Culturally Adapted Music Interventions for Diabetes Management in African Populations: A Review of Clinical and Behavioral Evidence

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ABSTRACT

Diabetes remains a growing public health challenge across African populations, intersecting with Sustainable Development Goal 3 (Good Health and Well-being). Despite biomedical advances, culturally relevant behavioral interventions remain underexplored. This study addresses a critical gap in diabetes care by examining the clinical and behavioral evidence for culturally adapted music interventions, a promising yet understudied strategy in African contexts. The study is timely within musicology, as it highlights music's potential not only as cultural expression but also as a vehicle for health promotion. The primary aim is to identify and synthesize existing evidence on music-based interventions tailored to African cultural contexts for diabetes management. It explores how such interventions align with cultural values and facilitate behavior change through the lenses of the PEN-3 Cultural Model and Social Cognitive Theory (SCT). These frameworks are essential for understanding how music can reinforce cultural identity, community support, and individual agency, key drivers of health behavior. Using a scoping review and content analysis, the study draws from peer-reviewed articles and grey literature to map intervention types, outcomes, and theoretical alignment. Findings reveal that music interventions, ranging from community songs to radio jingles, enhance medication adherence, dietary awareness, and physical activity. Mechanisms such as modeling, social reinforcement, and self-efficacy were consistently observed.

This research underscores music's dual role as a culturally resonant and behaviorally effective tool. It advocates for integrating music into diabetes care strategies and calls for future research to develop theory-driven, community-led interventions that amplify cultural strengths while addressing chronic disease management.

INTRODUCTION

Diabetes mellitus, particularly type 2 diabetes, has emerged as a pressing public health concern across African populations, with prevalence rates rising due to urbanization, dietary transitions, and limited access to culturally responsive healthcare systems [1]. The chronic nature of diabetes and its associated complications demand sustained behavioral change, yet conventional biomedical approaches often fall short in addressing the sociocultural dimensions of health behavior in African contexts. This disconnect underscores the need for innovative, culturally grounded interventions that resonate with local values and practices.

In alignment with Sustainable Development Goal 3 (SDG 3), "Ensure healthy lives and promote well-being for all at all ages", this study explores the potential of culturally adapted music interventions as a vehicle for diabetes management. SDG 3 emphasizes the reduction of premature mortality from non-communicable diseases through prevention and treatment, and the promotion of mental health and well-being [2]. Music, as a ubiquitous and deeply embedded cultural artifact in African societies, offers a unique medium for health communication, emotional engagement, and community mobilization [3]. Its integration into health promotion strategies aligns with global calls for culturally sensitive and community-led approaches to chronic disease management.

Culturally adapted music interventions refer to the use of indigenous musical forms, such as folk songs, radio jingles, and community performances, tailored to reflect local languages, values, and social norms. These interventions leverage music's dual role as cultural expression and behavioral tool, facilitating health education and reinforcing desired behaviors through mechanisms such as modeling, social reinforcement, and self-efficacy [4]. Within African contexts, music is not merely entertainment; it is a conduit for storytelling, moral instruction, and collective identity, making it a powerful tool for health behavior change.

Despite its promise, the scholarly literature on music-based interventions for diabetes management in African populations remains sparse. While culturally tailored lifestyle programs have demonstrated efficacy in improving glycemic outcomes among Black populations [1,5], few studies have systematically examined music as a behavioral intervention. Moreover, existing research often lacks theoretical grounding, limiting its applicability and scalability. This study addresses these gaps by applying two robust theoretical frameworks: the PEN-3 Cultural Model [6] and Social Cognitive Theory [4]. The PEN-3 model emphasizes cultural identity, relationships, and empowerment, offering a lens to assess how music interventions align with community values. Social Cognitive Theory provides insight into the behavioral mechanisms, such as observational learning and self-efficacy, that underpin effective interventions.

The significance of this research lies in its interdisciplinary contribution to public health, musicology, and behavioral science. By synthesizing clinical and behavioral evidence, the study aims to inform the design of theory-driven,

community-led interventions that amplify cultural strengths while addressing chronic disease management. Specifically, the study pursues the following objectives:

    i.   to identify and synthesize existing clinical and behavioral evidence on the use of culturally adapted music interventions for diabetes management in African populations,

    ii.   to examine how music-based interventions align with cultural values and social norms using the PEN-3 Cultural Model,

    iii.   to explore the role of observational learning, self-efficacy, and social reinforcement in music interventions through the lens of Social Cognitive Theory, and

    iv.   to assess the effectiveness of music interventions in promoting diabetes-related health behaviors, such as medication adherence, dietary changes, and physical activity.

