Proceedings of ICEIPI 2026 Symposium: Psychological Resilience, Motivation, and Well-Being in Educational Contexts
DOI: 10.54254/2753-7048/2026.NS36656

Research on the Design of a Music Therapy App Based on Emotional Design and AHP

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Abstract. Amid the quickening rhythms of contemporary life and the steady escalation of stress exposure, concerns surrounding psychological well-being have become increasingly visible. Within this context, music therapy has received increasing attention from both researchers and practitioners because it focuses on emotional regulation. However, current music therapy applications still have some clear limitations. In particular, they often do not provide a satisfying emotional experience for users or fully meet their individual needs. To address these issues, this paper applies emotional design theory and combines it with the Analytic Hierarchy Process (AHP). Based on this approach, it develops a research framework for designing music therapy applications that better support users' emotional needs. First, this study reviews previous research on emotional design theory and the AHP method through a literature review. Based on this review, the overall research process is established. Next, user research is carried out through interviews, questionnaires, and competitor analysis. These methods help identify the main user needs in different music therapy scenarios. Finally, an AHP model is developed to analyze the importance of these needs and determine their priority.

Keywords: Emotional Design, Analytic Hierarchy Process (AHP), music therapy, user experience, product design

1. Introduction

In contemporary society, against the coupled pressures of accelerating informatization and increasingly intense competition, individuals are being subjected to heavier psychological strain, with affective disturbances—most notably anxiety and depression—becoming more prevalent.

Amid the accelerating tempo of contemporary life, emotional regulation has increasingly emerged as a matter of broad social and scholarly concern. Especially pressing, in this context, is the identification of approaches to emotional adjustment that remain both readily accessible and durable over time. Because of its distinctive capacities for emotional expression and psychological regulation, music has been widely incorporated into psychological healing practices [1], a trajectory that has, in turn, contributed to the steady expansion of music-therapy applications [2]. Even so, a recurring limitation persists: many current products remain oriented chiefly toward functional delivery, whereas users' more deeply situated emotional expectations and experiential requirements receive comparatively limited design attention. As a result, many music therapy applications provide

DOI: 10.54254/2753-7048/2026.NS36656

a similar user experience. This limits their ability to support emotional regulation effectively. Because of this, improving the design of music therapy applications from the perspective of emotional experience [3] has become an important research topic that deserves further study.

Previous studies have shown that emotional design theory [4] explains user experience through three connected levels: visceral, behavioral, and reflective. These three levels provide a useful framework for improving the emotional value of products and increasing user engagement. At the same time, the Analytic Hierarchy Process (AHP) is a common method for multi-criteria decision-making. It helps researchers analyze complex problems in a structured way and evaluate the importance of different factors. Because of these advantages, AHP has been widely used in user needs analysis and product design.

Although many studies have explored music therapy, affective computing, and digital health product design, only a limited number have combined emotional design theory with the AHP method in the design of music therapy applications. This research gap suggests that more studies are needed in this area.

Against the backdrop of the foregoing considerations, the present study designates music therapy apps [5] as its central research object and, by bringing emotional design theory into conjunction with the AHP method [6], constructs a framework for user-needs analysis and design decision-making. Through user research alongside data-driven analysis, users' emotional needs are identified, and their relative weighting is assessed; on that basis, corresponding design strategies are then proposed. The resulting findings are intended to offer practically usable insights and reference support for the subsequent design and optimization of music therapy products.

2. User research

2.1. Analysis of user characteristics

With psychological strain among university students on the rise, music has been taken up, increasingly, as one of the principal means of emotion regulation. In the "Special Action Plan for Comprehensively Strengthening and Improving Student Mental Health Work in the New Era (2023–2025)," jointly issued by the Ministry of Education together with sixteen other departments, it is explicitly indicated that mental health problems among students have become progressively more prominent under the intersection of multiple factors; the document, in turn, underscores the value of aesthetic education in cultivating psychological well-being and in renewing the methods used for mental health education. Alongside this policy backdrop, the expansion of mobile internet technologies has positioned music applications as a key channel for emotional regulation. Existing products, however, remain oriented largely toward content playback and continue to show insufficient attention to emotionally restorative design and personalized user experience.

To probe, with greater specificity, users' actual needs within music-therapy contexts, the present study undertakes a systematic analysis of both the functional configurations and the emotional experiences associated with music therapy applications, drawing on preliminary investigations; through multiple methods, user-needs data are then collected as well.

