ALSYSTECH
Journal of Education Technology

e-ISSN : 2988-442X
p-ISSN : 2988-4403

Index : Dimensions, Scilit, Crossref, Garuda, Semantic, Google Scholar, Base, etc

https://doi.org/10.58578/alsystech.v4i3.10436

AI-Enabled Musical Communication Therapy: Enhancing Overall Well-Being of Patients in Select Hospitals in Akwa Ibom

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Article Info:

Submitted:	Revised:	Accepted:	Published:
Jun 18, 2026	Jul 16, 2026	Jul 28, 2026	Aug 2, 2026

Abstract

Artificial intelligence (AI)-enabled music therapy offers emerging possibilities for enhancing patient well-being through personalized musical communication; however, its application within Nigerian healthcare settings remains insufficiently examined. This study investigates the effectiveness of AI-enhanced music therapy programmes in promoting patients' general well-being, assesses the influence of musical communication on patients' emotional well-being during treatment, and explores how AI-based technologies can personalize music therapy according to individual patient needs in selected hospitals in Akwa Ibom State, Nigeria. A mixed-methods research design was employed with 120 patients recruited through convenience sampling from hospitals purposively selected across the state's three senatorial districts, with an average of two hospitals representing each district. Participants completed a three-week AI-enabled music therapy programme, and their well-being was assessed before and after the intervention. Qualitative data were also collected to examine participants' experiences and perceptions of the

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therapy and were integrated with the well-being assessments during analysis. The findings indicate that AI-enabled music therapy, facilitated through musical communication, has the potential to improve patients' general and emotional well-being and support the personalization of therapeutic programmes. Nevertheless, its implementation presents challenges related to privacy, data protection, and cultural sensitivity. The study concludes that AI-enabled music therapy represents a promising complementary approach to patient care, provided that its implementation is supported by continuous evaluation, responsible data-governance practices, cultural responsiveness, and multidisciplinary collaboration among relevant healthcare, technological, and creative-sector stakeholders.

Keywords: Artificial Intelligence; Music Therapy; Musical Communication; Patient Well-Being; Personalized Healthcare

INTRODUCTION

Nigeria, like many other developing countries, faces several health challenges that have contributed to low life expectancy and high mortality rates [1]. These challenges include infectious diseases such as malaria, HIV and AIDS, tuberculosis, and neglected tropical diseases, as well as non-communicable diseases such as cancer, diabetes, and hypertension [2]. Mental health conditions also remain a pressing concern, with depression, anxiety, and related disorders affecting a significant proportion of the population [3]. One of the main reasons for these health challenges is the lack of adequate healthcare infrastructure and facilities. A large number of Nigerians live in rural areas with little or no access to healthcare services, while those in urban centres often contend with overburdened and underfunded systems. This limited access prevents many from receiving timely and effective treatment, resulting in higher mortality rates and reduced life expectancy. Poverty compounds the situation, as many people cannot afford basic healthcare services or essential medicines [4]. This is particularly true for rural populations where poverty levels are often highest. Limited education and awareness about health practices also contribute to the spread of both infectious and non-communicable diseases, since many Nigerians lack the knowledge required to take preventive measures.

In recent years, there has been a growing recognition of the therapeutic role of music in healthcare [5]. Musical communication, which involves using music to connect emotionally with others, has been shown to improve the emotional and mental well-being

of patients in hospitals [6,7,8]. Goshen and Goshen [9] explain that music allows patients to connect emotionally with others, which supports their mental state and aids recovery. Activities such as group singing, listening to music, and playing instruments have been shown to relieve stress, reduce anxiety and depression, while creating a sense of relaxation and belonging. The integration of music into healthcare interventions has proven to be a holistic approach to patient care. Music therapy aims to enhance emotional, mental, and physical well-being [10]. It creates a calm and supportive environment that alleviates stress, anxiety, and even physical pain. Musical activities such as singing, instrument playing, or listening also encourage social interaction, emotional expression, and a sense of togetherness, which promote psychological well-being. Addressing the whole person in this way supports emotional and mental recovery, thereby improving overall health outcomes.

