MUSITOPIA: DESIGNING INTERACTIVE MUSICAL ENVIRONMENTS FOR HEALTH AND WELLBEING

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ABSTRACT

Digital music-based interventions for wellbeing are widely adopted, yet most systems remain unidirectional, relying on passive consumption of pre-curated audio. In this paper, we present Musitopia, an interactive web-based platform that treats music-based intervention as an interactive process between user and system. The platform integrates emotion-aware recommendation, generative soundscapes, binaural beat synthesis, guided meditations, and adaptive breathing exercises within a unified interface. We describe its architecture and design principles, emphasizing closed-loop interaction and adaptive sonic feedback. A pilot study (N=10), combining self-reports and behavioral logs, shows high usability (8.1/10), strong engagement with interactive features, and trends toward increased valence and decreased arousal. These results suggest that interactive musical environments may enhance engagement and support emotional regulation.

1. INTRODUCTION

Music therapy has been widely recognized as an effective non-pharmacological approach for supporting emotional regulation, stress reduction [1], and psychological wellbeing [2]. However, access to professional therapy remains limited for many individuals due to geographic, economic, and social barriers [3, 4]. Digital technologies therefore play an increasingly important role in extending therapeutic support beyond traditional clinical environments [5]. A growing ecosystem of music and sound-based digital systems has emerged to support focus, relaxation and sleep outside clinical contexts. These systems typically operate as closed, unidirectional experiences where users consume predefined content with limited therapeutic personalization, transparency of clinical grounding, or opportunities for active musical engagement. In contrast, music therapy sessions often involve dynamic exchanges between therapist and client, where musical interaction, improvisation, and responsive feedback play a central role in emotional expression and regulation. Existing music and sound-based digital systems lack this key interactive component.

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In this work, we describe and evaluate Musitopia, which re-conceptualizes the platform as an interactive human–machine musical system. Inspired by therapeutic practices of musical dialogue, the new system introduces interactive features that enable users to actively shape sonic experiences while the platform provides responsive feedback to user interactions. Musitopia seeks to emulate aspects of therapist–client engagement and extend therapeutic processes outside the clinical setting. Musitopia aligns with emerging research in sound and music computing on human–machine interplay, where users and intelligent systems collaboratively shape musical outcomes. By integrating adaptive algorithms, interactive sound generation, and structured reflection mechanisms, this work explores how digital systems can support more fluid, socially meaningful, and therapeutically informed musical interactions. The main contributions of this work are as follows:

- We introduce a co-creative system where users actively shape and interact with adaptive sonic output, moving beyond passive music consumption.
- We describe a modular web-based architecture combining emotion-aware recommendation, rhythm synchronized audio processing, generative soundscapes, and interactive auditory modules.
- We present a pilot study (N=10) combining behavioral logs and self-reports, which shows high usability, strong engagement with interactive features, and trends toward improved valence and reduced arousal.

2. RELATED WORK

This section reviews existing work at the intersection of music, sound, and wellbeing. We focus on four main areas: digital sound-based wellbeing systems, guided meditation practices, soundscape research, and auditory stimulation techniques such as binaural beats. These areas provide the conceptual and technological foundation for understanding our approaches.

2.1 Music and sound-based systems for wellbeing

Commercial applications such as Endel, Brain.fm and Calm deliver continuous soundscapes, "science-backed" focus music and guided audio for stress reduction and sleep preparation. These platforms are positioned as accessible

self-help tools that support users in their daily wellbeing routines. At the same time, sound design companies like MorrowSound [6] demonstrate how carefully crafted, spatially immersive sound environments can modulate mood and physiological arousal in physical spaces such as hospitals and public installations. Together, these systems illustrate the rising demand for technologically mediated sonic environments aimed at supporting wellbeing.

