



# The effect of active music therapy on the severity of positive and negative symptoms and performance in patients with schizophrenia

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## Abstract

**Objectives:** Music therapy has been recognized as an effective treatment for various conditions, including psychiatric disorders like schizophrenia. Given the limited number of studies on music therapy and its effects on schizophrenia in Iran, and the importance of incorporating multi-modal treatment approaches for this disorder, this study aimed to evaluate the impact of music therapy on the positive and negative symptoms and overall functioning of chronically schizophrenic patients.

**Methods:** A pre-post clinical trial was conducted in 2021 at the Parham Care Center in Kashan, involving 43 patients with chronic schizophrenia diagnosed based on DSM-V criteria. Patients underwent three sessions of music therapy per week for six months. Assessment tools included the Positive and Negative Symptoms Scale (PANSS), Brief Psychiatric Rating Scale (BPRS), and Global Assessment Function (GAF) scale administered before and after the intervention.

**Results:** Following music therapy, there was a significant decrease in overall scores and subscales as measured by PANSS and BPRS ( $P < 0.001$ ), accompanied by a significant improvement in patients' functioning based on the GAF scale ( $P < 0.001$ ).

**Conclusions:** The study findings suggest that integrating music therapy, both active and passive, alongside standard pharmacotherapy for chronic schizophrenia can lead to a significant reduction in positive and negative symptoms while enhancing overall functioning.

**Keywords:** Music Therapy, Negative Symptoms, Positive Symptoms, Schizophrenia.

## Introduction

Schizophrenia affects more than 26 million individuals globally, making it a significant public health concern, as highlighted by the World Health Organization (WHO).<sup>[1-3]</sup> The disorder's early onset, enduring impairments, substantial need for hospitalization, ongoing clinical care, and support services contribute to its substantial financial burden, equivalent to the combined costs of all cancers.<sup>[4,5]</sup> Despite pharmacotherapy being the primary treatment approach for schizophrenia, residual symptoms persist post-treatment, underscoring the importance of integrating complementary therapeutic modalities.<sup>[6]</sup> Numerous studies advocate for a combination therapy approach incorporating psychosocial interventions alongside pharmacotherapy.<sup>[7]</sup>

Music therapy has emerged as one of the most effective and practical interventions in psychiatry, offering controlled use of music to elicit positive effects on human physiology, psychology, and emotions.<sup>[8]</sup> Music therapy encompasses passive and active forms: passive therapy involves listening to recorded or live music, while active therapy entails engaging in live music, singing, playing percussion instruments, and physical activities. Both modalities promote social interaction and communication.<sup>[9,10]</sup> Music's impact on neurotransmitters and hormones like serotonin, dopamine, adrenaline, and testosterone influences mental health and emotional regulation, while also modulating physiological functions such as blood pressure, respiratory rhythm, and brain oxygenation.<sup>[11,12]</sup> Music therapy has been utilized in

treating various conditions, including acute psychiatric disorders, chronic schizophrenia, and personality disorders, with documented benefits in health improvement, stress reduction, symptom alleviation, and modulation of the autonomic nervous system.<sup>[13,14]</sup>

Moreover, music enhances attention and memory,<sup>[15,16]</sup> with active and passive music therapy shown to reduce positive symptoms of schizophrenia and enhance patients' performance in cognitive assessments and daily life skills.<sup>[17,18]</sup> Music therapy serves as a platform for patients with severe mental illnesses to express themselves in a supportive environment conducive to communication and relationship building.<sup>[19]</sup> The role of the music therapist as a facilitator and communication bridge is pivotal in fostering patient expression and connection. Extensive research has substantiated the positive impacts of music therapy on individuals with psychological disorders, with empirical evidence demonstrating emotional responses elicited by music listening.<sup>[20]</sup>

## Objectives

Given the limited availability of rehabilitation programs for patients with schizophrenia, their minimal participation in music therapy initiatives, and the scarcity of research on the impacts of music therapy on individuals with schizophrenia in Iran, this study aimed to evaluate the effects of music therapy on positive and negative symptoms as well as functioning in schizophrenic patients.

## Methods

This clinical trial, a before-after study with a single-arm design, lasted for six months and was conducted on patients with chronic schizophrenia at the Parham Psychiatric Care Center in Kashan, affiliated with the State Welfare Organization of Iran, in 2021.

Patients were selected using the convenient sampling method. The sample size was determined based on a previous study on the effects of music intervention on psychiatric symptoms and depression in patients with schizophrenia,<sup>[21]</sup> with parameters of  $\mu_1=73.89$ ,  $\mu_2=65.77$ , SD difference =18.49,  $\alpha=0.05$ ,  $\beta=0.2$ , resulting in a sample size of 43.