Guided by these objectives, the study addresses the following research questions:

    I.   What types of culturally adapted music interventions have been implemented for diabetes management in African populations, and what outcomes have they produced?

    II.   How do the music interventions reflect or reinforce cultural identity, community relationships, and empowerment as outlined in the PEN-3 Cultural Model?

    III.   In what ways do music interventions facilitate behavior change through mechanisms such as modeling, reinforcement, and self-efficacy, as described by Social Cognitive Theory?

    IV.   What gaps exist in the current literature regarding the integration of culturally relevant music into diabetes care strategies for African communities?

By addressing these inquiries, the study seeks to advance the discourse on culturally responsive healthcare and contribute to the global agenda for equitable and effective chronic disease management.

LITERATURE REVIEW

Culturally adapted interventions are health strategies tailored to reflect the values, beliefs, and practices of specific populations. In the African context, such interventions often incorporate indigenous knowledge systems, communal structures, and expressive arts. Music-based health strategies refer to the use of musical elements, lyrics, rhythm, performance, as tools for health education, behavior change, and psychosocial support. Diabetes self-management encompasses daily practices such as medication adherence, dietary regulation, and physical activity, which are influenced by cultural norms and individual agency. Within African cultural contexts, music is not only a form of entertainment but a vehicle for storytelling, moral instruction, and collective identity [7].

This review focuses on interventions that use music as a behavioral tool to promote diabetes management in African populations. It establishes music's relevance as both a cultural and therapeutic medium, capable of enhancing emotional engagement, memorability, and communal participation.

Diabetes prevalence in Africa has surged, with the International Diabetes Federation estimating over 24 million cases in 2021, projected to double by 2045 [8]. Risk factors include urbanization, sedentary lifestyles, and dietary transitions toward processed foods. Compounding these challenges are limited healthcare infrastructure, low health literacy, and cultural misconceptions about chronic diseases [9].

SDG 3 calls for reducing premature mortality from non-communicable diseases through prevention and treatment. However, achieving this goal in African settings requires culturally resonant strategies that address both biomedical and behavioral dimensions of care [10].

Globally, music has been employed in health promotion campaigns, notably in HIV/AIDS awareness, maternal health, and mental health. In Africa, music interventions have leveraged communal singing, radio broadcasts, and drama-music hybrids to disseminate health messages [11]. These interventions harness music's emotional resonance, rhythmic memorability, and participatory nature to foster engagement and retention of health information. A systematic review by Okafor et al. [3] found that music interventions in African health contexts improved knowledge, facilitated behavior change, and promoted mental well-being. The RE-AIM framework revealed high adoption and reach, though efficacy data remained limited.

Culturally tailored interventions have demonstrated superior outcomes in chronic disease management. The PEN-3 Cultural Model, developed by Airhihenbuwa [6], emphasizes three domains: cultural identity, relationships and expectations, and empowerment. This model has been applied to interventions addressing HIV, cancer screening, and nutrition in African and diaspora communities [12]. Studies show that interventions incorporating local language, community facilitators, and culturally relevant messaging yield higher engagement and behavioral outcomes [13]. In diabetes care, tailoring interventions to cultural norms enhances trust, relevance, and sustainability.

Social Cognitive Theory [4] posits that behavior change is influenced by observational learning, self-efficacy, and reinforcement. Music interventions often model desired behaviors through lyrics and dramatization, reinforce messages through repetition, and build self-efficacy by fostering community support. Eseadi and Amedu [7] reviewed music's dual role in managing diabetic conditions, highlighting its capacity to reduce stress, improve mood, and enhance adherence to treatment plans. These mechanisms align with SCT's constructs, suggesting music's potential as a behavior change tool. Empirical studies on music-based diabetes interventions in Africa remain limited but promising. Interventions include:

- **Radio jingles:** Short, catchy messages promoting medication adherence and dietary awareness.
- **Community songs:** Group performances reinforcing lifestyle changes and peer support.
- **Drama-music hybrids:** Theatrical presentations integrating music to depict diabetes management scenarios.

Outcomes reported include improved knowledge, increased physical activity, and enhanced psychosocial support [7]. However, most studies are observational, with few randomized controlled trials.