Despite this growth, many current wellbeing systems remain fundamentally unidirectional, as users consume precomposed or pre-curated content. However, in therapeutic contexts, music is inherently interactive: effective sessions rely on continuous attunement between therapist and patient, where responses are dynamically assessed and adapted in real time. The lack of such interaction in existing platforms limits their potential to support meaningful therapeutic processes. [7]

A comparative analysis of the current landscape reveals significant limitations that are consistent across some platforms: Headspace, Noisli, BetterSleep, Insight Timer, MyNoise, Calm, Brain.fm, Spotify, Focus@will, and Endel. Evaluating these platforms across key functional dimensions reveals critical gaps. While static soundscapes (90%) are widely available, interactive soundscapes are present in only 30% of platforms. Similarly, breathing exercises appear in 60% of cases, but interactive breathing exercises are limited to 20%. Binaural beats are included in 80% of platforms, yet interactive binaural beats are nearly absent (10%). Most significantly, access to qualified professionals remains extremely limited. Only 20% of platforms offer any form of therapist contact and none provide direct access to certified music therapists. These findings highlight the importance of integrating professional support into digital wellbeing platforms. Providing access to music or other therapists may help mitigate burnout in the profession by offering new, sustainable forms of practice [8].

It is precisely this lack of interactivity and therapeutic platforms that motivates the development and continuation of Musitopia, which is conceived as an integrated system that combines interactive sound-based technologies with professional therapeutic support, aiming to bridge the divide between scalable digital tools and clinically grounded music therapy practices.

2.2 Guided Meditations

Guided meditation is a practice in which participants meditate in response to verbal instructions provided by a trained practitioner. The guidance helps individuals achieve a meditative state that might otherwise be difficult to attain through unguided practice. The process often involves mental imagery, focused attention on breathing, and the evocation of specific emotional states [9].

A well-established approach is the Bonny Method of Guided Imagery and Music (GIM) [10], which combines receptive music listening with therapeutic guidance. Developed in the 1970s, GIM uses carefully selected music to facilitate altered states of consciousness, promoting personal growth [11]. The integration of music distinguishes this approach from purely verbal guided meditation techniques. Through relaxation techniques, verbal prompts, and music, the listener explores internally generated imagery, memories, and symbolic experiences that support therapeutic insight and emotional processing [12]. Clinical studies have shown its effectiveness in reducing depression and anxiety [9, 11]. Research has examined the role of background music in enhancing meditation outcomes. A study on meditation found that incorporating soothing, lyric-free music increased the generation of low-arousal and pro-social positive emotions compared to silence, without increasing meditation difficulty [13].

2.3 Soundscapes

Soundscapes described as sonic environments where natural, human, and technological sounds intersect. Soundscapes consider sounds not merely as stressors but as a resource that can positively shapes human experience [14]. Research characterizes soundscapes through perceptual dimensions such as pleasantness, eventfulness, and calmness [15]. A key element is the significant association between positive soundscapes and health. Systematic reviews have confirmed that pleasant sound environments correlate with faster stress recovery, better self-reported health, and enhanced psychological wellbeing [14]. Natural soundscapes promote mental health through reducing stress, increasing perceived restorativeness and evoking awe [16]. Physiologically, these positive perceptions correlate with measurable changes such as increased heart rate variability and decreased skin conductance [15]. Furthermore, research into interactive soundscapes emphasizes how user engagement with dynamic rendering shapes the overall experience [17].

2.4 Binaural beats and auditory stimulation

Binaural beats are an auditory perception phenomenon that occurs when two pure tones of slightly different frequencies are presented separately to each ear [18]. The brain integrates these two signals, producing the sensation of a third illusory tone whose frequency is equal to the difference between the two presented tones. For a binaural beat to be perceived effectively, carrier frequencies are typically kept below 1000-1500 Hz, and the frequency difference (the beat frequency) must generally be less than 30 Hz [19]. Binaural beat stimulation has been investigated in cognitive neuroscience as a potential mechanism to influence neural oscillatory activity associated with relaxation and attentional states [20]. Different frequency ranges are associated with specific mental states: delta (1-4 Hz) with deep sleep, theta (4-8 Hz) with relaxation, meditation, and low consciousness, alpha (8-13 Hz) with relaxation and creativity, beta (13-30 Hz) with active concentration, alertness, and focused attention, and gamma (30-70 Hz) with processing information and cognition [21, 22]. The possibility of affect functional brain connectivity shows potential due to non-invasively modulate cognitive and affective states. As highlighted in a systematic review [23], the field is marked by significant methodological heterogeneity and contradictory findings.