Music therapy, conducted by trained professionals to achieve specific therapeutic goals, has been shown to manage pain, reduce anxiety and stress, improve mood, and enhance quality of life [11]. Musical communication therapy (MCT), a holistic form of therapy that uses sound and music, involves structured activities such as singing, improvisation, instrument playing, and listening to achieve targeted outcomes [12]. It is widely employed in hospitals and healthcare facilities to support patients with diverse conditions. With the rapid development of artificial intelligence, MCT can be strengthened to provide new approaches for improving patient well-being. Incorporating artificial intelligence into MCT offers the opportunity for personalised and more efficient care [13]. This approach enhances healthcare delivery, improves patient outcomes, and raises overall quality of care. AI-enabled MCT applies technologies to improve traditional therapy by ensuring greater precision, personalisation, and real-time feedback. Through analysis of music and patient data, AI systems can adapt therapy sessions in real time to suit patient responses, which makes treatment more effective.

Artificial intelligence is already being applied across different areas of healthcare in Nigeria, including mental health, radiology, and diagnostics. For example, research has shown that AI systems can accurately identify and classify respiratory diseases using chest radiographs, offering valuable assistance to radiologists [14]. Another study found that AI could detect chest abnormalities such as pneumonia, tuberculosis, and lung cancer with a high level of accuracy, supporting earlier diagnosis and improving patient outcomes [15]. These findings highlight the potential of AI to transform diagnosis and treatment in healthcare. AI-enabled MCT offers several benefits. Personalised therapy sessions can be

designed based on patient-specific physiological indicators such as heart rate, breathing, and muscle tension. Real-time feedback during therapy enables therapists to adjust treatment immediately for better results. Data on mood, behaviour, and patient responses can be gathered through sensors, facial recognition, or biometric monitoring. This data is then analysed to guide therapists in making effective adjustments, identifying areas of difficulty, and addressing challenges in progress. Optimising therapy in this way can lead to greater improvements in patient mental health. AI-enabled MCT can also help to address the shortage of trained music therapists by assisting in therapy delivery and reducing the workload of healthcare staff.

However, challenges remain. One of the most pressing issues is the absence of clear regulatory guidelines and standards for AI in healthcare. Ethical issues surrounding data privacy and security must also be addressed since therapy involves sensitive patient information. There are also concerns about the role of technology in healthcare, with fears that artificial intelligence could replace human therapists in the future, leading to job losses and a decline in quality of care [16]. Despite these concerns, AI-enabled MCT holds strong potential to enhance patient well-being within hospitals. This paper, therefore, explored the use of AI in MCT, with emphasis on its potential benefits, challenges, and ethical implications [17]. The purpose is to present a comprehensive examination of AI-enabled MCT and its role in improving the quality and effectiveness of music therapy in healthcare settings. This study specifically focuses on the application of AI-enabled music therapy in hospitals within Akwa Ibom State, Nigeria.

Statement of the Problem

Existing literature demonstrates that music therapy improves pain management, reduces anxiety, and elevates mood among hospitalised patients. For instance, studies in critical care settings have reported significant declines in stress and improvements in emotional expression when patients receive structured musical interventions. The incorporation of artificial intelligence into therapeutic processes has begun to enable adaptive music selection and real-time feedback, promising to tailor interventions more precisely to individual patient needs. Yet, in Akwa Ibom state hospitals, there is no documented evidence that AI-enabled musical communication therapy is being used or evaluated, despite challenges in delivering standard supportive therapies and in addressing psychosocial distress among inpatients. Ideal circumstances would involve hospitals employing communication therapy augmented with AI so that patients' emotional,

cognitive and physical well-being are monitored and enhanced through personalised musical engagements. The dilemma is that without empirical data from the local setting, one cannot ascertain whether AI-enabled musical communication therapy yields measurable benefit in these hospitals, or whether cultural, infrastructural, or resource constraints would undermine its efficacy. A knowledge gap exists regarding how such therapy might influence the overall well-being of patients in Akwa Ibom, what forms of AI musical interaction are acceptable, and what outcomes (emotional, physical, psychological) would improve over existing care. Research is necessary to fill that gap and guide implementation.

Objectives of the Study

The objectives of the study are to:

i. Determine the effectiveness of AI-enhanced music therapy programmes in promoting the well-being of patients in select hospitals in Akwa Ibom State.
ii. Identify the level at which musical communication influences the emotional well-being of patients during treatment in select hospitals in Akwa Ibom.
iii. Investigate the dimensions through which AI-based technologies can be utilized to personalise music therapy programmes to individual patient needs in select hospitals in Akwa Ibom.

Research Questions

The following research questions are raised:

RQ 1: What is the effectiveness of AI-enabled musical therapy programmes in promoting the well-being of patients in select hospitals in Akwa Ibom State?