Inclusion criteria included chronically schizophrenic patients with no prior history of music therapy, no recent treatment changes in the past six months, and residency at the care center for 1-2 years. Exclusion criteria comprised patients with impaired hearing or sight, intellectual disability, movement disorders, non-cooperation, and those requiring new interventions during the study.

Patients participated in active music therapy sessions three times a week, each lasting 45 minutes. Group music therapy involved playing elementary instruments such as the drum, def, tambourine, shaker, cajon, daghakh, chubak, bell, and triangle.

All patients underwent pre-testing before the intervention, with post-tests administered after six months of music therapy by a psychologist blinded to the intervention. The Positive and Negative Syndrome Scale (PANSS), Brief Psychiatric Rating Scale (BPRS), and Global Assessment of Functioning (GAF) questionnaires were used to collect data. Medications were administered based on routine protocols during the study.

The PANSS questionnaire was developed in 1986 by Kay, Physbin, and Opler to assess the severity of positive and negative symptoms in patients with schizophrenia. This medical scale has been widely utilized in evaluating the effectiveness of antipsychotic treatments. The name of the scale reflects its focus on two categories of symptoms associated with schizophrenia: positive and negative. Comprising 30 questions, the PANSS questionnaire prompts respondents to rate their experiences on a 5-point scale ranging from "not at all" to "very high." Components of the questionnaire include negative symptoms and positive symptoms such as disintegration, excitement, anxiety, and depression. In a study conducted by the questionnaire's developers, the Cronbach's alpha coefficient was reported to be 83%, and its correlation with the Andriessen positive and negative symptoms scale was 58%. Two studies in Iran reported Cronbach's alpha values of 80% and 77%, respectively, indicating acceptable validity through factor analysis.<sup>[22]</sup>

On the other hand, the BPRS consists of 18 questions aimed at assessing both psychotic and non-psychotic symptoms in individuals with psychiatric disorders, particularly schizophrenia. Each symptom is rated on a seven-point scale from 1 to 7 based on clinician observations during interviews, enabling the evaluation of psychotic symptom severity. Reported reliability coefficients for this scale include a contingency coefficient of 0.56 and a reliability coefficient of 0.87.<sup>[23]</sup> These scales play crucial roles in evaluating and monitoring symptoms in individuals with schizophrenia and other psychiatric disorders, providing valuable insights for treatment planning and monitoring progress.

The GAF scale is utilized to assess the severity of mental illnesses by measuring the impact of symptoms on an individual's daily life on a scale ranging from 0 to 100. It aids mental health professionals in understanding the individual's ability to engage in daily activities, determine

appropriate levels of care, and predict treatment outcomes. Compared to other scales, the GAF scale has been reported to have a reliability of 74% and strong validity ( $P < 0.0001$ ,  $N = 44$ ,  $r = 0.60$ ).<sup>[24,25]</sup>

The continuous variables were expressed as the mean  $\pm$  SD, and the categorical variables were presented as a percentage and frequency. To assess the impact of music therapy on the dependent variables, paired t-tests were conducted. All statistical analyses were performed with SPSS (version 16.0, SPSS Inc, Chicago, IL, USA). A "P-value" less than 0.05 was considered significant.

The study was conducted in accordance with the Declaration of Helsinki. Prior to commencing the study, written informed consent was obtained from patients or their caregivers, and ethical approval was granted by the ethics committee of Kashan University of Medical Sciences under the code IR.KAUMS.MEDNT.REC.1399.001. Additionally, this study was registered on the Iranian Registry of Clinical Trials portal under the code "IRCT20200218046532N1."

## Results

In this study, 40 patients completed the intervention period, with three patients (6.9%) dropping out due to discharge from the center, lack of interest in treatment, and hospitalization due to disease exacerbation. All participants were male, with a mean age of 45.9 (8.2) years. Among the patients, 23 (57.5%) were single, and 17 were married (42.5%). The majority of patients had a moderate socioeconomic status (65%), an elementary level of education (40%), and a positive family history of schizophrenia (85%) [Table 1].

The pre-test results indicated a PANSS score of  $1.50 \pm 0.52$ . Among the PANSS subscales, the highest scores were observed in negative symptoms ( $2.44 \pm 0.65$ ), while the lowest scores were found in the anxiety and depression subscales ( $0.84 \pm 0.75$ ). The BPRS score was  $1.46 \pm 0.62$ , with the highest scores in the resistance subscale ( $1.75 \pm 0.90$ ) and the lowest in the orientation subscale ( $0.87 \pm 0.79$ ). The GAF scale score was  $32.13 \pm 8.38$  [Table 2].

