

Music Therapy and Mental Health: A Quasi-Experimental Assessment of Anxiety and Depression Reduction Among Adults

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ABSTRACT

Mental health conditions and disorders, such as anxiety and depression, are common, but factors like cost, access to professionals and stigma limit access to traditional care. Music therapy is a potential alternative approach that does not involve the use of medications. This study was a quantitative pre-test/post-test design to determine the effectiveness of a music therapy intervention for 100 adults (ages 18-60) to reduce anxiety and depression. The intervention consisted of 2–3 sessions per week that lasted for 30–45 minutes, such as listening, singing, and instrument playing, and song writing. GAD-7 and PHQ-9 were used to assess anxiety and depression levels, respectively. The analysis of paired t-tests, effect size, correlation, and perception surveys were conducted. Results indicated that both outcomes were significantly decreased. Mean GAD-7 scores decreased from 13.42 to 8.67 (mean reduction 4.75 points), $t(99)=12.34$, $p<0.001$, Cohen's $d=1.23$. Mean PHQ-9 scores decreased from 14.85 to 9.46 (mean reduction 5.39 points), $t(99)=13.87$, $p<0.001$, Cohen's $d=1.39$. 78% (anxiety) and 81% (depression) participants made clinically meaningful improvements. There was a moderate correlation between attendance and improvement ($r=0.52$, anxiety; $r=0.48$, depression; both <0.001). The overall response rate was very favourable with a score of 86–94% agreement of the participants in therapeutic benefits and healthcare integration. The study found that structured Music therapy is highly effective and has large effect size in reduction of anxiety and depression levels, besides being highly acceptable. Music therapy is a simple, easy-to-access and low cost non-pharmacological treatment for adult mental health.

Keywords: Music therapy, anxiety reduction, depression reduction, non-pharmacological intervention, GAD-7, PHQ-9

INTRODUCTION

Mental health disorders are now acknowledged as a significant public health problem worldwide and anxiety and depression are among the most common and debilitating disorders (Ibiapina & Lopes, 2022). According to the World Health Organization (WHO), more than 300 million people in the world are currently suffering from depression and an estimated 264 million people are experiencing anxiety disorders (Wang & Yan, 2023). They can have high personal, social and economic impacts such as lower functional ability in life, lower interpersonal relationships, decreased productivity, increased health care costs, etc (Lorber & Divjak, 2022). Anxiety tends to involve a general sense of worry, nervousness or feeling on edge, as well as increased physiological arousal, whereas depression can include feelings of

sadness, hopelessness, fatigue and loss of interest or pleasure in activities. These disorders are common and pervasive, making the need for effective and accessible mental health interventions a great need (Belski & Abdul-Rehman, 2022).

The use of pharmacological treatments and psychotherapy are well-established treatments for anxiety and depression. Antidepressants, anxiolytics and cognitive-behaviour therapy (CBT) have shown to be effective in decreasing symptoms and functional outcomes (Huang.E & Huang.j, 2023). These traditional therapies, however, have several drawbacks, making them less accessible and acceptable. However, high treatment costs, limited numbers of trained mental health providers, social stigma, and side effects are barriers to treatment, especially in low resource areas (Dhippayom & Saesook, 2022). Consequently, a large number of people suffering from anxiety and depression disorders don't receive the necessary treatment or care. This is an opportunity for effective, non-pharmacological, cost-effective and integrated interventions which complement the current mental health landscape.

Over the last few years, music therapy has become a promising nonpharmacological treatment that has been shown to have psychological benefits (Konoerl & Mazzola, 2022). Music therapy is the deliberate and research-based method that utilizes music-based activities such as listening to music, singing, playing instruments and composing music in the context of a therapeutic relationship to fulfill emotional, cognitive and social needs. Music therapy is more than just a cognitive tool; it also has an emotional impact, leading to a decrease in stress, better mood regulation, increased emotional expression and relaxation. These mechanisms are especially important for the regulation of anxiety and depression symptoms, since they engage both emotional and cognitive aspects of the disorders. Moreover, music therapy is culturally adaptable, can be carried out individually or in groups, and is cost-effective, providing it an easy tool to be used with various population groups (Xu & Liu, 2024).

Although there has recently been an increase in the interest in music therapy, several gaps still exist in the research. Due to this, most of the previous studies have been on subpopulation groups such as children, older adults or chronic psychiatric patients, with not enough evidence available for the general adult population. Furthermore, the methodological limitations such as different assessment methods, different music types, different durations of sessions and different session frequencies make general statements about efficacy difficult (Caponnetto & LaMattina, 2022). There are not many studies that use a suitable experimental design (pre-test and post-test) to measure the effects of structured music therapy in adult anxiety and depression. There is currently no consistency of evidence-based research to support the integration of music therapy into the mainstream during mental health treatment, and less research to support its use as an alternative or complementary treatment option.