RQ 2: What is the level at which musical communication influences the emotional well-being of patients during treatment in select hospitals in Akwa Ibom State?

RQ 3: What are the dimensions through which AI-based technologies can be utilized to personalize music therapy programmes to individual patient needs in select hospitals in Akwa Ibom State?

Literature Review

Artificial Intelligence

Artificial intelligence (AI) refers to the development of computer programmes that can perform tasks requiring human-like intelligence, including visual perception, speech recognition, and decision-making. It is regarded as a transformative technology with the potential to reshape societies across multiple domains [15]. Programmes designed within this field can analyse vast data sets, identify patterns, make predictions, and process natural language. AI simulates reasoning processes such as perception and problem-solving, with applications in healthcare, education, finance, transportation, and entertainment [12]. Its growing influence can be seen in automated manufacturing processes, diagnostic tools in healthcare, personalised treatment planning, and even predictive algorithms that drive recommendation systems on digital platforms [12]. Through machine learning and deep learning, which enable systems to learn from data and improve performance without explicit instructions, AI is steadily becoming indispensable to modern industries [3]. For example, deep learning through artificial neural networks allows computers to simulate human reasoning [9].

AI is already embedded in daily life. Voice assistants such as Siri, Alexa, and Google Assistant depend on natural language processing to follow spoken instructions. Predictive text on smartphones and personalised recommendations from streaming and shopping platforms are also products of machine learning [12]. In healthcare, AI enhances accuracy in diagnosis and supports clinical decision-making. In finance, it strengthens fraud detection and guides investment strategies. In transportation, AI is central to self-driving cars and predictive logistics [14]. Despite these benefits, AI presents challenges. One of the most pressing issues relates to employment. Automation threatens jobs that involve repetitive or manual labour, raising concerns about unemployment and economic inequality [14]. Ethical concerns are also significant. Algorithms can reinforce bias if trained on skewed data, potentially producing discriminatory outcomes in hiring, lending, or other sensitive areas [12]. Security risks are another issue, particularly when AI is used to manage critical infrastructure, leaving systems vulnerable to cyberattacks or technical malfunctions.

To manage these risks, governments and organisations are developing regulatory frameworks. The European Union's General Data Protection Regulation (GDPR), for instance, requires transparency in automated decision-making and safeguards in the

handling of personal data [2]. Researchers are also working on creating transparent and explainable AI systems. Methods such as visualisation of decision-making processes, natural language explanations, and attribution analysis aim to make AI outcomes more comprehensible and trustworthy [5]. The ethical deployment of AI demands collaboration among researchers, policymakers, and the public. With careful regulation and accountability, AI has the capacity to remain both innovative and socially responsible.

Musical Communication

Musical communication refers to the exchange of meaning and emotion through music. It encompasses elements such as melody, rhythm, harmony, timbre, and dynamics, which collectively shape listeners' emotional and intellectual responses [8]. Melody provides structure, rhythm creates movement, harmony enriches sound, and timbre and dynamics contribute texture and intensity. Music does more than entertain; it carries cultural values, beliefs, and history. Each composition reflects its cultural environment, with meaning shaped by social context [9]. For this reason, musical communication requires cultural awareness. A musician's ability to connect with an audience depends not only on technical skill but also on sensitivity to cultural traditions and significance [10]. Nigerian traditional music illustrates this point. Beyond entertainment, it serves as a medium for preserving history and communicating cultural identity. Lyrics, rhythms, and instruments are deliberately chosen to reflect communal values [11]. Equally, personal interpretation plays a role in musical communication. A listener's emotional response is influenced by personality, memories, and cultural background [12].

Music has often been used as a vehicle for social change. Nigerian musician Fela Kuti and Jamaican artist Bob Marley employed music to highlight injustice and promote resistance. Their songs inspired movements for political reform and social justice. In restrictive environments where speech was limited, music provided a voice for dissent and a rallying point for unity [13]. Thus, musical communication not only bridges cultural divides but also empowers communities, expressing emotions and values that transcend ordinary speech.