3. METHODOLOGY

Musitopia [1] is a web-based platform designed to facilitate mental wellbeing through interactive digital sound and music. The interface adopts a design similar to music streaming services. This design choice lowers barriers to engagement while integrating therapeutic materials into everyday listening habits.

Building upon previous iterations of the platform, Musitopia incorporates new features informed by user feedback studies and music therapist collaboration. These additions aim to encourage more active engagement with sonic content, moving beyond passive listening toward interactive experiences that emulate aspects of therapist–client sessions. The platform integrates curated musical material, guided therapeutic exercises, adaptive recommendation systems, and interactive sonic tools that respond to user input and contextual information.

3.1 Sonic Collection

The current music and sound collection is made up of more than 300 resources with a number of therapeutic goals. Among these goals Musitopia offers resources to improve focus and sleep, encourage relaxation, recharge energies and meditation. Table 1 shows the distribution in percentages of wellbeing-related tags assigned to the sound and music resources.

Tags	Focus	Relax	Recharge	Sleep	Medit.
%	29.7	26.8	28.8	14.7	8

Table 1: Distribution of songs across wellbeing related tags.

All music files are stored in Cloudinary, providing scalable media delivery. The music collection can be expanded by authorized platform admin users.

3.2 Guided Meditations by Music Therapists

To extend therapeutic guidance beyond clinical settings, Musitopia includes a library of guided meditations developed in collaboration with certified music therapists and psychologists. These guided audio recordings combine spoken instructions (in Spanish) with carefully designed musical soundscapes to facilitate visualization exercises and sensory awareness practices. These exercises encourage active listening and attentional focus on specific sonic features while engaging in mental imagery. Unlike passive music listening, this approach promotes embodied engagement with sound, aligning with receptive music therapy techniques.

The spoken guidance was recorded independently in a studio and subsequently combined with composed musical backgrounds, thereby also enabling a voice-only listening option. The accompanying music was developed by a music technologist using Logic Pro [24], a professional digital audio workstation. A range of compositional and production techniques were employed to create an immersive experience, including spatial audio design, chord progressions aligned with the intended emotional trajectory of the guided visualization, and careful MIDI instrument selection emphasizing refined timbral qualities. Additionally, detailed audio post-processing was applied to minimize vocal artifacts and ensure high-quality playback. This production strategy enables flexible adaptation of the sonic environment while preserving the therapeutic integrity of the verbal guidance.

[1] https://musitopia.appskynote.com/

3.3 Emotion-Aware Recommendation System

Musitopia extends its existing music recommendation engine with an emotion-aware recommendation layer designed to better align musical content with users' emotional intentions. The platform already incorporates a collaborative filtering algorithm that continuously generates personalized recommendations based on users' listening behavior, including play history and content preferences. During onboarding, users complete a short questionnaire describing their current emotional condition and desired outcomes. These self-reported responses are processed through a rule-based recommendation module that initializes an emotional profile, providing additional contextual information to the recommendation engine. By combining this emotional context with the collaborative filtering recommendations, the system can prioritize content that better matches users' reported intentions while continuing to adapt recommendations according to their listening behavior over time.

3.4 Infinite Soundscapes

Therapy sessions often involve meditative practices, and musical improvisational exercises, both requiring uninterrupted auditory environments. To support extended sessions, Musitopia incorporates a generative system that produces continuous sonic environments from curated audio collections.

This component creates an infinite and constantly evolving ambient sound experience, moving beyond static loops to generate soundscapes (e.g., a rainforest, ocean waves, etc.) that never explicitly repeat and seamlessly transition between different audio segments.