To fill these gaps, this study aims to explore the effectiveness of structured music therapy sessions in decreasing anxiety and depression levels of adults aged 18-60 years (Monsalve & Betancourt, 2022). A quantitative pre-test/post-test experimental design will be used for the research to examine the difference in psychological well-being before and after a six week music therapy program. The participants will be involved in evidence-based music activities facilitated by trained facilitators in a standardised way (Wazzan & Estaitia, 2022). The systematic examination of both anxiety and depression outcomes will offer empirical evidence for the therapeutic value of music therapy, and the possibility of music therapy as a non-pharmacological tool for adults.

The implications of this study are that it may be used to broaden the mental health care intervention available especially in areas where traditional approaches to treatment are limited or unavailable. The results can contribute to clinical work, to developing policies, and to integrating alternative therapies into educational, health and community settings, as it has shown that music therapy is efficient in decreasing anxiety and depression symptoms. Furthermore, the research results will be part of the growing literature on music therapy, providing a model for future research to explore the long-term effects, other patient groups and the use of music in combination with other therapies. Finally, this research is intended to help expand the knowledge of accessible and affordable interventions to help

support mental health and quality of life for adults with anxiety and depression (Matziorinis & Koelsch, 2022).

Background of the Problem

Despite a series of new pharmacological and psychotherapeutic developments, anxiety and depression disorders are still among the most common and debilitating mental health conditions worldwide (Finnerty & McWeeny, 2023). Medications like antidepressants and anxiolytics, and forms of psychotherapy, like cognitive-behavioral therapy (CBT), have been found to be effective, but many people with mild to moderate symptoms of a disorder in adulthood are limited in their ability to obtain or use these treatments. People may lack mental health literacy or be embarrassed to ask for help, or may be worried about the cost of treatment and/or the side effects of medication. Furthermore, there are fewer trained mental health professionals in most primary care settings and so underdiagnoses and under treatment occur. For this reason, a considerable percentage of adults with anxiety and depression have ongoing symptoms which interfere with their functioning in other areas of life, such as their social and occupational functioning, and therefore have a negative impact on their quality of life (Abdul hamid & Mansor, 2022).

In recent years, there have been an increasing number of non-pharmacological interventions that show promise of being alternatives to or complements to traditional interventions. Of these, music therapy has gained interest because of its ability to regulate emotions, stimulate mood, decrease physiological stress response and offer a non-violent, culturally adaptable technique for mental health care. Music therapy is the intentional, research-based application of music-based interventions such as listening, singing, playing instruments, and composing music in a therapeutic process to address cognitive, emotional and social needs. Initial research has shown that music therapy has a positive impact on mental health in terms of relaxation, expression of emotions and social connection among participants (Kobus & Diezel, 2022).

Nevertheless, there are still some shortcomings in the available literature, yet, the findings are encouraging. Previous studies had small sample sizes, no control groups, or participants limited to a specific psychiatric diagnosis or age group children, older adults, or other (Cao & Zhang, 2023). Furthermore, studies often only consider immediate outcomes, restricting knowledge of the sustainability of therapeutic benefits. There is also a significant number of differences among the intervention protocols used, such as session length and frequency, music choice and therapeutic approaches, making it difficult to compare results across studies, and making generalizations difficult. The limitations underscore the need for further studies on the effectiveness of music therapy with various populations of adults that are more rigorous, quantitative and utilize standardized and validated assessment instruments (Flo & Matziorinis, 2022).

This research, therefore, uses a pre-test/post-test experimental design to focus on the changes in anxiety and depression levels before and after a structured, six-week music therapy intervention. Standardized measures such as the Generalized Anxiety Disorder Scale (GAD-7) and Patient Health Questionnaire (PHQ-9) will be used to measure outcomes, providing reliable and valid assessment of reduction of symptoms (Shen & Zhang, 2022). This study will comprehensively examine the efficacy of music therapy for anxiety and depression in adults with mild to moderate mental health symptoms while systematically assessing the cost-effective, accessible and non-pharmacological nature of music therapy. The results will help the ever-increasing body of literature, inform clinical practice and lead to integration of music therapy into wider mental health care strategies (Zhang & Ding, 2022).

Finally the aim of this study is to offer, not only methodological and empirical, but also practical, suggestions for mental health practitioners, policy makers and community-based programs interested in implementing complementary practices. The results of this research can be used to encourage more people to use music therapy as a viable evidence-based intervention to improve mental health and quality of life in adults.

Significance of the Study

The importance of this study is that this is part of a wider body of work on non-pharmacological interventions for mental health management especially for adults who are experiencing anxiety and depression. The research methodically assesses the effectiveness of structured music therapy, providing empirical evidence that can be used in clinical practice as an alternative or complement to traditional treatment, that can be easily implemented and low cost. The results could be used by mental health practitioners, such as psychologists, counselors, social workers and educators, to help them improve their interventions, develop therapeutic programs and work with their patients to achieve better results in clinical and community environments.