Musical Communication Therapy

Musical communication therapy is a branch of music therapy that employs music to enhance communication skills, particularly among individuals with disabilities such as autism spectrum disorder, developmental delays, and cerebral palsy. It focuses on

developing verbal and non-verbal communication, emotional expression, and social interaction [14]. Activities such as singing, dancing, instrument playing, and improvisation form its foundation. Singing improves vocalisation and clarity of speech, dancing develops coordination and expressive body language, while playing instruments supports problem-solving and creativity [15]. This approach is particularly effective for individuals with autism spectrum disorder. Music provides an alternative mode of communication that bypasses verbal difficulties. Therapists often use musical cues to prompt participation and elicit responses, thereby strengthening non-verbal exchanges [16].

Therapy also benefits individuals with developmental delays and cerebral palsy. Singing and instrumental play promote muscle coordination, breath control, and fine motor development, all of which are vital for speech [17]. For instance, coordinating breath with vocal cords and articulators helps individuals regulate breathing and improve speech clarity. Instrumental practice builds posture, dexterity, and awareness of movement [18]. Music is equally valuable in addressing mental health conditions. It can regulate mood, reduce anxiety, and provide a means for emotional expression, particularly for those who struggle with verbal communication [19]. The practice demands expertise from therapists, who must combine knowledge of music theory, psychology, anatomy, and physiology with skills in improvisation and adaptability [16]. Assessment includes evaluating communication skills, developmental stage, and musical abilities, while also taking into account cultural preferences [20].

Evidence supports the effectiveness of musical communication therapy. Research shows that children with autism who received structured music therapy displayed improvements in initiating and responding to communication compared to those who did not [21]. Adults with autism who participated in music-based social training also experienced gains in social functioning and quality of life [22][23]. These benefits arise partly because music, as a universal medium, provides predictability and structure that instil confidence in social situations. Studies also reveal positive outcomes for individuals with cerebral palsy. Musical activities foster emotional expression and socialisation [24]. A case study of a sixteen-year-old girl with cerebral palsy demonstrated this impact. Initially withdrawn, she developed confidence, improved her social interactions, and formed friendships through a music-based programme. She was also able to use music as a tool for emotional regulation, showing how therapy provided not only communication support but also empowerment [25].

AI-Enabled Musical Communication Therapy

Music has long been part of human culture, serving as a medium for social bonding, emotional expression, and healing. In modern healthcare, music therapy has gained recognition as an effective intervention for neurological, cognitive, and emotional disorders. Whether through listening, singing, or playing instruments, music evokes emotions, stimulates brain functions, and contributes to well-being. Evidence shows that music therapy supports communication, emotional regulation, and mood improvement [12]. Participation in music-based activities enables patients to manage stress, strengthen interpersonal skills, and constructively engage with their emotions. Since therapy can be tailored to each individual, it has become a valuable complement to conventional medical care [5]. Nonetheless, traditional methods rely heavily on the therapist's expertise, and technological innovation is increasingly being explored to enhance outcomes.

AI has transformed several fields, including healthcare, finance, and education. Its application in music therapy has given rise to AI-enabled musical communication therapy, which creates personalised therapy sessions to improve communication, language, and social interaction while using music's restorative qualities. This approach can provide corrective feedback, modify therapy plans based on patient responses, and adjust treatment in line with specific needs [15]. The process involves gathering patient information such as medical history, therapeutic goals, and preferences, which is then analysed by AI algorithms to design effective treatment plans. These systems also monitor facial expressions, body language, and speech patterns during therapy. Real-time feedback allows for immediate adjustments, such as introducing soothing music when a patient shows signs of anxiety, thereby improving therapeutic outcomes [15].

A notable strength of AI-enabled musical communication therapy is its ability to be delivered remotely. Patients are able to access therapy sessions from home, eliminating barriers such as mobility issues, financial challenges, or distance from treatment centres. This accessibility makes therapy more convenient and extends its reach to individuals who might otherwise be excluded. Remote therapy also reduces travel and waiting times, improving efficiency and patient comfort [21]. The versatility of this approach is another important benefit. Patients with autism may require support for speech and social interaction, whereas those with dementia may benefit from music's role in memory recall and emotional regulation. AI systems adapt to these diverse conditions, offering tailored

experiences that maximise therapeutic outcomes [21]. However, challenges remain. Since the field is relatively new, research into the long-term effectiveness of AI-based therapy is limited, and large, diverse datasets are needed to improve the accuracy and reliability of AI systems [26].

Concerns around ethics and data privacy are also significant. Patients may be wary of how their personal information is collected, stored, and analysed. Transparency is therefore essential, and individuals should retain the right to decline participation in AI-based interventions if they so choose [17]. Robust safeguards for data protection are critical to ensuring trust in this evolving therapeutic approach.