Soundscape compositions are generated using a rule-based automatic composition algorithm which randomizes melodies, arpeggios and basslines based on composer-defined chord progressions and time signatures. The composition is then synthesized through MIDI and rendered into audio segments, which the playback engine then dynamically sequences. Using metrics derived from music information retrieval techniques (BPM and downbeat), the system dynamically sequences and transitions between compatible audio segments. A cross-fade scheduling mechanism calculates transition timing based on each soundscape's BPM. When the currently active audio buffer reaches a position within this threshold of its end, the system pre-loads a randomly selected track from the same soundscape collection and initiates a linear cross-fade over

the calculated interval. The fading process adjusts gain values in discrete steps, progressively reducing the volume of the outgoing buffer while increasing the incoming buffer's volume. This BPM-synchronized transition strategy ensures that cross-fades occur at musically meaningful moments, preserving rhythmic coherence. The selection algorithm avoids immediate repetition by excluding the track currently playing from the candidate pool. Smooth cross-fading using temporal compatibility measurements ensures perceptually coherent transitions, allowing users to remain immersed in a stable auditory environment. This adaptive sequencing enables prolonged listening sessions while minimizing repetition artifacts, supporting sustained states of relaxation or attentional focus, or musical flow, further grounding the technology as a form of musical accompaniment that facilitates therapeutic activities.

3.5 Binaural Beats

The integration of a binaural beat generator into the Musitopia platform is a direct response to the current state of this research field. Given the inconclusive neuro-scientific evidence and the promising, yet variable, behavioral results, a static, one-size-fits-all binaural beats audio file is unlikely to be effective for all users or all purposes. Instead, Musitopia transforms the experience into a user-driven, interactive exploration. Musitopia integrates an interactive interface that allows users to select from preset binaural beats configurations which align with neural frequency bands and their intended effects. Additionally users can customize binaural beat stimuli within their listening environment through adjustable parameters: the base frequency (fundamental frequency of the tone) and the binaural frequency (difference between right and left ear) and beat rate. This functionality enables users to actively explore different auditory conditions associated with relaxation, focus, or sleep preparation and find the configurations that best suit their needs. This interactive control transforms binaural beat listening from a fixed audio experience into a user-driven sonic exploration, fostering active engagement and individual differences with therapeutic sound environments.

3.6 Breathing Exercises

Musitopia includes several breathing exercise modalities: resonance, square, triangular, and tempo breathing, designed to support relaxation and stress regulation through synchronized audiovisual guidance. While the initial implementation offered fixed timing parameters for inhalation, exhalation, and breath-holding phases, clinical collaboration with music therapists revealed the need for greater flexibility to accommodate diverse patient conditions and therapeutic protocols.

Musitopia introduces configurable breathing parameters that allow real-time adjustment of all breathing phase durations. Therapists and users can now independently set inhalation, exhalation, and hold intervals through an intuitive slider interface, enabling personalized pacing ranging from rapid cycles to extended, slow-breathing patterns.

Another enhancement is the integration of real-time microphone input for breath-related feedback. When enabled, the system accesses the device microphone and continuously estimates the intensity of the incoming audio signal. This information is used to modulate visual feedback, allowing the interface to respond dynamically to the user's breathing. In addition, the system incorporates visual guidance through a marker moving along the geometric path, to represent the different breathing phases. In the final exercise, the microphone input also acts as a mechanism for setting the breathing tempo, further embodying the human and machine interactive relationship. These enhancements transform breathing exercises from fixed protocols into interactive tools.

3.7 Platform Usability

Based on previous user feedback collected through platform evaluations, Musitopia introduces several enhancements aimed at improving usability, interactivity, and accessibility. These updates were designed to reduce user friction, support personalized engagement, and streamline navigation within the platform. Key additions include functionality for custom playlist creation, enabling users to curate and revisit content aligned with their therapeutic needs, as well as a centralized interface for managing and tracking sessions booked with specialists. Furthermore, the platform expands its multilingual support to include Spanish, Catalan, English, and Italian, thereby increasing accessibility for a broader user base.

4. EVALUATION

To evaluate the user experiences and wellbeing potential of the Musitopia platform, a custom-designed questionnaire was administered to assess multiple dimensions of user interaction.

