpful for people of all ages [17]. Research shows that singing special songs, chanting, and counting sounds continuously can help people who stutter to improve over time [18]. Rhythm, rhythmic poetry reading, and musical sounds can also help

to strengthen speech fluency and reduce stuttering [19]. Furthermore, music therapy can have a calming effect and may allow people with stuttering to explore and address their emotions and fears about stuttering [20]. Overall, music therapy can be an effective tool for improving self-esteem and addressing emotional issues related to stuttering [21]. Therefore, considering the therapeutic effects of music therapy, which is considered one of the non-pharmacological treatments for many disorders, this study investigates the impact of music therapy on anxiety resulting from stuttering in children.

Materials and Methods

Study participants

The present study is an applied and experimental research, employing a pre-test/post-test design with a control group. The statistical population for this study consisted of children aged 4 to 12 years with stuttering who visited speech therapy centers in Yazd City, Iran, during 2021-2022. The sample size for both the treatment and intervention groups was set at a minimum of 15 individuals, which is considered sufficient based on previous experimental research [22].

In this study, a group of 15 individuals receiving music therapy and a control group of 15 individuals were included. To select the sample, all children with stuttering who visited the speech therapy department of Bahar Rehabilitation Center in Yazd City, Iran, were identified through referral lists and speech therapy records. Then, with the coordination of the head and speech therapist assistant of the speech therapy department, the records of 64 children aged 4-12 years with language stuttering were examined, consisting of 39 boys and 25 girls. From these 64 individuals, a total of 36 children whose families agreed to their participation in the research project were selected. The parents of the selected individuals were then asked to complete the Spence children's anxiety scale-parent version (SCAS-P), and finally, 30 children with higher levels of anxiety were selected as the study sample. The desired sample was randomly divided into two groups: Experimental and control groups. The experimental group underwent 10 one-hour sessions of music therapy treatment.

The inclusion criteria were being in the age range of 4 to 12 years, having a minimum of one-year history of language stuttering disorder, obtaining a score of 20 or higher on the anxiety questionnaire, obtaining consent from parents and children themselves, and not undergoing treatment with other therapeutic methods were considered for selecting the experimental samples. Additionally, the exclusion criteria were irregular participation in educational classes, lack of parental consent for their children to participate in educational classes, lack of interest of children in participating in educational classes, and undergoing treatment with other therapeutic methods. The work process was clarified during the treatment sessions, and the effects of the interventions were explained to the participants. When the process is clarified, it helps parents and children understand what to expect during the treatment sessions. This understanding can reduce anxiety, and increase trust in the treatment. Clear communication about the intervention's effects can also empower parents and children, leading to a more positive experience and enhanced satisfaction with the overall treatment process. The researchers have strived to establish as well as maintain a cooperative communication atmosphere with parents throughout the treatment period by addressing their concerns. Information analysis was conducted in a group format using codes and numbers instead of names to ensure anonymity, thereby convincing the participants of confidentiality.

Study instruments

The data collection tools included a checklist of demographic and clinical information (age, gender, disease history) and SCAS-P. SCAS-P consists of 38 items and 6 subscales, including fear and anxiety about open spaces (9 items), separation anxiety (6 items), fear of physical harm (5 items), social anxiety or phobia (6 items), obsessive-compulsive symptoms (6 items), and general anxiety (5 items). The scale is completed by parents. The total score of this questionnaire is obtained from the sum of scores on the above-mentioned subscales. The responses to the questions are rated based on a 4-point Likert scale (never, sometimes, often, always) and scored from 0 (never) to 3 (always). The maximum score that can be obtained is 114 [23, 24]. In addition to the subscales, this questionnaire also provides a total score that represents overall anxiety and can be used for analysis. The validity and reliability of this questionnaire have been assessed in previous research, with a validity coefficient of 0.874 and a reliability coefficient of 0.89 for the overall test [25].