2.2. User research

To strengthen both the breadth and the credibility of requirements acquisition, the study proceeded through three complementary user-research angles: online market research, a literature review, and user interviews.

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Method 1: Online Market Research

Selected as representative cases for both comparative analysis and direct experiential evaluation were mainstream music platforms and sleep-aid therapy applications. The inquiry focused on several dimensions: music recommendation mechanisms, emotional categorization strategies, interaction processes, and styles of interface presentation. Alongside this layer of analysis, user comments and feedback drawn from app-store review sections were also collected and examined, with the review corpus making visible the recurrent pain points users encountered during product use as well as the expectations they brought to these products.

Method 2: Literature Review

A systematic review and analysis were undertaken of pertinent domestic and international scholarship on music therapy, emotional design, and user experience. From that body of literature, theoretical grounding emerged for classifying user needs and, in turn, for constructing the subsequent research framework.

Method 3: User Interviews

To develop a more fine-grained understanding of user experience, unstructured interviews were conducted with three university students, 20 to 22 years of age, drawn from different year levels and academic backgrounds. The discussions centered primarily on emotional states, patterns of music listening, experiences with currently available products, and expectations for application functions (that practical cluster of issues, in this case, proved especially revealing). From these interviews, a relatively authentic account emerged of the difficulties faced by university students; at the same time, the materials brought to light several latent needs that may surface during the use of music therapy applications.

Following integration and analysis of the collected information, several recurring deficiencies in current music therapy products [7] came into view. Particularly salient was an imbalance in design priorities: a large share of existing music applications continues to privilege content provision, whereas markedly less attention is directed toward the precise recognition of users' emotional states and the subsequent matching process [8]. In moments when users are experiencing negative emotions [9]—anxiety or depression, for instance—they are often left to locate and choose appropriate content on their own, a requirement that raises the effort burden during actual use.Of comparable concern is the interaction experience itself. Across many products, operational flows remain comparatively rigid, with limited flexibility and only sparse contextual guidance; under such conditions, efficient responses to users' needs across differing emotional situations become difficult to achieve. Also notable is the recurrent sameness of interface design: visual layouts frequently converge to a high degree, while the combination of visual and auditory healing elements [10] is still underdeveloped (not integrated with much depth, in practice), thereby diminishing the user's sense of immersion.

More specifically, users' emotional states are different from person to person and can change over time. Because of this, a single function or a fixed content structure is often not enough to meet users' changing needs at different stages. As a result, the lack of personalized support has become an important factor that affects the overall user experience.

Based on the results of product experience evaluation and user needs research [11], this study collected and organized information from interviews, market research, and literature analysis. Using these findings, a user needs index system for music therapy applications was developed. The study then identified 17 representative user needs. These needs served as the foundation for developing the AHP evaluation indicators and carrying out the following analysis.

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Table 1. User needs extraction table

Category	No.	User Need	Description
Product Functions	1	Emotion Recognition	Support users in inputting or selecting current emotional states
	2	Personalized Music Recommendation	Recommend matching music according to emotions, scenarios, or habits
	3	Emotion Recording	Record users' daily emotional states
	4	Emotion Trend Analysis	Visualize emotional changes and trends
	5	Scenario-Based Music Content	Provide categorized content such as sleep aid, study, and relaxation
	6	One-Click Therapy Mode	Quickly enter a relaxation or therapy state
Interaction Experience	7	Simplicity of Operation	Clear interface flow and reduced operation steps
	8	Playback Fluency	Stable music playback without lag
	9	Clear Information Hierarchy	Well-structured functions that are easy to understand
	10	Immersive Experience	Enhance immersion through animation and sound effects
	11	Visual Comfort	Soft colors and healing-oriented interface design
Emotional Experience	12	Emotional Feedback Mechanism	Provide feedback or prompts according to users' emotional states
	13	Companion-Like Design	Offer anthropomorphic or light interactive experiences
	14	Security and Privacy	Protect users' emotional data and avoid interference
	15	Emotional Expression Channels	Support recording, sharing, and expressing emotions
Extended Functions	16	Lightweight Social Functions	Anonymous sharing and emotional communities
	17	Personalized Settings	Customize recommendations, interfaces, and reminders

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2.3. User needs analysis based on emotional design theory