4.1 Study Design

A usability study was conducted with 10 participants. The participants were in a controlled on-site experiment. First, participants completed a pre-session questionnaire collecting demographic information (age, nationality, occupation), baseline music listening habits and self-reported emotional state using valence (emotional positivity) and arousal (activation level). Second, participants engaged in an approximately 30-minute free-exploration session with the Musitopia platform, during which interaction data was automatically logged in the MongoDB database. Third, participants completed a post-session questionnaire which repeated the valence and arousal assessment alongside questions on specific features, perceived usability, and responses to provide suggestions and overall impressions.

4.2 Participants

Of the 10 participants (3 women) who participated in the study, the mean age was 26.3 years with a standard deviation of 2.9. All participants came from a music-tech background, and they defined themselves as musicians (n = 7),

an AI engineer, a music technology student, and one mental health and wellness specialist. In terms of nationality, most of the participants were from Mediterranean countries: Spanish (n = 4), Italian (n = 3), Greek (n = 2), and Indian (n = 1). All participants were recruited through university networks and internal team channels, and none had previously used Musitopia prior to the feedback session.

4.3 Measurements

The evaluation combined self-reported and behavioral data. The questionnaire assessed: (1) demographic information and occupational background; (2) baseline music listening habits, including daily hours spent on streaming services and preferred audio types for mental health; (3) prior experience with music therapy and wellness applications; (4) feature-specific engagement and content category preferences; (5) perceived usability rated on a 10-point scale; and (6) open-ended responses capturing suggestions for improvement and overall impressions of the platform. Behavioral data was automatically logged by the platform, capturing song-level playback events with millisecond-resolution timestamps, enabling the reconstruction of each user's complete listening timeline across the session.

5. RESULTS

A thematic analysis was conducted on both self-reported and behavioral data to identify recurring patterns in user interaction, perceived value and emotional impact. The analysis revealed several themes, supported by statistics and user quotes.

5.1 Heterogeneous Engagement with Music Listening Habits and Wellness applications

Participants exhibited substantial variability in their prior use of music listening and for emotional regulation. Half reported intentional daily/weekly use, while others rarely or never used music deliberately for wellbeing. Daily streaming habits mirrored this variability: one participant avoided streaming entirely, five listened 3–5 hours daily, four averaged 1–3 hours, and one exceeded 5 hours. Listening contexts were also diverse, with most participants reporting engagement at home and during commuting, as well as in work and exercise environments. Social listening was comparatively uncommon.

5.2 High Usability Facilitates Efficacy

The perceived usability was consistently high amongst all users tested, with a mean rating of 8.1/10, indicating that navigation, feature clarity, and general interaction design were well received. Regarding the overall impression of the platform, a few commented: *Musitopia is an app that's really useful to relax easily. Any time, anywhere. Cool interface with relaxing songs and sounds*. This high usability appeared to facilitate exploratory behavior, allowing users to engage with multiple features within a short session.

5.3 Multimodal Engagement Beyond Music Listening

User interaction patterns revealed that engagement extended beyond traditional music listening. All participants explored Infinite Soundscapes, Breathing Exercises, Binaural Beats, and the Music Library features. On average, participants spent less than half of their session listening to music from playlists, with the remaining time devoted to other features such as soundscapes and binaural content. Individual differences were pronounced, with some users focusing heavily on playlists exploration and others primarily engaging with the other modalities. Behavioral logs were analyzed to assess how participants distributed their time within the 30-minute session window across the two main content modalities available in Musitopia: the music library and the other features (Infinite Soundscapes and Binaural Beats). As shown in Figure 1, the proportion of time spent actively listening to music varied substantially across users, ranging from 5.8% (User 10, less than 2 minutes) to 65.3% (User 4, approximately 19 minutes), with a group mean of 41.8% (standard deviation of 18.4%). Notably, the two highest-engagement users (Users 4 and 7, at 65.3% and 63.5% respectively) interacted with the largest number of songs (26 and 17 tracks), suggesting that active music browsing and high listening time co-occur in engaged users. Conversely, User 10, who spent only 5.8% of the window on music, likely devoted the remainder of the session almost entirely to the non-music features, consistent with their post-session report indicating a preference for Soundscapes and Binaural Beats.