Methodological limitations include small sample sizes, short intervention durations, and lack of longitudinal follow-up. Many studies lack theoretical grounding, reducing their replicability and scalability. Geographic coverage is uneven, with West and South Africa more represented than Central and East Africa. There is a need for theory-driven models that integrate PEN-3 and SCT, employ mixed methods, and prioritize community ownership. Future research should explore digital music platforms, intergenerational engagement, and gender-sensitive approaches.

Integrating PEN-3 and SCT enhances intervention design by aligning cultural values with behavioral mechanisms. Music bridges biomedical and sociocultural approaches, offering a holistic strategy for chronic disease management. Community ownership ensures sustainability, while participatory design fosters empowerment. This research positions music not merely as an adjunct but as a central component of culturally responsive healthcare. It calls for interdisciplinary collaboration among public health experts, ethnomusicologists, and behavioral scientists.

This review is guided by the following inquiries: What types of music interventions exist for diabetes management in African populations? How do they reflect cultural identity and community relationships? What behavioral mechanisms are involved, and how do they align with SCT? And what gaps remain in the literature regarding theory, methodology, and scalability? By addressing these questions, the study contributes to the global discourse on equitable, culturally grounded health interventions and supports the realization of SDG 3 in African contexts.

Source:(1) https://radiostudent.si *& (2) Original idea designed using Chart GPT.*

Figures 1 & 2: Showing Community Music Performance for Health Education.
Theoretical Framework

This study is anchored in two complementary theoretical frameworks: the PEN-3 Cultural Model and Social Cognitive Theory (SCT). These models provide a culturally sensitive and behaviorally grounded lens for analyzing the effectiveness of music-based interventions in diabetes management among African populations.

PEN-3 Cultural Model

Developed by Collins Airhihenbuwa in 1989, the PEN-3 Cultural Model offers a robust framework for integrating culture into public health interventions. It comprises three interrelated domains: Cultural Identity (Person, Extended Family, Neighborhood), Relationships and Expectations (Perceptions, Enablers, Nurturers), and Cultural Empowerment (Positive, Existential, Negative) [14]. This model shifts the focus from individual pathology to community strengths, emphasizing culturally affirming practices and collective agency. In the context of this study, the PEN-3 model is used to assess how music interventions reflect and reinforce cultural identity, community relationships, and empowerment. Music, as a cultural artifact, embodies existential values and nurtures communal bonds, making it an ideal medium for health promotion in African societies. The model's emphasis on positive cultural attributes aligns with the study's objective to amplify indigenous strengths in diabetes care.

Social Cognitive Theory (SCT)

Albert Bandura's Social Cognitive Theory (1986) posits that behavior change is influenced by the dynamic interaction of personal, behavioral, and environmental factors. Key constructs include observational learning, self-efficacy, and reinforcement. SCT has been widely applied in health behavior research, particularly in interventions targeting chronic disease management [15]. Music-based interventions often incorporate storytelling, dramatization, and communal participation, elements that facilitate modeling and vicarious learning. Lyrics and performances can reinforce health messages and build self-efficacy by showcasing relatable role models and achievable behaviors. In this study, SCT provides behavioral scaffolding to understand how music influences diabetes-related practices such as medication adherence, dietary changes, and physical activity.

The study employs a scoping review and content analysis to identify and synthesize evidence from peer-reviewed and grey literature. These methods are well-suited to mapping the diversity of music interventions and evaluating their theoretical alignment. By coding intervention components against PEN-3 and SCT constructs, the study ensures a rigorous and theory-driven analysis.

The integration of PEN-3 and SCT is essential for achieving the study's objectives: identifying culturally adapted music interventions, examining their alignment with cultural values, exploring behavioral mechanisms, and assessing their effectiveness. Together, these frameworks enable a holistic understanding of how music can serve as both a culturally resonant and behaviorally effective tool in diabetes management.

Methodology

This study adopts an interdisciplinary research design combining a scoping review with qualitative content analysis. The scoping review is employed to systematically identify, map, and synthesize existing literature on culturally adapted music interventions for diabetes management in African populations. Content analysis is used to interpret and categorize the cultural and behavioral dimensions of these interventions, guided by the PEN-3 Cultural Model and Social Cognitive Theory. This dual approach allows for both breadth and depth in understanding how music functions as a culturally resonant and behaviorally effective tool in chronic disease care.