Table 2. Classification of user needs under emotional design dimensions

Emotional Design Dimension	Corresponding Need Numbers	User Need Content
Visceral Level	10, 11	Immersive experience, visual comfort
Behavioral Level	1, 2, 3, 4, 5, 6, 7, 8, 9	Emotion recognition, personalized music recommendation, emotion recording, emotion trend analysis, scenario-based music content, one-click therapy mode, simplicity of operation, playback fluency, and clear information hierarchy
Reflective Level	12, 13, 14, 15, 16, 17	Emotional feedback mechanism, companion-like design, security and privacy, emotional expression channels, lightweight social functions, and personalized settings

According to Donald Norman's emotional design theory, user experience can be divided into three levels: visceral, behavioral, and reflective. The visceral level focuses on users' first impressions of a product. It mainly considers the emotional responses created by visual design and sensory experience when users first interact with the product. Based on these characteristics, needs related to immersive experiences and visual comfort were included in this level. The behavioral level focuses on how users interact with the product during actual use. It pays more attention to functional performance and ease of use. Therefore, user needs such as emotion recognition, music recommendation, and interaction design were classified into this level. The reflective level is related to users' emotional feelings and personal evaluations that develop during and after using the product. Following this framework, needs including emotional feedback, emotional companionship, privacy and security, and personalized emotional expression were grouped into the reflective level.

Following the reorganization and integration of the original 17 user requirements in line with the distinguishing features of the different emotional dimensions, a more internally coherent classification framework gradually took shape. In practical terms, this framework made the interrelations among heterogeneous user needs easier to distinguish while also furnishing a structured hierarchical foundation for the subsequent development of the AHP model [12].

3. Differentiation of user need weights

3.1. Construction of the AHP model

Based on the findings from the user research and emotional needs analysis, this study applied the Analytic Hierarchy Process (AHP) to evaluate the importance of different user needs in music therapy applications. Since these needs are complex and involve multiple levels, a hierarchical framework was developed to organize and analyze the relationships among the indicators identified in the previous stage. Next, judgment matrices were constructed, and pairwise comparisons were carried out to compare the importance of each indicator. Based on these comparisons, the relative importance of each indicator was calculated and converted into its corresponding weight value.

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By applying the AHP method, user needs could be analyzed in a more systematic and structured way. This approach reduced the limitations of relying only on qualitative evaluation. It also made it easier to identify the priority of different user needs. Based on these results, the study provided a more reliable foundation for later design decisions and the optimization of music therapy applications.

Based on Donald Norman's emotional design theory, user needs in music therapy applications were organized into three dimensions: the visceral level, the behavioral level, and the reflective level. Following this framework, an AHP-based evaluation model was developed. At the target level, the model was defined as "Research on User Need Weights of Music Therapy Apps." The criterion level included three main dimensions that corresponded to the visceral, behavioral, and reflective levels. Based on the results of user interviews, questionnaires, and competitor analysis, ten representative indicators were identified and included in the indicator level.

Among these dimensions, the visceral level focuses on users' first impressions when they interact with the product. It mainly involves their visual and sensory experience. Therefore, immersive experience and visual comfort were included in this level. The behavioral level is related to how users operate and interact with the application during use. It emphasizes usability and interaction efficiency. User needs such as emotion recognition, personalized music recommendations, ease of operation, and smooth music playback were classified under this level. The reflective level focuses on the emotional connection and personal value that users develop after using the product over time. Based on this perspective, emotional feedback, companion-like features, privacy and security protection, and emotional expression were included in this level.

Based on the hierarchical framework described above, an AHP model was developed to evaluate user needs in music therapy applications. Experts and representative users were invited to compare the indicators in pairs at different levels of the model. Their evaluations were then used to build the corresponding judgment matrices. After that, the weights of each indicator were calculated, and consistency tests were carried out to ensure the reliability of the results. Based on these analyses, the relative importance of each user need was determined. The final rankings provide a quantitative reference for future design improvements and the development of related design strategies.