Theoretical Frameworks

Social Learning Theory

Social Learning Theory, introduced by Albert Bandura in 1977, emphasises that learning occurs through observation of others' behaviours and their consequences [27]. Bandura argued that behaviour is shaped by external influences as well as internal cognitive processes, and highlighted four essential components: attention, retention, reproduction, and motivation. Attention refers to focusing on a behaviour, retention involves storing it in memory, reproduction is the ability to imitate it, and motivation determines whether it will be adopted [27][28]. Critics have pointed out that the theory does not fully address genetic factors or the role of social inequality, and questions have been raised about the reliability and generalisability of Bandura's methods [27][28]. Nonetheless, the theory remains influential across psychology, education, and health promotion [29]. In the context of AI-enabled musical communication therapy, the framework is valuable. Patients can observe how the AI programme responds to their emotional and behavioural cues, and through repetition, they can learn to adjust and strengthen their communication skills. Over time, this process enhances both well-being and quality of life.

Social Penetration Theory

Social Penetration Theory was developed by Irwin Altman and Dalmas Taylor in 1973 [30]. It explains how relationships deepen as individuals gradually engage in self-disclosure, moving from surface-level interactions to more meaningful exchanges. This process builds trust and intimacy through reciprocal communication. Altman and Taylor

linked the theory to social exchange principles, arguing that individuals disclose information to maximise relational rewards while minimising risks [31]. The theory has been criticised for cultural limitations, as values attached to self-disclosure vary across societies. Some also argue that its reliance on self-report methods overlooks non-verbal communication and other social influences. Despite these criticisms, the framework has proven useful in contexts such as therapy, where trust and openness are essential. In AI-enabled musical communication therapy, the principles of this theory are evident. Patients can gradually open up through music-based interaction in a safe and supportive environment. Since the AI system can be customised to reflect an individual's preferences and emotional state, it encourages progressive self-disclosure. Over time, this process fosters personal growth, strengthens communication, and supports the development of meaningful relationships.

METHODOLOGY

This research paper aimed to utilise AI-enabled communication therapy to enhance the overall well-being of patients in select hospitals in Akwa Ibom State. The study will adopt a mixed-methods approach, combining qualitative and quantitative analyses to evaluate the effectiveness and efficiency of the therapy. The study population comprised 3,000 patients across general hospitals in the three senatorial districts in Akwa Ibom State. The senatorial districts include:

Senatorial Districts Selected

Table 1

S/N	Senatorial Districts
1.	Akwa Ibom North-East Senatorial District
2.	Akwa Ibom North-West Senatorial District
3.	Akwa Ibom South Senatorial District

The researchers selected 2 general hospitals from each of the three senatorial districts in Akwa Ibom State, namely;

Selected General Hospitals

Table 2

S/N	General Hospitals
1.	North-West senatorial district
	Ibom Specialist Hospital
	Ikot Ekpene General Hospital
2.	North-East senatorial district
	Etinan General Hospital
	University of Uyo Teaching Hospital
3.	South Senatorial District
	Immanuel Hospital
	Cottage Hospital

The hospitals were selected based on the accessibility, availability of patient data, and willingness to participate in the study. The convenience sampling technique was used to select the participants from these hospitals, with a target of 120 patients for the study, thus:

Participants Selected Per Hospital

Table 3

S/N	General Hospitals	Sample
1.	North-West senatorial district	
	Ibom Specialist Hospital	20
	Ikot Ekpene General Hospital	20
2.	North-East senatorial district	
	Etinan General Hospital	20
	University of Uyo Teaching Hospital	20
3.	South Senatorial District	
	Immanuel Hospital	20
	Cottage Hospital	20
	Total	120

The researchers ensured that the selected participants were willing and available to participate in the music therapy programme, using AI technology to enhance the overall well-being of the patients' accessibility, availability of patient data, and willingness to participate in the study. The researchers ensured that the selected participants were willing and available to participate in the music therapy programme. The selected respondents participated in a 3-week music therapy programme using AI technology. The AI

technology used in this study was designed to assist in musical communication therapy, enhancing the overall well-being of patients. The measurement of well-being before and after the intervention was carried out using quantitative methods. Standardised measures, such as the WHO-5 Well-Being Index, were used to assess the participants' well-being. The collection of qualitative data was obtained through semi-structured interviews and focus group discussions. The qualitative data were used to explore the experience and perception of the participants regarding the AI-enabled musical communication therapy. The quantitative data collected were analysed using descriptive statistics, such as frequencies. The qualitative data obtained through interviews and focus group discussions were analysed using content analysis.