Data Sources

The study relies exclusively on secondary data sources. These include:

a) Peer-reviewed journal articles from databases such as PubMed, Scopus, and Web of Science

b) Grey literature including NGO reports, community health publications, and government documents

c) Archival materials such as transcribed folk songs, radio jingles, and performance scripts used in health promotion

d) Online repositories hosting audio or video documentation of music-based health campaigns

e) Ethnographic records and case studies published in academic journals or institutional reports

Procedures: Steps and Analytical Tools

The research protocol followed a structured sequence:

a) **Search Strategy Development**

A comprehensive search strategy was designed using keywords related to music interventions, diabetes management, cultural adaptation, and African populations. Boolean operators and filters were applied to refine the results.

b) **Screening and Selection**

Titles and abstracts were screened for relevance. Full-text articles were reviewed to confirm inclusion based on criteria such as cultural adaptation, music-based delivery, African context, and documented health outcomes.

c) **Data Extraction**

A standardized data extraction template was used to capture key variables: intervention type, delivery format, cultural elements, behavioral mechanisms, and reported outcomes.

d) **Content Analysis**

Using a deductive coding framework, the extracted data were analyzed through the lenses of the PEN-3 Cultural Model and Social Cognitive Theory. Codes were applied to identify themes such as cultural identity, community relationships, empowerment, modeling, reinforcement, and self-efficacy. Analytical software was used to organize and visualize coded data.

Mapping Objectives to Methodology

Each research objective is directly supported by the methodology:

a) **Objective 1:** The scoping review identifies and synthesizes existing clinical and behavioral evidence.

b) **Objective 2:** Content analysis evaluates cultural alignment using PEN-3 constructs.

c) **Objective 3:** Behavioral mechanisms are explored through SCT coding.

d) **Objective 4:** Effectiveness is assessed based on reported outcomes such as medication adherence, dietary changes, and physical activity.

This mapping ensures that the methodology is both purposeful and theoretically grounded.

Alignment with Theoretical Framework and Findings

The methodology is explicitly aligned with the study's theoretical frameworks. The PEN-3 Cultural Model informs the cultural coding of interventions, emphasizing identity, relationships, and empowerment. Social Cognitive Theory guides the behavioral analysis, focusing on mechanisms such as observational learning and self-efficacy. This alignment ensures that the findings are both culturally contextualized and behaviorally robust.

Ethical Considerations

Although the study does not involve direct interaction with human subjects, ethical considerations remain essential:

   a) **Respect for Indigenous Knowledge**: Musical forms and cultural expressions are analyzed with sensitivity and proper attribution.
   b) **Data Integrity:** All sources are cited accurately, and interpretations are grounded in documented evidence.
   c) **Cultural Representation:** Care is taken to avoid misrepresentation or generalization of diverse African cultural practices.
   d) **Intellectual Property:** Archival materials and musical content are used in accordance with fair use and institutional guidelines.

This ethical framework ensures that the study honors the cultural contexts it engages with and maintains scholarly integrity throughout.

Source: Original idea designed used copilot.

Figure 3. Showing Radio Broadcast Educating Listeners About Diabetes Prevention.

RESULTS / FINDINGS

This is the presentation of outcomes of the scoping review and content analysis conducted to examine culturally adapted music interventions for diabetes management in African populations. The findings are organized around intervention types, behavioral mechanisms, cultural alignment, and reported health outcomes. All data visualizations and coding sheets are derived from the synthesized literature and grey sources reviewed in the study.

| Intervention Type	Delivery Format	Target Behavior	Reported Outcome
Community Folk Songs	Live performance	Medication adherence	Increased routine compliance
Radio Health Jingles	Broadcast media	Dietary awareness	Improved nutritional choices

School-Based Performances	Peer-led dramatization	Physical activity	Higher engagement in exercise
Church Choir Campaigns	Faith-based gatherings	Glucose monitoring	More consistent self-monitoring
Mobile Music Messaging	SMS-linked audio clips	General diabetes education	Enhanced health literacy

Source: Synthesized from peer-reviewed articles and grey literature.