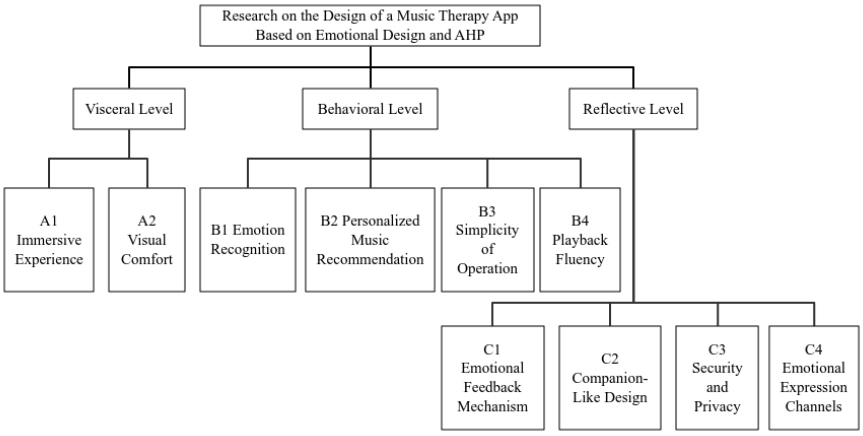

Figure 1. A hierarchical analysis model of requirements for music therapy apps

DOI: 10.54254/2753-7048/2026.NS36656

3.2. Data collection and analysis

Following the construction of the AHP model, data were gathered through an expert-scoring procedure. Invited to complete the relative-importance evaluations and, in turn, develop the corresponding judgment matrices were specialists drawn from product design, interaction design, and psychological therapy research, together with target users who had prior experience with music-therapy applications (that user-experience criterion being part of the original selection logic).

Thereafter, the eigenvector procedure within the Analytic Hierarchy Process (AHP) was used to derive indicator weights across the different hierarchical levels. For reasons of methodological rigor and result reliability, the judgment matrices were then subjected to consistency testing. Where the consistency ratio (CR) was less than or equal to 0.1, the corresponding matrix was treated as satisfying the required consistency criterion, and the resulting estimates were accordingly regarded as reliable.

The consistency test formula is as follows:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

$$CR = \frac{CI}{RI}$$

where λ_{max} refers to the maximum eigenvalue of the judgment matrix, n refers to the order of the matrix, CI refers to consistency index, RI refers to random consistency index, CR refers to consistency ratio.

According to the calculated results, every judgment matrix examined in this study met the prescribed consistency criterion. For the visceral layer, λmax was 2.000, and CI was 0.000. Within the behavioral layer, λmax reached 4.019, with CI = 0.006 and CR = 0.007. As for the reflective layer, λmax was 4.071, CI was 0.024, and CR was 0.026. Because each CR value remained below the 0.1 threshold, the judgment matrices can be regarded as exhibiting satisfactory consistency, thereby adequately capturing the relative importance relationships among user needs.

Table 3. Results of the consistency test for the study on the design of a music therapy app based on affective design and AHP

Project	Visceral Level	Behavioral Level	Reflective Level
λmax	2.000	4.019	4.071
CI	0.000	0.006	0.024
RI	0.000	0.890	0.890
CR	null	0.007	0.026

Following the successful completion of the consistency tests, the comprehensive weight assigned to each indicator was derived by multiplying the weight of each first-level indicator by that of its

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corresponding second-level indicator; from these calculated values, the final ranking of comprehensive weights was established.

Table 4. Comprehensive weighted ranking of secondary requirements for music therapy app design

Primary Indicator	Weight	Secondary Indicator	Weight	Comprehensive Weight	Rank
Visceral Level	0.2254	A1 Immersive Experience	0.3955	0.0891	6
		A2 Visual Comfort	0.6045	0.1363	1
Behavioral Level	0.3873	B1 Emotion Recognition	0.2148	0.0832	7
		B2 Personalized Music Recommendation	0.3145	0.1218	3
		B3 Simplicity of Operation	0.2040	0.0790	9
		B4 Playback Fluency	0.2667	0.1033	4
Reflective Level	0.3873	C1 Emotional Feedback Mechanism	0.2427	0.0940	5
		C2 Companion-Like Design	0.1961	0.0759	10
		C3 Security and Privacy	0.2155	0.0835	8
		C4 Emotional Expression Channels	0.3457	0.1339	2

Among the first-level indicators, both the behavioral level and the reflective level were assigned an identical weight of 0.3873, rendering them the most influential dimensions within the overall evaluation system. Read plainly, this pattern indicates that users of music therapy applications are attentive not only to whether a product functions effectively to satisfy practical needs, but also to the emotional value and psychological resonance elicited over the course of use (that is, during the usage process itself, not merely at first contact). In comparison, the visceral level received a weight of 0.2254. Although users' visual and sensory experience is still important in creating a positive first impression, it has less influence than functional performance and emotional engagement.