Study design and data collection

This study was conducted by providing music therapy sessions once a week for a duration of ten 1-h sessions for the experimental groups. The sessions were conducted by two specialists in the field of music therapy at the speech therapy center in Yazd City, Iran, one day

Table 1. Overview of music therapy sessions

Sessions	Description of Sessions
1	Introduction and acquaintance of group members, description of goals and rules of music therapy group for individuals
2	Feedback from the previous session, introduction of musical rhythms (beat, accent, pause, and stop), engaging in rhythmic games, assignment presentation
3	Feedback and repetition of exercises from the previous session, reducing anxiety and promoting relaxation using musical rhythms, and assignment presentation
4	Feedback and repetition of exercises from the previous session, creating calmness, improvisation, group exercises, assignment presentation
5	Feedback and repetition of exercises from the previous session, building self-confidence, playing rhythmic movements and harmonizing with the music, assignment presentation
6	Feedback and repetition of exercises from the previous session, expressing emotions and self-expression through improvisation singing, assignment presentation
7	Feedback and repetition of exercises from the previous session, practicing longer and more complex songs from children's songbooks with specific objectives (to improve quality of life and reduce anxiety levels), repeating songs while clapping hands, assignment presentation
8	Feedback and repetition of exercises from the previous session, teaching anxiety management through musical rhythms, assignment presentation
9	Feedback and repetition of exercises from the previous session, using melodic speech to narrate a story without clapping hands and gradually approaching natural speech in individual and group exercises, assignment presentation
10	Feedback and repetition of exercises from the previous session, review of all course exercises, conducting post-test and closing ceremony

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per week for two and a half months. Table 1 provides a summary of the objectives and methods of the music therapy sessions.

Statistical analysis

Mean±standard deviation (SD), frequency, and percentage were used for descriptive variables. The normality of data distribution was investigated using Kolmogorov-Smirnov test, which confirmed the normal distribution of the data.

Statistical calculations were done in SPSS software, version 24. A multivariate analysis of covariance was used for statistical inference to assess group differences on multiple continuous dependent variables. Also, the Levene test was employed to assess the equality of variances between groups. A significance level of α=0.05 was considered.

Results

Descriptive findings related to the research variable are provided in Table 2.

Table 2. Descriptive statistics of the anxiety variable

Anxiety		N	Minimum	Maximum	Mean±SD
Control group	Pre-test	15	10.00	41.00	25.7333±10.96401
	Post-test	15	10.00	42.00	25.6000±11.26816
Test group	Pre-test	15	11.00	41.00	25.7333±11.13852
	Post-test	15	4.00	00	19.8000±11.21988

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Table 3. The results of the analysis of covariance test

Name of the Test	Value	F	Significance	Degree of Freedom of Error	Degree of Freedom of Hypothesis
Pillai trace	0.376	7.533	0.003	25	2
Wilk lambda	0.624	7.533	0.003	25	2
Hotelling trace	0.603	7.533	0.003	25	2
Roy largest root	0.603	7.533	0.003	25	2

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Before analyzing the covariance test, the Kolmogorov-Smirnov and Levene tests were used to ensure the assumptions of the test were met. The Kolmogorov-Smirnov test confirmed the normality of the variable's distribution in the research population. The Levene test indicated that the assumption of equal variances between groups was met.

As shown in Table 3, all tests have a significance level of $P<0.05$, indicating that the analysis of the covariance test can be applied. This suggests a significant difference between the experimental and control groups in at least one of the dependent variables.

To examine the differences between the experimental and control groups, the between-subjects effects test was used, and the results are presented below.

According to Table 4, the results of the between-subjects effects test for comparing the anxiety variables in the post-test stage between the experimental and control groups are shown. According to the results presented in Table 4, the obtained F value is significant. In other words, music therapy has led to a reduction in children's anxiety.

Discussion

This study investigated the effect of music therapy on anxiety resulting from stuttering in children. The results of the research showed that the mean pre-test and post-test anxiety scores in the experimental group were 25.33 and 19.8, respectively. This indicates a decrease of 5.53 in anxiety scores. Furthermore, the results of the analysis of covariance demonstrated that music therapy is effective in reducing anxiety in children with stuttering. The finding aligns with the results of a study [26], indicating the impact of music therapy in decreasing exam anxiety. Similarly, another study [27] demonstrates the effectiveness of music therapy in reducing children's anxiety. Amini et al. [28] also illustrated how music therapy reduces anxiety related to the COVID-19 pandemic. Additionally, various studies [29-31] have confirmed the consistent impact of music therapy in reducing anxiety and stress.