Following the intervention, post-test results showed PANSS scores of  $1.09 \pm 0.38$ , with the highest score in negative symptoms ( $1.63 \pm 0.64$ ) and the lowest in anxiety and depression subscales ( $0.62 \pm 0.40$ ). BPRS scores were  $0.76 \pm 0.47$ , with the highest score in negative symptoms ( $0.99 \pm 0.74$ ) and the lowest in the orientation subscale ( $0.45 \pm 0.71$ ). The GAF scale post-test score was  $41.02 \pm 8.42$ .

Significant reductions were observed in PANSS scores post-intervention ( $0.42 \pm 0.4$ ,  $P < 0.001$ ), with all PANSS subscales showing significant declines except for anxiety and depression subscales ( $P < 0.05$ ). Similarly, BPRS scores significantly decreased ( $0.7 \pm 0.53$ ,  $P < 0.001$ ), as did GAF scale scores ( $-8.9 \pm 5.54$ ,  $P < 0.001$ ).

Effect sizes were categorized into small (0.2-0.5), medium (0.5-0.8), and large ( $> 0.8$ ) groups based on absolute value differences post-intervention. The PANSS exhibited the largest effect size in the negative symptoms subscale (-1.54), while the BPRS had large effect sizes in all subscales except for the orientation subscale, which had a small effect size (-0.45). The GAF scale also showed a large effect size (1.60).

To assess possible confounding factors on treatment outcomes, linear regression using the random-effects model was employed. No interactions were found between marital status ( $Z = 1.35$ ,  $p = 0.178$ ), education ( $Z = 1.57$ ,  $p = 0.116$ ), family history of schizophrenia ( $Z = 0.79$ ,  $p = 0.428$ ), and GAF score [Table 3].

**Table 1.** The demographic data of the patients

Variable		
<b>Age (mean and standard deviation)</b>		45.9 $\pm$ 8.22
<b>Sex</b>	Male	40 (100%)
<b>Marital status</b>	Single	23 (57.5%)
	Married	17 (42.5%)
<b>Education</b>	Illiterate	10 (25%)
	Elementary	16 (40%)
	Middle school	6 (15%)
	High school	6 (15%)
	Diploma and higher	2 (5%)
<b>Economical status</b>	Poor	9 (22.5%)
	Middle	26 (65%)
	High	5 (12.5%)
<b>Family history</b>	Positive	34 (85%)
	Negative	6 (15%)

## Discussion

This study aimed to evaluate the impact of music therapy on positive and negative symptoms in chronically schizophrenic patients and their overall functioning. A total of 43 patients with chronic schizophrenia participated in music therapy sessions in addition to receiving standard treatment. The results revealed significant improvements in symptoms and functioning as assessed by the PANSS, BPRS, and GAF scales.

**Table 2.** The scores of PNASS, BPRS, and GAF questionnaires

	Subscale	Music therapy		Score difference	P value
		Before	After		
PANSS	Negative symptoms	2.44±0.65	1.63±0.64	0.8±0.52	<0.001
	Positive symptoms	1.72±0.89	1.18±0.55	0.54±0.69	<0.001
	Disorganization	1.15±0.66	0.91±0.61	0.25±0.50	<0.003
	Agitation	1.36±0.78	1.04±0.65	0.32±0.56	<0.001
	Anxiety & depression	0.84±0.75	0.62±0.40	0.21±0.67	0.05
	Total score	1.50±0.52	1.09±0.38	0.42±0.40	<0.001
BPRS	Mood symptoms	1.59±0.83	0.82±0.5	0.76±0.72	<0.001
	Positive symptoms	1.58±0.90	0.81±0.70	0.76±0.62	<0.001
	Negative symptoms	1.69±0.93	0.99±0.74	0.70±0.68	<0.001
	Resistance	1.75±0.90	0.82±0.77	0.93±0.89	<0.001
	Activity	1.25±0.62	0.65±0.51	0.6±0.72	<0.001
	Orientation	0.87±0.79	0.45±0.71	0.42±0.93	<0.006
	Total score	1.46±0.62	0.76±0.47	0.70±0.53	<0.001
GAF	Total score	32.13±8.38	41.02±8.42	-8.90±5.54	<0.001

**Table 3.** The effect size of the subscales of PNASS, BPRS, and GAF questionnaires

Variable	Effect size	Effect size group
PANSS (negative symptoms)	1.54	Large
PANSS (positive symptoms)	-0.78	Medium
PANSS (disorganization)	0.50	Medium
PANSS (agitation)	0.57	Medium
PANSS (Anxiety & depression)	0.31	Small
PANSS (total score)	1.06	Large
BPRS (mood symptoms)	1.06	Large
BPRS (Positive symptoms)	1.22	Large
BPRS (Negative symptoms)	1.01	Large
BPRS (resistance)	1.04	Large
BPRS (activity)	0.84	Large
BPRS (orientation)	0.45	Small
BPRS (total score)	1.30	Large
GAF (total score)	-1.60	Large