Among the secondary indicators, visual comfort had the highest overall weight, at 0.1363. This result suggests that users pay close attention to the interface design and visual experience when using music therapy applications. Since these applications are designed to support emotional well-being, a comfortable visual environment can help reduce psychological stress and create a better emotional experience.

The second highest secondary indicator was emotional expression, with a composite weight of 0.1339. This result shows that users want practical ways to record, express, and share their emotions while using the application. Providing features that support emotional expression and emotional release can increase user engagement and help users build a stronger emotional connection with the product.

Personalized music recommendation received a composite weight of 0.1218, making it one of the most important indicators. This suggests that users prefer music recommendations that match their emotional state. Therefore, music therapy applications should consider users' emotional condition, listening preferences, and emotional changes when recommending content. This can improve the relevance of the recommendations and better support users' emotional needs. In comparison,

DOI: 10.54254/2753-7048/2026.NS36656

playback fluency received a weight of 0.1033. This shows that smooth system performance is a basic requirement for a good user experience. If the application responds slowly, buffers frequently, or takes a long time to load, users may lose their sense of immersion. As a result, the effectiveness of emotional regulation may also be reduced.

Several other indicators also showed relatively high importance. Emotional feedback received a composite weight of 0.0940, followed by immersive experience (0.0891), security and privacy (0.0835), and emotion recognition (0.0832). These results suggest that users expect more from music therapy applications than basic functional support. They also value timely emotional feedback, an immersive user experience, and strong protection of their personal emotional information. Together, these factors play an important role in building user trust, increasing engagement, and improving overall emotional satisfaction.

In comparison, ease of operation and companion-like design received weights of 0.0790 and 0.0759, respectively. Although these two indicators ranked lower than the others, they are still important for the overall user experience. Ease of operation affects how easily users can learn and use the application, while companion-like design helps users build a stronger emotional connection with the product. Therefore, both factors should be included in the overall design process and considered together with the higher-priority user needs during future product development and optimization.

3.3. Discussion of analysis results

The AHP results show that users expect more from music therapy applications than basic functional features. They do not see these applications as simple music players. Instead, users place great importance on the emotional experience during use, especially in areas such as emotional regulation, emotional expression, and emotional companionship. In other words, users expect the application to provide not only practical functions but also emotional support. Overall, these findings suggest a growing demand for music therapy applications that can meet both practical needs and emotional needs at the same time.

Among the first-order indicators, the behavioral and reflective dimensions received the highest weights in the overall evaluation system. This suggests that users pay more attention to whether the application can understand their emotional state and provide meaningful emotional support. Compared with traditional music applications, users expect music therapy applications to play a more active role in recognizing emotional changes and helping with emotional regulation. Therefore, designers should place greater emphasis on features such as emotion recognition, personalized music recommendation, and emotional interaction.

The results for the secondary indicators highlight several important design priorities. Among them, visual comfort received one of the highest weights in the user needs framework. This suggests that the quality of the interface has a strong influence on users' emotional experience while using the application. Music therapy applications are often used for stress relief, emotional regulation, and relaxation. Because of this, users are especially sensitive to the overall feeling created by the visual design. Elements such as colors, typography, and animation work together to shape the emotional atmosphere of the interface. A clear, soft, and visually stable interface can help reduce psychological stress while improving users' sense of immersion and emotional security.

A similar pattern can be seen in the results for emotional expression and emotional feedback. These findings suggest that users do not view music therapy applications as simple tools for delivering music. Instead, they expect the application to provide opportunities for emotional expression, communication, and self-reflection during use. This result has clear implications for

DOI: 10.54254/2753-7048/2026.NS36656

design. Music therapy applications should include features that allow users to express, record, and receive feedback on their emotions, rather than simply providing or displaying content.Within this framework, features such as emotional diaries, mood tags, anonymous sharing spaces, and interactive feedback can help users record and organize their emotional experiences. These features also give users more opportunities to express feelings that may be difficult to share in daily life. In addition, these functions can strengthen users' emotional connection with the application and encourage them to continue using it over time.