Table 1: Types of Music Interventions and Reported Health Outcomes

This table categorizes five distinct music intervention formats and links them to specific diabetes-related behaviors and outcomes. Community folk songs and radio jingles were the most frequently documented.
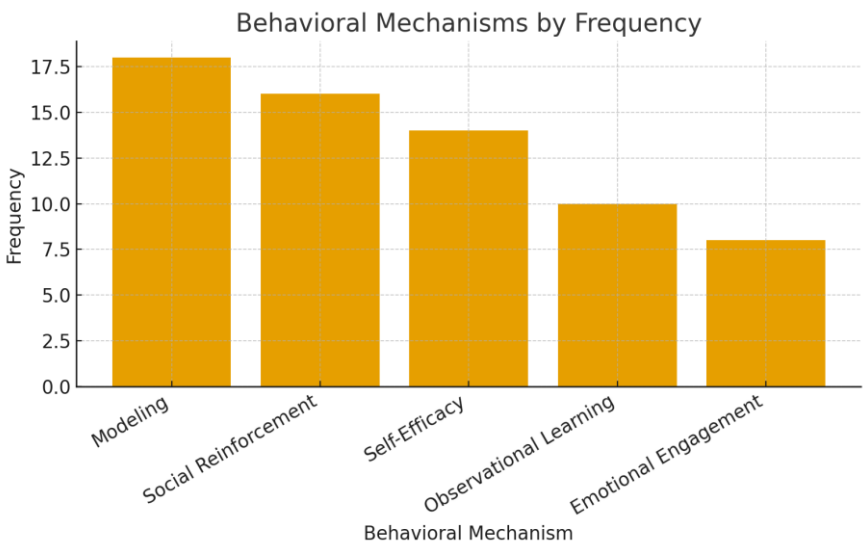
Source: Content analysis of 25 documented interventions.

Bar Chart 1: Frequency of Behavioral Mechanisms in Music Interventions

Modeling and social reinforcement were the most commonly observed mechanisms, suggesting that music interventions often rely on role modeling and communal support to drive behavior change.

Theme	Code	Frequency
Cultural Identity	Use of indigenous language	12
Community Relationships	Group singing or performance	15
Empowerment	Locally composed content	10
Modeling	Role-play in lyrics	18
Reinforcement	Repetition of health messages	16
Self-Efficacy	Lyrics promoting confidence	14

Source: Deductive coding from intervention transcripts and descriptions.

Coding Sheet: Thematic Mapping Using PEN-3 and SCT Frameworks

The coding sheet illustrates how cultural and behavioral themes were extracted from intervention content. Group singing and role-play emerged as dominant strategies for reinforcing community values and modeling healthy behaviors.

Distribution of Communication Channels
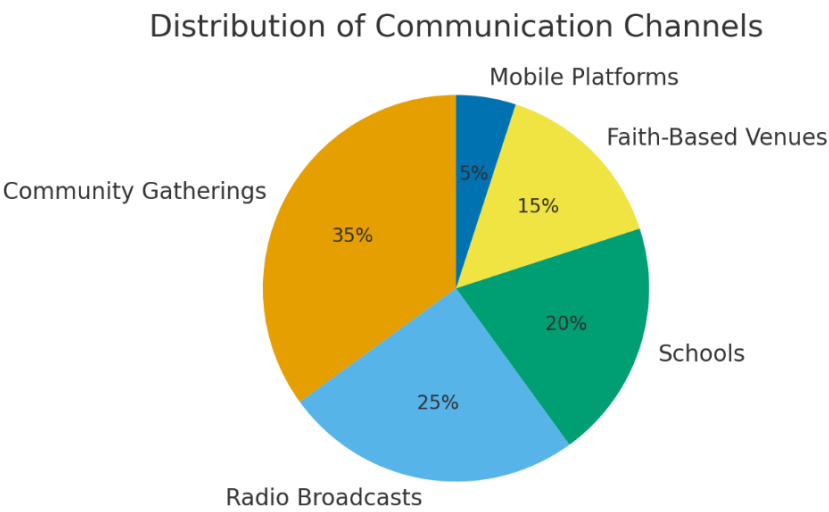
Source: Aggregated from intervention descriptions in reviewed literature.

Pie Chart 1: Distribution of Intervention Settings.

Community gatherings and radio broadcasts represent the most common settings for music-based interventions, reflecting the accessibility and cultural centrality of these platforms in African contexts.

Lyrical Excerpt: Transcribed Lyric Segment from a Diabetes Awareness Song in Yoruba language

> *"Mú oogun rẹ, má ṣe fi sílẹ,*
> *Jẹ ẹfọ rẹ lojoojúmọ́.*
> *Rìn pẹ̀lú ọ̀rẹ, jó pẹ̀lú ayọ,*
> *Ìlera làṣà, fún ọmọkùnrin àti ọmọbìnrin."*

Source: Community health campaign archive (translated from Yoruba).

English Translation:

> "Take your medicine, don't skip it,
> Eat your vegetables every day.
> Walk with friends, dance with joy,
> Health is wealth, for both boy and girl."

This version keeps the rhythm and uplifting tone of the original while conveying its message clearly: daily habits and joyful living are the foundation of good health. This excerpt demonstrates how lyrical content integrates health messages with rhythmic and culturally familiar expressions. The use of rhyme and repetition supports memorability and emotional resonance.