Music therapy, with its pleasant and enjoyable imagery effects [32] can provide individuals with a sense of relaxation and emotional release. As Brocklehurst (2013) stated, music activities at various sensory and motor levels create a safe, stimulating, and enjoyable environment, facilitating therapeutic communication and increasing individual and group activities. Music can convey human feelings, emotions, perceptions, and cognition without the need for speech or language [33]. Evidence suggests that rhythm, rhythmic chanting, and music sound can enhance speech flow in language impairment and reduce it [19]. It also improves speech fluency in these individuals by helping them "let go of their fears and anxieties about stuttering or situations that increase stuttering" [20]. Overall, music therapy helps individuals with language impairment regain their self-esteem and serves as an effective tool for identifying and exploring emotions [21].

Table 4. Results of the between-subjects effects test for comparing the anxiety variables in the post-test stage between the experimental and control groups

Variable	Sum of Square	Degree of Freedom	Mean Square	F	Significance	Effect Size
Anxiety	3766.467	3	1255.489	1263.603	0.001	0.993

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According to the metacognitive theory of Wells (2000), the use of redirection techniques can shift individual attention from anxiety-provoking stimuli to external stimuli, and music therapy is used as a tool to redirect attention. Music therapy can reduce the secretion of adrenaline and noradrenaline, thereby lowering blood pressure and heart rate [34]. According to various studies, music therapy is effective in promoting relaxation, reducing anxiety and stress, and treating depression [35]. Musical activities, such as playing instruments, moving with music, and creating melodies allow individuals to express their emotions and transform undesirable motivations into socially acceptable behaviors. Additionally, activities involving singing, playing instruments, and group discussions help emotionally vulnerable children and adults in the following areas: 1) Self-awareness, 2) Improving communication skills, 3) Appropriate emotional expression, and 4) Increasing group cooperation [36].

Musical sounds and melodies can divert thoughts from anxiety and aid in stress adaptation [37]. One of the calming effects of music is its ability to reduce anxiety levels and induce a sense of tranquility. Music helps with mental focus, improves mood, and prevents hallucinations and obsessive thoughts. Furthermore, certain musical notes can regulate heart rate, breathing patterns, muscle relaxation, and induce sleepiness. Therefore, the use of music therapy is effective in reducing anxiety in children with language impairment [38].

Conclusion

Music therapy, as a non-pharmacological method, has a significant impact on reducing anxiety caused by stuttering in children aged 4 to 12 years. When children are exposed to music and music therapy, it helps them become more self-aware and enhances their performance. Additionally, when they sing collectively in a music therapy group, they can identify and express their true feelings, momentarily detaching themselves from external and internal problems, and experiencing a sense of calm and liberation. By engaging in these activities in a group setting, children can experience emotional discharge and benefit from the positive feedback they receive, thereby reducing their anxiety. Rhythmic play integrated with music for children leads to increased serotonin production (the happiness hormone) in their brains, resulting in a sense of relaxation and ultimately reducing anxiety. Therefore, music therapy can be considered a complementary method for reducing anxiety in children. The current research proposes implementing and supporting continuous music therapy as a non-pharmacological approach, alongside other treatments, to alleviate anxiety in children. Hence, establishing a secure environment for group music therapy sessions is crucial to fostering children's singing and collective expression.

Future research recommendations

For future research, the following suggestions are provided: Explore similar studies with adults who stutter, as this demographic possesses well-established personalities and less malleable attitudes, potentially enhancing understanding of the impact of simulation techniques on communication attitudes; further, investigate the impact of music therapy on additional challenges linked to stuttering.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Science and Arts University of Yazd (Code: IR.ACECR.JDM.REC.1402.027). All individuals received written information about the research and chose to participate if they wished. Participants were assured that all information would remain confidential and be used solely for research purposes. To ensure privacy, participants' names were not recorded.

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Authors' contributions

Conceptualization, supervision, and investigation: Mohsen Saeidmanesh; Data collection, developing the therapeutic program, and preparing the report: Fateme Moqhimi; Data analysis and consultant: Mohammad Reza Yousefi; Final approval of the handwritten version: All authors.

Conflict of interest

The authors declared no conflict of interest.

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