The relatively high importance given to personalized music recommendation and emotion recognition clearly shows that users increasingly expect more individualized emotional support. Since users' emotional states can change across different situations and over time, and are often unpredictable, standardized recommendation methods may not be able to effectively meet the diverse needs of different users.Against that background, recommendation systems stand to benefit from the integration of artificial intelligence algorithms, emotion recognition technologies, and music preference analysis. By coupling these components, the relevance of recommended content can be strengthened, and music resources can be made more responsive to users' changing emotional conditions (that is, to fluctuation rather than emotional stasis).

A further issue requiring careful scrutiny concerns privacy and security. Given that music therapy applications commonly handle emotional records, psychological information, and other sensitive categories of personal data, user concern over the collection, management, and protection of such information is hardly surprising (particularly where disclosure touches on emotionally vulnerable states). In response, transparent data-governance practices, privacy-control mechanisms, and secure storage protocols can mitigate these concerns and, in turn, strengthen users' sense of trust. Within emotional health service settings, that trust bears not only on continued engagement with the product but also on users' willingness to disclose emotional information authentically (a condition that is, arguably, central to the service's functioning).

Taken together, these findings sharpen understanding of the way distinct user needs are ordered in music therapy applications. Of particular relevance for subsequent design work are visual comfort, emotional expression, personalized recommendation, emotional feedback, and privacy protection (the five dimensions most clearly foregrounded by the results). With greater design attention directed toward these dimensions, products may be better positioned to reconcile practical functionality with emotional value and, in turn, to provide more substantive support for users' psychological well-being and emotional regulation.

4. Design strategies

Emerging from the user research and AHP analysis, the findings suggest that users assign especially strong importance to several study-defining aspects of music therapy applications: visual comfort, channels for emotional expression, personalized music recommendation, emotional feedback mechanisms, and immersive experience. In the evaluation process, these dimensions were accorded comparatively high weight values; taken together, they also register users' expectations not only for functional support but for emotionally resonant engagement during product use as well.Based on these findings, this study combines emotional design theory with the results of the user-needs weighting analysis to develop corresponding design strategies from the visceral, behavioral, and reflective levels. By optimizing these three dimensions, which represent different aspects of user interaction and experience, the proposed design framework aims to improve the effectiveness of music therapy applications while enhancing the overall user experience.

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4.1. Visceral-level design strategies

At the visceral level, user experience is tied primarily to the immediate impressions formed at first contact with a product. Such impressions arise not solely from visual presentation and auditory cues, but also from the overall atmosphere communicated throughout the interaction process. In the case of music therapy applications, these sensory elements often shape users' emotional responses during the earliest phase of use. From an interface-design standpoint, then, a relaxing and emotionally supportive environment warrants close attention, with visual style, color use, and motion effects operating in concert to strengthen the product's therapeutic character.

According to the AHP evaluation results, visual comfort carried the greatest weight among the user-need indicators, underscoring its central role in shaping the user experience. From this, a fairly direct design implication follows: excessive visual stimulation should, as far as possible, be avoided throughout the design process. Under such conditions, highly saturated colors, densely packed information arrangements, and excessively complex interfaces are liable to increase cognitive burden and, in turn, diminish the soothing effect expected of music therapy products. A relatively simple, gentle visual language aligns more closely with users' emotional expectations.With regard to color planning, low-saturation hues—notably blue, green, and beige—can be employed to establish a calmer, more stable atmosphere. Typography, if it is to support rather than interrupt this effect, should remain clear and readily legible, while sufficient spacing between interface elements helps preserve visual balance. At the level of information architecture, clear prioritization is required so that users can identify needed functions quickly and without unnecessary visual pressure. As one further layout-level adjustment, a card-based structure can strengthen information organization by separating emotional-status records, music recommendations, and therapy-related modules into distinct sections, thereby improving both usability and visual comfort.

The findings further suggest that immersive experience constitutes a key element in emotional regulation as implemented through music therapy applications. Beyond static interface components, dynamic interaction design has the capacity to deepen user involvement and, in turn, refine the therapeutic atmosphere as a whole. Depending on the use context, elements such as dynamic backgrounds, breathing-guidance animations, natural environmental sounds, and music-visualization effects may be embedded within the interface. Upon entry into a therapy session, for instance, interface components may gradually adjust to shifts in musical rhythm through restrained visual transitions, thereby producing a more internally coherent sensory experience. At the auditory level, the inclusion of white noise and natural soundscapes—ocean waves, rainfall, or forest ambience among them—may further extend perceptual richness and intensify the sense of immersion.