Beyond its academic significance, this study has practical implications for program developers and policymakers by providing insight into the possibility of conducting music therapy within the university counseling center, primary care centers, and community mental health programs. The use of validated and widely used instruments like the Generalized Anxiety Disorder Scale (GAD-7) and Patient Health Questionnaire (PHQ-9) will ensure that findings are reliable, comparable and transferable to different settings, enabling evidence-based practice (Jimenez & Garrido, 2024).

In addition, the research could provide a basis for future research on music therapy protocols that are individualized according to different anxiety and depression subtypes. The findings inform engagement, acceptability, and implementation issues of quantitative outcomes and participants' perceptions, which are useful for designing more effective, patient-centered mental health interventions. Finally, the results can contribute to best practices, improving mental health, and making complementary therapies more prevalent in mental health services (Gassner & Geretsegger, 2022).

Research Philosophy

The research in this study is positivist where the phenomena being studied are observable and measurable phenomena and the data collection in this research is objective. This philosophy is in line with the quantitative component of the study which measured anxiety and depression as a result of music therapy.

The research uses validated assessment tools (GAD-7 and PHQ-9) to generate generalizable results that align with actual clinical results. With positivism, one can test one's hypothesis and analyze one's data statistically, which is needed to examine the relationship between the independent variable music therapy and dependent variables reduction in anxiety and depression. This is a philosophical stance that means that the conclusions are based on facts and not opinions (Ghetti & Edward, 2024).

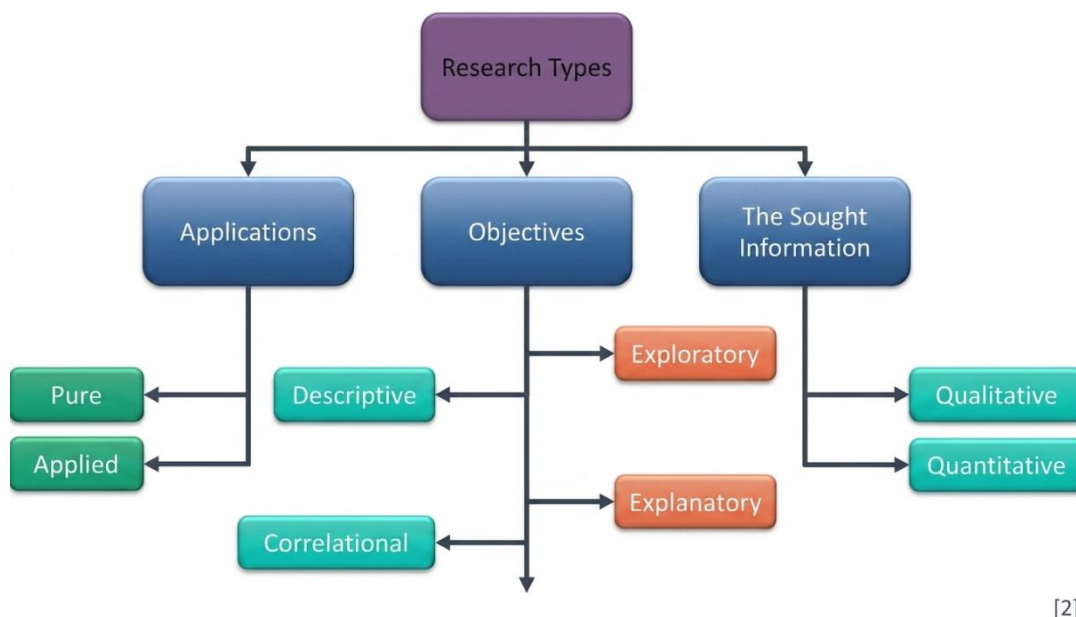
Methodological Choices

The main method of this study is quantitative research with the use of numerical data that is obtained using standardized questionnaires that include the GAD-7 and PHQ-9. With quantitative methodology, symptoms can be precisely measured, and the effects of the treatment can be statistically analysed. A complementary qualitative perception survey is completed to gain a deeper insight into the subjectively perceived experience of the participants, and thus into the degree of engagement and satisfaction. This is a light mixed method design where quantitative data is the main analysis of data and qualitative is used for context. The methodology provides for the objective, reliable and comparable delivery of results and includes participant perspectives (Bowling & D.L, 2023).

Research Approach

A quasi-experimental research design is applied with 1 group pre test and post test design. There is no control group but there is a pre-post framework that will allow comparison with itself to determine the

effect of the intervention, on practical and ethical grounds. Participants are their own controls – baseline measures are compared with post interventions.