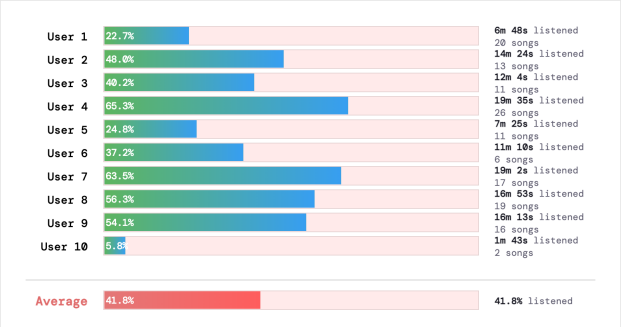


Figure 1: Proportion of Session Time Spent on Music Listening vs. Other Features per User

Qualitative feedback revealed strong multimodal engagement beyond traditional music listening. Infinite Soundscapes were most frequently praised (n=7 mentions), and Breathing Exercises ranked second (n=5). Three users highlighted Binaural Beats as one of their favorite components of the platform, expressing surprise at the effectiveness of its customizable features. This pattern underscores preference for interactive, generative audio over conventional music streaming. One participant stated *I don't think I would use this for a catalog version I would focus on the other features* and *the meditation/infinite soundscape/breathing exercises were very good*.

5.4 Divergent Content Engagement Patterns

Self-reported preferences from the cohort group favored Relax and Meditation categories, with Concentration and Sleep also selected. However, behavioral logs revealed low actual engagement with Guided Meditations (n=4), highlighting a gap between stated preferences and enacted behavior.

Compared to prior evaluations [25], which included two additional cohorts, Non-MT Group 1 (non-specialist users interacting with an early prototype) and an MT Group (music therapy patients in a clinical context), clear differences emerged in listening time distribution (Fig. 2). Non-MT Groups 1 and 2 devoted the largest share of their listening time to recharge content, with only a small proportion allocated to the Meditation category. By contrast, the MT Group oriented most strongly toward sleep, relax, and meditation content, which is coherent with a clinical population whose therapeutic needs center on emotional regulation, anxiety reduction, and sleep improvement, and suggests that the platform's catalog is well aligned with this user group.

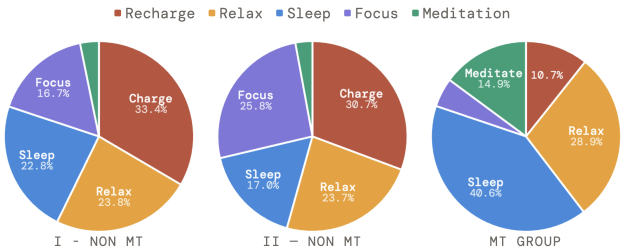


Figure 2: Distribution of listening time across musical categories for the I-non-MT (left), II-non-MT (middle), and MT (right) groups.

5.5 Consistent Emotional Regulation Across Users

Pre-post emotional state analysis revealed uniform directional effects across all participants. Valence increased moderately from 5.9 to 7.4 ($\Delta = +1.5$), reflecting shared gains in perceived emotional positivity (Fig. 5). Arousal showed stronger, more consistent reduction (6.6 to 3.1, $\Delta = -3.5$), indicating reliable calming effects.

User 6 exhibited the most pronounced shift (+3 valence, -8 arousal), ending in markedly improved state. This consistent pattern, universal arousal reduction with valence gains, demonstrates the platform's capacity to induce therapeutic relaxation regardless of baseline music habits.

Qualitative feedback corroborated these quantitative shifts, with participants reporting genuine relaxation: *'I really got relaxed, so I guess it did the job'*, *'I almost fell asleep during meditation/relaxation content'*, *'I was not expecting to actually feel relaxed by the binaural pulses'*, and *'Possibly I would also suggest it for sleep'*.

5.6 Desire for Deeper Interaction, Personalization, and Distinct Identity

Users expressed interest for a greater feature integration to create seamless multimodal experiences, particularly



Figure 3: Valence variation (emotional positivity)



Figure 4: Arousal variation (activation level)

Figure 5: Pre-post changes in emotional state across users: (a) valence and (b) arousal. Each point represents an individual participant, showing consistent increases in valence and reductions in arousal.

merging soundscapes, binaural beats, and breathing exercises: *'I would connect breathing exercises and infinite soundscapes so we can do it in the same time'* and *'I find really useful if Musitopia could merge binaural beats with infinite landscapes'*.