RESULTS

RQ 1: What is the effectiveness of AI-enabled musical therapy programmes in promoting the well-being of patients in select hospitals in Akwa Ibom State?

Table 4

Options	Frequency	Percentages
Highly effective	73	61
Moderately effective	31	26
Slightly effective	16	13
Total	120	100

The data presented in Table 4, representing RQ 1 shows the responses of 120 participants who were asked to evaluate the effectiveness of AI-enabled musical therapy programs in promoting the well-being of patients in select hospitals in Akwa Ibom State. According to the results, the majority of respondents (61%) reported that the programmes were highly effective at promoting the well-being of patients. 26% of respondents reported moderate effectiveness, while 13% stated slight effectiveness. In all, the results suggest that AI-enabled musical therapy programs have a positive impact on the well-being of patients in select hospitals in Akwa Ibom State, with a majority of respondents finding them to be highly effective.

RQ 2: What is the level at which musical communication influences the emotional well-being of patients during treatment in select hospitals in Akwa Ibom State?

Table 5

Options	Frequency	Percentages
High level	59	49
Some degree	41	34
Not much	13	11
Not at all	7	6
Total	120	100

According to the data gathered in Table 5 above, representing RQ 2, 49% of the participants perceived that musical communication had a high level of influence on their emotional well-being during treatment in select hospitals in Akwa Ibom State. Another 34% responded that it had some degree of influence, while 11% said that it didn't have much influence. Only 6% of participants thought that it didn't have any influence at all. The majority of patients felt that the use of music had a positive impact on their emotional well-being during treatment, with nearly half stating that it had a high level of influence.

RQ 3: What are the dimensions through which AI-based technologies can be utilised to personalise music therapy programmes to individual patient needs in select hospitals in Akwa Ibom State?

Table 6

Options	Frequency	Percentages
Patient's medical history and condition	7	5
Patient's musical preferences	37	31
Patient's emotional and mental state	44	37
Patient's cultural and religious background	32	27
Total	120	100

The data in Table 6, representing RQ 3 above shows that the most common dimension through which AI-based technologies can be utilised to personalise music therapy programs in select hospitals in Akwa Ibom State is the patient's emotional and mental state, with 37% of participants selecting this option. This is followed by the patient's musical preferences, which were chosen by 31% of respondents. Patient's cultural and religious background came in at 27%, while the patient's medical history and condition garnered the least amount of responses at 5%. The results suggest that AI-based

technologies can be utilised to personalise music therapy programs by taking into account the patient's individual emotional and mental state, as well as their musical preferences and cultural background.

DISCUSSION

RQ1: What is the effectiveness of AI-enabled musical therapy programmes in promoting the well-being of patients in select hospitals in Akwa Ibom State?

The findings from this study show that AI-enabled musical therapy programmes are highly effective in promoting patient well-being in hospitals within Akwa Ibom State. A majority of respondents (61%) reported that such programmes were very effective in enhancing their well-being. This outcome aligns with Social Learning Theory developed by Bandura, which highlights the role of observing behaviours, attitudes, and their consequences in shaping learning. Within this framework, the AI-enabled music programme responds directly to patients' emotional states and behaviours, offering tailored therapy sessions that reflect their mood and personality, which in turn enhances well-being. The findings also confirm earlier studies that demonstrated the positive role of music therapy in improving health outcomes and well-being [32]. The evidence presented here suggests that AI-enabled musical therapy should be adopted as a credible option for promoting the well-being of hospitalised patients.

RQ2: What is the level at which musical communication influences the emotional well-being of patients during treatment in select hospitals in Akwa Ibom State?

Results reveal that musical communication contributes positively to emotional well-being during hospital treatment. Nearly half of the respondents (49%) indicated that musical communication had a strong influence on their emotional state, while a further 34% agreed that it had a moderate influence. This finding resonates with Social Penetration Theory, which proposes that gradual and reciprocal sharing of personal information fosters relational depth. As patients interact with the AI music programme, they gradually disclose emotions and experiences, which contribute to improved emotional well-being. The positive influence of music therapy on emotional outcomes is well documented in literature, with research linking it to reductions in anxiety, stress, and depression [33].