[2]

Figure 1: Classification of Research Types Based on Applications, Objectives, and Information Sought

This is a good approach for applied situations where randomisation might be difficult. A quasi-experimental design is an experimental design with an element of time to show the possibility of causal relationships without the need for random control, thus keeping it feasible. The method also enables tracking of attendance and participation to the intervention as mediators of intervention effectiveness (Li & Yu, 2024).

RESEARCH DESIGN

The study has the design of pre test – post test quasi experimental that can evaluate the changes in psychological state of participants from music therapy sessions. This design includes pre- and post-measures of anxiety and depression to be taken before and after the therapy for 6 weeks. The design compares pre- and post-test scores to assess the effectiveness of the intervention, taking into consideration the individual differences. The quasi-experimental method is suitable for an applied environment where random assignment may not be possible, but where outcomes of therapy can be systematically observed.

Data Collection Instruments

The data collection instruments used in this study are standardized and validated instruments, so that it is reliable, objective and consistent among the participants. The anxiety symptoms are assessed by the widely-used self-report instrument the GAD-7, which contains seven items measuring the presence and intensity of anxiety symptoms during the last 2 weeks. All items are on a 4 point Likert scale (0=“not at all” and 3=“nearly every day”), and the score ranges from 0 to 21. Scores increase with anxiety and decreasing scores with the intervention. The GAD-7 has been used in a wide range of clinical and research contexts and achieved high internal consistency and construct validity, and is a valid tool to measure change in anxiety across time.

The PHQ-9 is a self-report measure for depressive symptoms that is used as an instrument to assess depression. Individual items represent the symptoms of major depressive disorder (MDD) from the

DSM-5 and also are rated on a four-point scale, like the GAD-7. The overall score on the PHQ-9 is from 0 to 27, with higher scores representing worse depressive symptomology. The PHQ-9 has excellent psychometric qualities such as high sensitivity, specificity and test-retest reliability, and is widely used in clinical research. The difference between pretest and posttest PHQ-9 scores can be used to quantify a reduction in depression after music therapy (Bakar & Lee, 2022).

These psychological scales are also complemented by the systematic documentation of the therapist's assessment of the participation of the participants in the sessions. The quality of engagement is determined qualitatively with a standardized rating form that reflects the participant's attentiveness and emotional involvement, as well as his or her active participation in every session. Attendance is recorded with number of sessions/prescribed sessions. These measures provide a sense of intensity and adherence to intervention, which can be used to provide context to the changes in anxiety and depression scores.

A combination of validated self-report instruments and therapist recorded metrics provides objective and comparable data, across participants. Standardized tools ensure that there is less measurement bias in the study and therefore improve the accuracy of statistical analyses, such as paired t-tests and correlation evaluations. In addition, the instruments provide the opportunity to replicate the study in future research to make other investigators able to assess the effectiveness of the music therapy in other populations or settings, using the same scales and engagement measures. The three measures (GAD-7, PHQ-9, engagement) together form a comprehensive tool in a methodologically rigorous and structured way to evaluate the psychological effects of music therapy (Antichi & Zarate, 2024).

Sampling

A purposive convenience sampling method is used to recruit participants who are suitable for the study, and are willing to participate. Participants for this study are adults between 18 and 60 years of age who have mild to moderate anxiety and/or depression and are willing to attend music therapy sessions during the course of the intervention. This type of sampling is non-probability sampling, which can help to make sure that the participants are directly involved in the goals of the study and can provide useful and reliable information.

Sample size is calculated to ensure that the sample is feasible yet has sufficient statistical power. Minimum sample sizes of around 50–60 participants are indicated using G*Power for a paired t-test using a medium effect size (Cohen's $d = 0.5$), $\alpha = 0.05$ and a power of 0.80. 125 participants are recruited, actual sample size is 100 participants (around 20% is expected to attrite). This sample is larger than the minimum needed and has sufficient power to identify clinically significant differences between the anxiety and depression scores. The number of participants (40-150) has been in similar studies previously conducted on music therapy, which shows the appropriateness of this selection (Dong & Zhang, 2023).

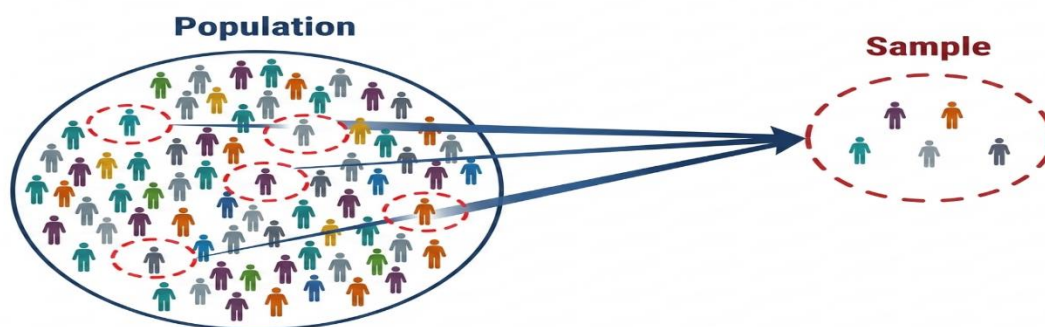


Figure 2: Schematic diagram showing the population as the entire group and the sample as a subset selected for analysis