In a study conducted by Talwar et al., in 2006, 81 patients with schizophrenia and schizophrenia-like psychosis diagnosed according to ICD-10 criteria in London were divided into case (33 patients receiving standard treatment + music therapy) and control (48 patients undergoing standard treatment) groups. Music therapy sessions were

conducted once a week for three months. The study utilized PANSS, client satisfaction, and GAF scales, showing a noticeable reduction in negative symptoms based on the total PANSS score.<sup>[26]</sup> This finding aligns with the outcomes observed in our study, which focused on chronically schizophrenic patients and involved a longer treatment duration (6 months vs. 3 months), incorporating the BPRS alongside the PANSS and GAF scales.

Ulrich et al. investigated 32 patients with acute psychosis based on ICD-10 criteria in Germany, with 11 patients receiving standard treatment as a control group and 21 patients undergoing standard treatment plus music therapy. The intervention group received an average of 7.5 music therapy sessions in total, with 1.6 sessions per week. The study used the Gießentest self-assessment scale, Gießentest observer assessment scale, SANS for negative symptoms, and Scales for mental health to assess quality of life.<sup>[27]</sup> Results indicated a significant impact on patients' psychosocial status and negative symptoms, while no difference was observed in terms of quality of life and observers' evaluations. Notably, our study focused exclusively on patients with schizophrenia, featured a longer intervention period, and had a larger sample size, demonstrating significant enhancements in patient functioning using the GAF scale.

Similarly, Peng et al., examined 67 patients diagnosed with schizophrenia and categorized them into intervention (n=32) and control (n=35) groups based on DSM-IV criteria. Active and passive music therapy interventions were administered five times a week for two weeks. Consistent with our findings, BPRS was employed to assess patient status, revealing a significant decrease in

all BPRS subscale scores. However, our study exclusively utilized active music therapy compared to the active and passive approaches in their research, along with broader scales over an extended timeframe.<sup>[28]</sup>

In 2015, a study conducted by Kavak et al., in Turkey investigated 70 patients with chronic schizophrenia. The patients were divided into control (35 patients receiving standard treatment) and intervention (35 patients receiving standard treatment + music therapy) groups. Passive music therapy and relaxation sessions were administered five times a week for four weeks. The researchers utilized the BPRS and CDSS (The Calgary Depression Scale for Schizophrenia), with significant decreases observed in scores on both scales.<sup>[29]</sup> Similar to our study, they focused on chronically schizophrenic patients. However, in addition to the total BPRS score, we incorporated PANSS subscales, total GAF scores, and BPRS subscales.

Kosugi et al., conducted a study in Japan involving 36 schizophrenic patients diagnosed based on the DSM-IV criteria. The patients underwent a 30-session music therapy treatment with two sessions per week. Pre- and post-intervention assessments using the BACS (Brief Assessment of Cognition in Schizophrenia) scale and BPRS showed improvements in all BPRS and BACS subscales.<sup>[30]</sup> Our study yielded similar results; however, compared to this study, we employed a wider range of scales.

There is a scarcity of studies on the effects of active music therapy in schizophrenia, particularly on a national level, with existing research primarily focusing on passive music therapy. Therefore, our study represents a novel contribution that builds upon previous limited findings. A limitation of our study was the small sample size and absence of a control group due to the limited population size. One of the strengths of our study was the utilization of active music therapy for schizophrenia patients, which had not been previously explored, along with an extended intervention duration compared to other studies in this area.

## Conclusions

The findings of this study suggest that incorporating both active and passive music therapy alongside standard pharmacotherapy in chronic schizophrenia can lead to significant reductions in positive and negative symptoms and improvements in overall functioning. In the current landscape where combination therapy is increasingly favored for treating psychiatric disorders, music therapy emerges as a valuable treatment modality to complement

pharmacotherapy and other non-pharmacologic interventions in addressing various facets of schizophrenia.

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## Competing interests

The authors declare that they have no competing interests.

## Abbreviations

World Health Organization: WHO;  
Positive and Negative Syndrome Scale: PANSS;  
Brief Psychiatric Rating Scale: BPRS;  
Global Assessment of Functioning: GAF.

## Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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## Availability of data and materials

The data used in this study are available from the corresponding author on request.

## Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki. Prior to commencing the study, written informed consent was obtained from patients or their caregivers, and ethical approval was granted by the ethics committee of Kashan University of Medical Sciences under the code IR.KAUMS.MEDNT.REC.1399.001. Additionally, this study was registered on the Iranian Registry of Clinical Trials portal under the code "IRCT20200218046532N1."

## Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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