Findings from this study confirm that musical communication enhances emotional well-being and underscore the importance of embedding music therapy within hospital care.

RQ3: What are the dimensions through which AI-based technologies can be utilised to personalise music therapy programmes to individual patient needs in select hospitals in Akwa Ibom State?

Study findings indicate that AI-based technologies can personalise music therapy programmes by considering three main factors: patients' emotional and mental state, musical preferences, and cultural background. The largest proportion of respondents (37%) emphasised the patient's emotional and mental state. This corresponds with Social Learning Theory, which stresses the significance of internal cognitive processes in guiding behaviour. Addressing the patient's mental and emotional condition ensures that therapy resonates with their psychological needs. Musical preferences were also highlighted by 31% of respondents, reflecting the deeply personal role of music. This outcome aligns with Social Penetration Theory, as music serves as a form of self-expression that supports progressive disclosure of personal emotions [33]. Cultural and religious background was noted by 27% of participants, underlining the importance of respecting diversity and individuality when designing therapy interventions. These dimensions suggest that personalisation is critical for the success of AI-enabled therapy.

Summary of Findings

The overall findings indicate that AI-enabled musical communication therapy is an effective method of promoting patient well-being in hospitals in Akwa Ibom State. Music therapy positively influences emotional well-being, while AI-based systems offer valuable opportunities to tailor programmes to patients' mental and emotional state, preferences, and cultural identity. The evidence suggests that hospitals should integrate music therapy within treatment plans, as it holds significant potential to improve patient well-being.

CONCLUSION

This study examined the effectiveness of AI-enabled musical communication therapy in promoting the well-being of patients in select hospitals in Akwa Ibom State. The study also investigated the level at which musical communication influences the emotional well-being of patients during treatment and the dimensions through which AI-based

technologies can be utilised to personalize music therapy programs to individual patient needs. The findings of the study revealed that AI-enabled musical communication therapy is highly effective in promoting patients' well-being. Additionally, musical communication has a positive impact on patients' emotional well-being, with nearly half of the participants indicating that it had a high level of influence. The study also found that AI-based technologies can be utilised to personalise music therapy programs to individual patient needs by considering factors such as the patient's emotional and mental state, musical preferences, and cultural background.

Recommendations

Based on the findings of this study, the following are recommended:

i. Hospitals should consider incorporating AI-enabled musical communication therapy in their treatment plans to promote patients' well-being.

ii. Hospitals should encourage the use of musical communication in treating patients to enhance their emotional well-being during treatment.

iii. Hospitals should adopt AI-based technologies in personalising music therapy programs based on individual patients' needs.

iv. Hospitals should train healthcare professionals on the use of music therapy to enhance patients' overall well-being.

v. Future studies should investigate other dimensions through which AI-based technologies can be utilised to personalise music therapy programs in hospitals.

REFERENCES

1. Adeyemo, D. O., & Adegboye, F. B. (2020). Health challenges facing Nigeria and the way forward. *Journal of Public Health in Africa, 11*(2).
2. Uguru, N. P., & Ugboma, E. U. (2019). Non-communicable diseases in Nigeria: The growing burden and urgent need for action. *Nigerian Journal of Medicine, 28*(2).
3. Pennap, G. R., & Yilgwan, C. S. (2020). Depression among the elderly: A neglected crisis in Nigeria. *Nigerian Postgraduate Medical Journal, 27*(1).
4. Onu, C. M. (2019). Health care delivery in Nigeria: A review. *Nigerian Journal of Physiological Sciences, 34*(2).
5. Etowa, J. B., & Magnus, M. D. (2016). Music therapy and its impact on mental health: A review. *International Journal of Psychiatry in Medicine, 51*(3).
6. Makinde, O. C., & Lasisi, M. K. (2022). Music therapy in health care: A review. *Journal of the West African College of Surgeons, 12*(2).