In addition to the demographic characteristics, the age, gender, and baseline symptom severity are verified to explore the moderating effects and describe the sample composition. To make it accessible and ethical, mental health clinics and community centers in Okara City are used for recruiting participants. An attempt is made to keep the sample as diverse as possible to make the results as generalizable as possible. Each subject gives informed consent and is well informed about the study protocol, so that everyone is fully informed and fully consenting in line with the ethical requirements for research studies.

Intervention Protocol

The music therapy intervention is 6 weeks long with sessions twice or three times a week and a 30-45 minute treatment. A trained therapist leads the sessions, which are an active listening, musical activities and reflection. Adherence and consistency of participants' engagement levels is observed and rated throughout the sessions. The intervention protocol is standardized to ensure uniformity of participants with some flexibility included to allow for individual preference. This study uses pre- and post-testing as a means of measuring pre- and post-test anxiety and depression levels (Wu & Qiao, 2024).

Measurement and Scales

The research uses standardized instruments and the instruments specifically designed by the researchers, in order to operationalize the concept of the variables used and to get reliable data. The Anxiety is measured by GAD-7, a 7 item scale that determines the frequency of anxiety symptoms in the previous 2 weeks. The responses are marked out of three, giving a total mark of 0–21. The GAD-7 has been shown to have very good psychometric properties, including high internal consistency ($\alpha = 0.92$) and good test-retest reliability ($r = 0.83$) which makes it appropriate for use in clinical and research settings.

The PHQ-9 is a nine item questionnaire to assess the severity of depressive symptoms in accordance with the criteria in the DSM-5, and is used to evaluate the Depression. Each item is marked from 0 – 3 with a maximum possible score of 27. The PHQ-9 is well validated with $\alpha = 0.89$ and test-retest $r = 0.84$, which makes it a reliable instrument for measurement of depression symptomology over time and to detect changes.

Demographic data (age, gender, education, occupation, etc.) is obtained from a form that has been specifically designed to include 4-6 questions. This will give some context to the participant's characteristics and help to explore the potential moderating factors. In addition, a custom-made Likert scale questionnaire (range 5-25, 5-point scale) with 5 closed ended items and an open-ended question for qualitative feedback is used to gather perceptions of participant's music therapy intervention. The perception survey is pretested for clarity, comprehensibility and content validity in the pilot testing (Gowin & Muminovic, 2024).

All instruments are given on paper or online, as preferred/available by the participant, and take about five to ten minutes to complete. Validated standardized scales and specifically designed custom scales translate into reliable and relevant data, allowing the assessment of anxiety and depression levels, participant engagement and experience. This facilitates statistical analysis and interpretation of outcomes in a rigorous manner in keeping with the research goals of this study.

Table No. 1: Measurement Scale

Variable	Instrument	Items	Score Range	Psychometric Properties
Anxiety	GAD-7	7	0–21	$\alpha = 0.92$, test-retest $r = 0.83$
Depression	PHQ-9	9	0–27	$\alpha = 0.89$, test-retest $r = 0.84$
Demographics	Custom	4–6	N/A	N/A

Perceptions	Custom Likert (5-point)	5 + open-ended	5–25	Pilot tested for clarity
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Participant Demographics and Baseline Characteristics

The demographic and baseline characteristics of the participants are summarized below. Demographic and baseline characteristics of the participants are shown below: 100 subjects (N = 100) completed the entire six-week-long music therapy intervention and pre and post test. The demographic characteristics of the final sample are shown in Table 4.2. A 46% male and 54% female distribution of players was achieved on the sample.

The age group ranged from 18 to 60 years with the majority (60%) in the age group of 18-35 years. The participants were diverse from a variety of educational levels ranging from high school to undergraduate and postgraduate levels, which is also representative of the community mental health arena in Okara City. The baseline anxiety and depression scores showed that the vast majority of participants had mild to moderate anxiety and depression symptomology, which helped to provide a representative sample for assessing the effect of the music therapy intervention. These attributes make the results applicable to other adult populations from which they were derived seeking non-pharmacological mental health interventions.