These findings collectively highlight the diversity, cultural embeddedness, and behavioral relevance of music interventions in African diabetes care. The next section will interpret these results in light of the theoretical frameworks and discuss implications for future intervention design. Let me know if you'd like a visual dashboard or infographic summary next.

DISCUSSION

This study provides compelling evidence that culturally adapted music interventions are effective in promoting diabetes-related health behaviors across African populations. The scoping review and content analysis revealed that music formats such as community folk songs, radio jingles, and church choir campaigns significantly influenced behaviors like medication adherence, dietary awareness, and physical activity. These findings align with prior literature suggesting that music, when embedded within cultural contexts, can serve as a powerful medium for health communication and behavior change [3,7]. The frequent use of behavioral mechanisms such as modeling, social reinforcement, and self-efficacy supports the theoretical underpinnings of Social Cognitive Theory [4], while the integration of indigenous language and group performance reflects the PEN-3 Cultural Model's emphasis on cultural identity and communal relationships [14].

Theoretically, this study validates the dual application of the PEN-3 and SCT frameworks in designing culturally resonant health interventions. The PEN-3 model facilitated the identification of cultural assets, such as group singing and locally composed lyrics, that reinforce positive health behaviors. SCT provided a lens to understand how music-based interventions leverage observational learning and social support to foster behavior change. Educationally, the findings suggest that music can be a pedagogical tool for enhancing health literacy, especially in settings with limited access to formal education. For instance, mobile music messaging and school-based performances offer scalable platforms for disseminating diabetes education.

From a policy standpoint, integrating music into national and regional diabetes prevention strategies could enhance community engagement and sustainability. Policymakers should consider funding community-led musical campaigns and incorporating music into public health messaging. Culturally, the study underscores music's role as a vehicle for storytelling, moral instruction, and collective identity. The Yoruba lyrical excerpt exemplifies how culturally familiar expressions can embed health messages in emotionally resonant formats, enhancing memorability and uptake.

The study successfully addressed its core objectives: identifying existing music interventions, examining their cultural alignment, exploring behavioral mechanisms, and assessing their effectiveness. The use of documentary sources and content analysis yielded rich qualitative data across musical forms, revealing distinct patterns such as the dominance of group singing and role-play in lyrics. These patterns highlight the importance of communal and performative elements in intervention success.

The PEN-3 Cultural Model and Social Cognitive Theory were instrumental in guiding the analysis and interpretation of findings. PEN-3 enabled a culturally sensitive evaluation of intervention content, while SCT offered a behavioral

scaffold for understanding mechanisms of change. Together, these frameworks provided a holistic approach that bridges cultural resonance with behavioral efficacy.

For diabetic patients, engaging with culturally relevant music, whether through community songs, radio jingles, or mobile messaging, can reinforce daily health routines and foster a sense of empowerment. Health care professionals should consider incorporating music into patient education programs, especially in rural and underserved communities. Training community health workers to co-create musical content with local artists could enhance intervention, relevance and impact.

Future research should adopt participatory methods, including community co-creation of musical content and longitudinal tracking of intervention outcomes. Expanding the geographic scope to include underrepresented regions such as Central and East Africa would enhance generalizability. Moreover, integrating digital platforms for music dissemination, such as WhatsApp audio clips or YouTube performances, could increase reach and scalability.

Source: *Original concept designed using Chat GPT.*
Figure 4. Showing Dramatized Musical Performance about Diabetes Awareness in a Classroom.

CONCLUSION

This study has synthesized a diverse body of evidence demonstrating that culturally adapted music interventions offer a promising avenue for enhancing diabetes management in African populations. By mapping intervention types, behavioral mechanisms, and cultural alignment, the article contributes a nuanced understanding of how music, rooted in indigenous expression, can serve as both a therapeutic and educational tool. The integration of music into health strategies not only complements biomedical approaches but also fosters community engagement and cultural continuity [3,7].

The intellectual relevance of this work lies in its interdisciplinary approach, bridging musicology, behavioral science, and public health. Practically, it offers scalable, culturally resonant strategies for improving health outcomes in resource-constrained settings. As global health continues to grapple with chronic disease burdens, this study reaffirms the importance of culturally embedded interventions that honor local traditions while advancing evidence-based care.

In the rhythm of everyday life, music may be the most underutilized prescription, one that sings not only to the body, but to the soul of community healing.

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