7. Gregory, J. H., & Saviour, K. A. (2022). Music in medical settings: A review of effects, issues and techniques. *Journal of Music Therapy, 59*(2).
8. Johnson, C. M., & Memmott, J. E. (2006). Perception of emotion in musical performance: A review. *Journal of Music Therapy, 43*(2), 110–127.
9. Goshen, L., & Goshen, M. D. (2021). The effect of group singing on mood, motivation, and self-concept in adult women. *Music Perception, 38*(1).
10. Morah, D. N., & Brown, G. N. (2024). Knowledge and adoption of artificial intelligence for effective communication by healthcare providers in Nigerian teaching hospitals. *Pakistan Journal of Media Science, 5*(1), 1–17.
11. Hilliard, R. E. (2005). Music therapy in hospice and palliative care: A review of the empirical data. *Evidence-Based Complementary and Alternative Medicine, 2*(2), 173–178. https://doi.org/10.1093/ecam/neh076
12. Setiadi, A., & Curtis, S. (2021). A review of musical communication therapy. *Voices: A World Forum for Music Therapy, 22*(2), 1–19.
13. Choi, M. H., Han, J. W., & Lee, K. Y. (2019). AI-based music therapy program development and experience using an AI speaker. *Journal of the Korean Society of Medical Informatics, 25*(2), 75–84.
14. Adedokun, B., & Seun, A. A. (2020). Respiratory diseases diagnosis using chest X-rays and machine learning techniques. *International Journal of Scientific & Technology Research, 9*(4).
15. Azeez, I. A., & Bamigboye, O. O. (2023). Detection and classification of respiratory diseases using artificial intelligence tools. *Journal of Medical Systems, 47*(2).
16. Wang, H., Zhang, Y., Yang, C., & Zheng, Y. (2020). Ethics of AI in healthcare. *Current Opinion in Systems Biology, 25*, 68–73.
17. Xu, Z. (2020). Artificial intelligence and music: Challenges and opportunities. *Journal of New Music Research, 49*(4).
18. Afolayan, A., & Gbadegesin, A. (2017). Understanding Nigerian traditional music within its socio-cultural context. *Journal of Cultural Heritage Management and Sustainable Development, 7*(3), 215–230.
19. Nzewi, M. (2003). Perspectives on African musicology in the twenty-first century: A discourse. *South African Journal of Musicology, 23*, 1–14.
20. Schyff, G. V. D. (2015). Music therapy: What it is and how it can be used for people with autism. *Journal of Child Neurology, 30*(2), 205–209.
21. Maxwell, K. A., Frank, B., & Gabriel, N. (2015). Music therapy increases conversational skills in pre-school children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45*(12), 3978–3989.
22. Mitrovic, M., & Grayo, S. (2023). The effectiveness of musical communication therapy on communication skills in adults with autism. *The British Journal of Occupational Therapy, 86*(1), 1–8.
23. Israel, M., & Kayode, T. (2021). The role of musical communication therapy in promoting communication skills in individuals with autism spectrum disorder. *Nigerian Journal of Health and Biomedical Sciences, 20*(2), 1–8.

24. Guzmán-Vélez, E., & Levitin, D. J. (2014). Musical intervention enhances social interaction and communication in individuals with cerebral palsy. *Journal of Music Therapy, 51*(3), 250–274.
25. Aldridge, D. (2008). Music therapy with children who have cerebral palsy: An evaluation study. *Journal of Music Therapy, 45*(2), 120–142.
26. Bradt, J., Dileo, C., Grocke, D., & Magill, L. (2011). Music interventions for improving psychological and physical outcomes in cancer patients. *Cochrane Database of Systematic Reviews*, (8), Article CD006911. https://doi.org/10.1002/14651858.CD006911.pub2
27. Bandura, A. (1977). *Social learning theory*. Prentice-Hall.
28. Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
29. Kortleven, I., Willems, M., Klugkist, I., Bais, L., & Kleijer, L. (2020). Virtual music therapy with patients coping with Parkinson's disease during the COVID-19 pandemic. *Voices: A World Forum for Music Therapy, 20*(3), 1–21.
30. Altman, I., & Taylor, D. A. (1973). *Social penetration: The development of interpersonal relationships*. Holt, Rinehart and Winston.
31. Chang, Y.-S., Chu, H., Yang, C.-Y., Tsai, J.-C., Chung, M.-H., Liao, Y.-M., Chi, M.-J., Liu, M. F., & Chou, K.-R. (2015). The efficacy of music therapy for people with dementia: A meta-analysis of randomised controlled trials. *Journal of Clinical Nursing, 24*(23–24), 3425–3440. https://doi.org/10.1111/jocn.12976
32. Kearney, M., Levine, J., Quinn, M., & Vakkuri, J. (2019). *AI governance: A framework to counter risks and promote benefits*. McKinsey & Company.
33. Mischel, W. (2017). *The marshmallow test: Why self-control is the engine of success*. Hachette Books.