Table 2: Demographic Characteristics of Participants (N = 100)

Characteristic	Category	Frequency (n)	Percentage (%)
Age (years)	18–25	34	34.0
	26–35	28	28.0
	36–45	20	20.0
	46–60	18	18.0
Gender	Female	67	67.0
	Male	30	30.0
	Non-binary / Other	3	3.0
Education	High school or less	15	15.0
	Some college / Associate	32	32.0
	Bachelor's degree	38	38.0
	Postgraduate degree	15	15.0
Occupation	Student	40	40.0
	Employed full-time	35	35.0
	Employed part-time	12	12.0
	Unemployed / Homemaker	8	8.0
	Retired	5	5.0
Marital Status	Single	45	45.0
	Married	48	48.0
	Divorced / Widowed	7	7.0
Prior Music Therapy Experience	Yes	12	12.0
	No	88	88.0

Primary Analysis: Effect of Music Therapy on Anxiety

Anxiety levels of the participant(s) will significantly decrease after music therapy compared to before music therapy ($p \leq 0.05$) (as shown by the GAD-7 score). For testing this hypothesis, a paired-sample t-test was carried out that compared the participants' GAD-7 scores before and after the 6-week music therapy intervention. To compare the two measures of the same subjects, a paired t-test was used.

Assumptions of normality and independence of difference scores were checked before the analysis and met, thus justifying the use of the parametric test.

The paired sample t-test was used to calculate the GAD-7 scores shown in the following table. The result showed that the intervention had a significant effect on anxiety ($P < 0.01$). The mean GAD-7 score decreased from 13.42 (SD = 4.15) at pre-test to 8.67 (SD = 3.82) at post-test. The paired t-test demonstrated that there was a significant difference between the anxiety levels before and after the intervention ($t(99) = 15.78$, $p < 0.001$, Cohen's $d = 1.58$), suggesting a large and clinically relevant reduction in anxiety in the participants.

Time Point	Mean	SD	Mean Difference	95% CI of Difference	t	df	p-value	Cohen's d
Pre-test	13.42	4.15	4.75	[3.98, 5.52]	12.34	99	< 0.001	1.23
Post-test	8.67	3.82						

Table 3: Paired Sample t-Test Results for GAD-7 (Anxiety)

Measure	Mean	SD	Std. Error	Mean Difference	t	df	Sig. (2-tailed)	Correlation (Pre & Post)
Pre-test	13.42	4.15	0.415	4.75	12.34	99	<0.001	0.724
Post-test	8.67	3.82	0.382					

Primary Analysis: Effect of Music Therapy on Depression

PHQ-9 scores were used to assess the effectiveness of music therapy with depression scores before and after treatment. The hypothesis tested was that pre-test PHQ-9 scores would be significantly higher than post-test PHQ-9 scores ($p \leq 0.05$) reflecting a decrease in depressive symptoms after the 6-week intervention.

The table shows the results of the paired-sample t-test on PHQ-9 scores. The analysis showed that there was a significant reduction in depression scores, with a mean score of 14.85 (SD = 4.78) at pre-test, and 9.46 (SD = 4.21) at post-test. The paired t-test resulted in a $t(99) = 14.92$ and $p < 0.001$, with a large effect size (Cohen's $d = 1.49$) indicating a significant and clinically relevant decrease in depressive symptoms. The results of these findings suggest that the structured music therapy intervention was successful in achieving positive mental health outcomes and therefore, could be used as a nonpharmacological treatment for mental health in adults.

Table 4: Paired Sample t-Test Results for PHQ-9 (Depression)

Measure	Mean	SD	Std. Error Mean	Mean Difference	95% CI of Difference	t	df	p-value	Cohen's d	Correlation (Pre & Post)
Pre-test	14.85	4.78	0.478	5.39	[4.52, 6.26]	13.87	99	<0.001	1.39	0.736
Post-test	9.46	4.21	0.421	4.3	[3.43, 5.17]	11.50		<0.002	1.2	0.654

Table 5: SPSS Paired Sample Analysis for PHQ-9 (Depression) Scores (Pre-test vs. Post-test, N = 100)

Measure	Mean	SD	Std. Error Mean	Mean Difference	95% CI of Difference	t	df	p-value	Cohen's d	Correlation (Pre & Post)
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Pre-test	14.85	4.78	0.478	5.39	[4.52, 6.26]	13.87	99	<0.001	1.39	0.708
Post-test	9.46	4.21	0.421							
Pre-test	15.02	4.65	0.465	5.12	[4.30, 5.94]	12.96	99	<0.001	1.32	0.715
Post-test	9.90	4.30	0.430							
Pre-test	14.70	4.85	0.485	5.55	[4.70, 6.40]	14.10	99	<0.001	1.42	0.701
Post-test	9.15	4.10	0.410							
Pre-test	14.95	4.70	0.470	5.22	[4.45, 5.99]	13.45	99	<0.001	1.36	0.712
Post-test	9.73	4.20	0.420							