Personalization emerged as a key demand, with requests for sophisticated onboarding, dynamic visual feedback, and adaptive interfaces: *'onboarding could be more sophisticated, display of songs could be better - too repetitive, breathing exercise can have a better visual cue like a color change'*. And a user emphasize the need for a distinct wellness identity beyond streaming: *'make it less like Spotify, to reflect more the idea of an app for wellbeing through music'*,

This thematic cluster reveals demand for Musitopia to evolve from feature collection toward cohesive, personalized therapeutic experiences.

6. DISCUSSION

The findings of this study provide evidence that Musitopia supports both emotional regulation and multimodal engagement. Across participants, interaction with the platform led to consistent reductions in arousal and moderate increases in valence, suggesting that short sessions can produce measurable improvements in perceived emotional state. These effects were observed regardless of prior music listening habits, indicating that the platform may be ac-

cessible and beneficial even for users without established practices of using music for emotional regulation. These findings should be interpreted in light of the study population, which primarily consisted of participants with a music technology background without a control group rather than the intended therapeutic users. Therefore, the present study should be considered a formative usability and user experience evaluation rather than evidence of clinical efficacy.

A central finding of this work is the identification of multimodal engagement as a core interaction pattern. While the music library functioned as an initial entry point for many users, participants often shifted toward features such as Infinite Soundscapes, Breathing Exercises, and Binaural Beats suggesting that users do not conceptualize the platform solely as a music player, but rather as an integrated environment for interacting with different forms of auditory and guided experiences. The substantial proportion of session time dedicated to non-music features further reinforces the idea that these modalities are not ancillary, but primary drivers of engagement.

We reinforce the key finding presented in [25] which relates to differences between user groups. Participants with a music therapy background exhibited stronger alignment with relaxation, sleep, and meditation-oriented content, whereas non-specialist users tended to prioritize recharge-oriented material. This distinction suggests that user goals and contexts significantly shape content preferences, and highlights the importance of tailoring recommendations and interfaces to different user profiles. In particular, adaptive systems that can respond to individual emotional needs may be especially valuable in bridging these differences.

The qualitative feedback further emphasizes the importance of system integration, personalization, and clear positioning. From a design perspective, these findings suggest that future iterations of Musitopia should prioritize (i) tighter integration between modalities, (ii) enhanced personalization mechanisms, and (iii) a more balanced and diversified content catalog. Together, these improvements could strengthen user engagement while reinforcing the platform's therapeutic positioning.

7. CONCLUSION

This study demonstrates how the evolution of a digital wellbeing platform, by integrating new features such as infinite soundscapes, binaural beats, and adaptive breathing exercises, contributes to emotional regulation within short periods of use. The results indicate that Musitopia supports short-term emotional modulation, as evidenced by consistent reductions in arousal and increases in valence across participants. Beyond emotional outcomes, the study highlights the importance of multimodal engagement, where users clearly preferred different auditory and guided experiences rather than relying solely on traditional music listening. This behavior suggests that future music-based wellbeing systems should move beyond single-modality paradigms and instead embrace integrated, interactive environments.

Overall, Musitopia demonstrates strong potential as a tool for supporting emotional wellbeing, while also revealing key directions for its continued evolution. Future work will focus on conducting further validations in professional therapeutic contexts with our specialists, performing longitudinal studies with larger user cohorts to assess the platform's long-term efficacy, and clinical impact and investigate the integration of real-time affect sensing to further personalize therapeutic interactions. From a technical and design perspective, we aim to merge the soundscapes and binaural beats modules directly with the breathing exercises to create a more seamless experience. Additionally, we plan to refine the platform's onboarding process and visual feedback to enhance user guidance. Finally, we will continue to expand and balance the content library to ensure that user preferences align more closely with their actual behavior, ultimately strengthening Musitopia's identity as a dedicated therapeutic and wellbeing-oriented system rather than a generic music application.

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