Given that music therapy apps are commonly engaged during rest periods, relaxation routines, or the transition to sleep, interface adaptability warrants closer design attention as well. In low-light settings, features such as eye-comfort dark modes and sleep-assistance modes can curb unnecessary visual stimulation while shaping an interface environment more conducive to relaxation. By jointly refining visual presentation, sensory experience, and the overall interaction atmosphere, visceral-level design in music therapy apps is better positioned to support users' emotion-regulation needs and, in turn, foster a more comfortable therapeutic experience.

4.2. Behavioral-level design strategies

At the behavioral level, the main focus is on what users actually experience when they use the product. In particular, it looks at how much certain functions help users manage their emotions and use the app in daily life. For music therapy apps, this includes things like emotion recognition,

DOI: 10.54254/2753-7048/2026.NS36656

personalized recommendations, easy operation, and smooth playback. The user research shows that people no longer just expect basic music playback. Their expectations have slowly gone beyond that. Now, they care more about whether a product can notice how they feel and give support that is timely, convenient, and personalized. This support should be there throughout the whole process of using the app, not only at a few separate moments. Based on this, behavioral-level design should pay attention to both practical functions and interaction that is well organized and smart.

Among all the functions the platform needs, emotion recognition and personalized music recommendation are especially important. To help users express how they feel in a more natural way, the system can support several input methods. For example, users can choose emotion tags, use emojis, or type in keywords to describe their mood. By using both the user's emotional information and their listening history, the recommendation algorithm can better connect emotions with the right music. For instance, when users say they feel anxious or tired, the system can put calming music first and also suggest features that help them relax or sleep. In study or work situations, it can recommend music with a steady rhythm that helps people focus. This kind of recommendation makes the content more relevant. At the same time, it lets the music respond better to the way users' emotional needs keep changing.

The effectiveness of personalized recommendations can be further improved by combining artificial intelligence algorithms with user behavior data. By analyzing information such as saved music, listening time, and skipped content, the system can gradually understand users' preferences and adjust its recommendation methods accordingly. As more user data is collected over time, the recommended content can become better matched with individual habits and emotional needs. This can create a more personalized music therapy experience and encourage users to continue engaging with the application.

The interview results show that many users choose music therapy applications when they experience stress, emotional changes, or mental fatigue. In these situations, overly complex interactions may increase users' cognitive burden and reduce the effectiveness of emotional support. Therefore, the interface design should be simple and easy to understand.

Key functions, such as "Quick Therapy," "Sleep Mode," and "Emotion Record," should be given more visible positions in the interface so that users can access them with fewer steps. Similarly, the playback page can adopt a simpler design by reducing unnecessary information and focusing more on music controls and emotional feedback features.

From an interaction design perspective, efficiency can be improved by providing more flexible ways for users to operate the application. Features such as gesture controls, shortcut options, and voice commands can offer faster and more convenient ways to complete tasks. For example, users can switch therapy modes through long-press gestures and adjust the balance of environmental sounds with sliding controls. Compared with traditional multi-level menus, these interaction methods reduce unnecessary steps and create a smoother user experience.

To maintain user satisfaction and support continuous engagement with therapy, uninterrupted playback should be considered a basic requirement. Problems such as lag, slow responses, and loading errors can interrupt users' emotional regulation process and reduce their sense of immersion. Therefore, system stability and performance optimization should receive continuous attention throughout the product development process.Across heterogeneous network conditions and actual use contexts, functions such as background playback, breakpoint resume, and offline caching can accommodate user needs more effectively. Coupled with these features, reducing page-transition latency and compressing loading duration may strengthen overall system responsiveness, thereby supporting a more continuous and stable therapeutic experience.

DOI: 10.54254/2753-7048/2026.NS36656

4.3. Reflective-level design strategies

At the reflective level, the focus is placed on the emotional connection, psychological value, and sense of identification that users gradually build through long-term interaction with the product. Unlike traditional music applications, which mainly focus on content consumption, music therapy applications are expected to provide more active emotional support and psychological companionship. From this perspective, the product is not only a tool for playing music. Instead, it serves as a space where users can express their emotions, receive emotional comfort, and gradually develop a lasting connection with the application.