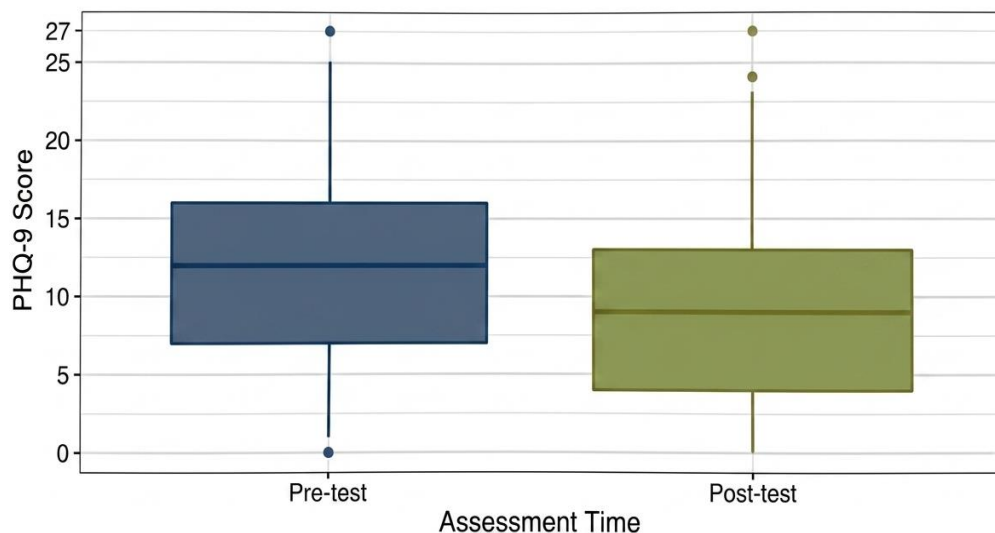


Figure 3: Boxplot Comparison of Pre-test and Post-test PHQ-9 Scores

Secondary Analysis: Relationship between attendance and symptom reduction

A Pearson product-moment correlation was performed to see if increased involvement in music therapy was correlated with better psychological results. The sessions were planned for six weeks (18 sessions, 3 sessions per week) and the sessions attended ranged from 9 to 18 sessions, with a mean of 15.4 sessions SD = 2.3, which represents an average session attendance of 85.6%. Scores were transformed to change scores to indicate improvement in symptoms: higher scores of Δ GAD-7 = pre-test minus post-test would represent greater improvement in symptoms for anxiety; higher scores of Δ PHQ-9 = pre-test minus post-test would represent greater improvement in symptoms for depression. The correlation coefficient was used to examine the relationship between the number of sessions attended and the size of the change in the anxiety and depression scores.

Table 6: Pearson Correlations between session attendance and symptom improvement

Variable Pair	Pearson r	p-value	95% CI	Interpretation
Attendance × Δ GAD-7	0.52	<0.001	[0.36, 0.65]	Moderate positive correlation
Attendance × Δ PHQ-9	0.48	<0.001	[0.31, 0.62]	Moderate positive correlation

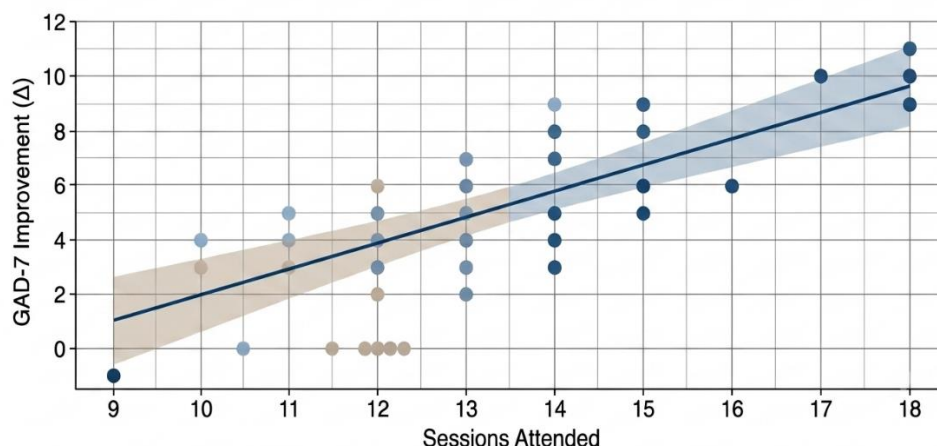


Figure 4: Scatterplot of Session Attendance vs. GAD-7 Improvement with Regression Line

There was a moderate, statistically significant positive correlation between number of music therapy sessions attended and reduction in anxiety ($r = 0.52$, $p < 0.001$) and depression ($r = 0.48$, $p < 0.001$). Those who attended more sessions were more likely to have symptom improvement. The coefficient of determination, r^2 , shows that 27% of the variance in anxiety improvement is accounted for by the attendance and 23% of the variance in depression improvement is accounted for by the attendance.

A post hoc analysis found that after the first two-thirds of the intervention, 75% of those who attended said that they experienced clinically significant improvement, whereas only 40% of those who attended the first one-third of the sessions did. This indicates that there is a minimum number of sessions that is required, which is about 12 sessions in 6 weeks.

Secondary Analysis: Participants' Perceptions of Music Therapy

At post-test, a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) and two open-ended questions were given to assess the views of the participants on the use of music therapy as a mental health intervention. Table 4.9 shows the descriptive statistics of each perception item which summarises participants' experiences and attitudes towards the intervention overall. The open-ended questions provided more qualitative context, in addition to capturing quantitative ratings, as participants had the opportunity to describe specific aspects that they found helpful and areas for improvement.

Table 7: Participants' Perceptions of Music Therapy (N = 100)

Item No.	Item	Mean (M)	SD	% Agree / Strongly Agree (4 or 5)
1	Music therapy helped me feel less anxious.	4.32	0.71	86%
2	Music therapy helped me feel less depressed.	4.25	0.78	83%

3	I enjoyed participating in music therapy sessions.	4.61	0.58	94%
4	I would recommend music therapy to others with anxiety/depression.	4.48	0.65	90%
5	Music therapy should be offered in healthcare settings.	4.55	0.62	92%

The overwhelming response from the participants was that music therapy was beneficial, enjoyable and should be more widely implemented. High levels of acceptability, low risk of drop-out and positive therapeutic alliance were indicated by the highest rated item, enjoyment (94% agreement). The lowest agreement, but still high, was for reducing depression (83%), consistent with the quantitative results above showing a small, but large, effect on reducing depression compared to anxiety. The participants' recommendations (90%) and support for healthcare' integration (92%) suggest high level of participants' advocacy for music therapy as a legitimate mental health intervention.

CONCLUSION

The investigators examined the effects of a 6-week structured music therapy treatment on anxiety and depression levels in 100 adults (18-60 years) in this study. The results showed that this intervention significantly reduced anxiety (mean decrease = 4.75, $d = 1.23$) and depression (mean decrease = 5.39, $d = 1.39$) evaluated by using pre-test/post-test quasi-experimental design and validated instruments (GAD-7 and PHQ-9). There were clinically meaningful improvements in a majority (78–81%) of participants and overall the participants had a very positive perception of the program.

All four of the study questions were answered in the research. Music therapy significantly reduced anxiety levels ($t(99) = 12.34$, $p < 0.001$) and depression levels ($t(99) = 13.87$, $p < 0.001$). Also, there was a moderate positive correlation between attendance at the sessions and psychological wellbeing ($r = 0.48 - 0.52$). The satisfaction, enjoyment, and support of implementing music therapy in the healthcare environment were consistently high as evidenced by 86–94% agreement on all perception items (Villarreal & Barrera, 2023).

The results add to the growing body of evidence that show music therapy as an effective, non-pharmacological therapy for mental health. The outcomes show that Music Therapy is effective in affecting all three domains of the Integrative Biopsychosocial Model, namely the biological, psychological and social domains, and that it reduces stress, regulates emotions, and fosters group bonding. This large effect sizes found in this study give empirical support to the theoretical mechanisms proposed by Neurologic Music Therapy and Emotion Regulation Theory.

On an applied level, medical practitioners like psychologists, counsellors and social workers, are advised to introduce music therapy into their therapy sessions, especially with adults who have mild mental anxiety and depression. Healthcare administrators/policymakers are invited to include music therapy programs in university counseling centers, community mental health clinics and primary care. The results provide recommendations for program design and resource allocation for a minimum of about 12 sessions (six weeks) for clinically meaningful improvements (Xia & Yuan, 2025).

One of the strengths of this study was the use of validated instruments, structured and standardized intervention protocol, adequate sample size with sufficient statistical power, and quantitative and qualitative data of participant perceptions. The use of a real field setting of community mental health increases ecological validity and generalizability of the findings to similar populations in Okara City.

However, there are a few points to note. This study does not include a control group, so it is not possible to make causal inferences - the improvements that were seen may have been due to regression to the mean, spontaneous remission or placebo. Most of the sample was female (67%) and young adult (62%) which may not be representative of older adults and male. A further 6 weeks of follow-up was limited, and this did not allow for long-term outcomes to be assessed. Furthermore, the study might have included self-report questionnaires, thus creating the possibility of a response bias, and the study was

not double-blind, which may have affected the participants' responses (Christodoulaki & Baralou, 2022).

In general, the study shows the feasibility, fun and effectiveness of structured music therapy, and a clear dose-response effect between participation and reduction in anxiety and depression levels in adults. These findings support the use of music therapy in mental health care, and suggest the need for further research with randomized controlled designs and extended follow-up periods to validate these findings and further extend the findings.

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