According to the AHP evaluation results, users placed high importance on emotional feedback during product use. This suggests that a product's ability to recognize and respond to users' emotional states has become an important factor influencing the overall user experience. Therefore, emotional support features should be considered in the design process. After completing a therapy session, the application can provide encouraging messages, personalized emotional summaries, or gentle visual feedback. Messages such as "You have worked hard today" or "Hope the music helps you relax" may help users feel understood and supported. In addition, emotional-recording features can further improve users' self-awareness. Through daily or weekly emotional reports and visual charts showing emotional changes over time, users can better understand their emotional patterns and gain clearer insights into their psychological well-being.

The relatively high weight given to emotional expression channels suggests that users expect more opportunities to communicate and release their emotions within the application. Music therapy applications are no longer viewed only as tools for listening to music. Instead, users increasingly expect these applications to provide spaces where emotions can be recorded, organized, and expressed. Features such as emotional diaries, anonymous sharing spaces, and mood check-in functions can help users better express their emotional experiences. At the same time, these features may reduce psychological pressure and provide users with additional emotional support.Against that background, the design of social interaction should remain tightly calibrated to the product's therapeutic orientation. Instead of importing interaction models that encourage overly intensive participation or cue social comparison, lighter and lower-pressure communicative formats appear better suited. Anonymous emotional sharing, when paired with simple responses such as "resonance" or "hug" reactions, can create channels for emotional support while also reducing isolation and loneliness.

Within the reflective level, privacy protection is an important concern. Since music therapy applications often involve emotional records, psychological information, and other sensitive personal data, users are likely to pay close attention to how their information is collected, managed, and protected. Therefore, privacy and transparency should be considered throughout the product design process. Users should also be given more control over their personal information. Measures such as data encryption, anonymous recording, and privacy permission settings can help improve users' sense of security and trust. For example, emotional diaries and psychological records can be designed as private content that is only visible to individual users, allowing them to decide whether and when to share this information. Meanwhile, reducing unnecessary advertisements and excessive notifications can create a more trustworthy and comfortable product environment. When users feel that their privacy and emotional needs are respected, they are more likely to develop stronger trust in the application and maintain long-term engagement.

At the same time, the overall product experience should signal sustained respect for users' emotional needs and psychological boundaries. From the user's perspective, comfort and trust can be

DOI: 10.54254/2753-7048/2026.NS36656

eroded by over-commercialized interfaces, high-frequency promotional messaging, or information notifications experienced as intrusive. In place of those practices, a more restrained, user-centered design orientation can cultivate a gentler product image and, with it, a more supportive emotional setting. Once users repeatedly perceive that their emotions, privacy, and personal experiences are being treated with respect (a perception that is easily undermined when boundary-crossing signals accumulate), the basis for long-term engagement and more sustainable user relationships becomes markedly stronger.

5. Conclusion

With the rapid pace of modern life, psychological stress among university students and young people has become an increasingly important issue. In this context, music therapy has been increasingly used as a practical way to support emotional regulation and relieve psychological pressure. In the mobile internet era, music therapy applications are no longer only tools for playing music. Instead, they are gradually developing into platforms that provide emotional companionship and psychological support. Therefore, how to design music therapy products that combine practical functions with emotional value while also meeting users' actual needs has become an important topic in current design research.

Based on emotional design theory, this paper applies the Analytic Hierarchy Process (AHP) to study user needs in music therapy applications. First, through a literature review, market research, and user interviews, the study identified and organized relevant user needs for music therapy apps. Following Norman's emotional design framework, these needs were divided into three dimensions: the visceral level, the behavioral level, and the reflective level. Then, an AHP-based quantitative analysis was carried out to evaluate the relative importance of different needs and establish the ranking of user-need weights.

The results show that visual comfort, emotional expression channels, personalized music recommendations, and emotional feedback mechanisms are the key factors influencing user experience. This suggests that users evaluate music therapy applications not only based on their functions but also on the emotional value they experience during use. Compared with traditional music products that mainly focus on content delivery, music therapy applications are expected to provide emotional support, psychological comfort, and a stronger sense of companionship. These findings also reflect a broader trend in the development of music therapy products. They are gradually moving beyond simple tool-based functions and becoming more intelligent, personalized, and emotionally responsive services.

Based on the analysis of user needs and the AHP evaluation results, this study explored design strategies from three connected levels: the visceral, behavioral, and reflective levels. At the visceral level, the focus was on creating a visually comfortable interface environment. At the behavioral level, attention was given to improving emotion recognition features and personalized recommendation systems. At the reflective level, the strategies focused on enhancing emotional feedback, strengthening the sense of companionship, and improving privacy protection. Based on these strategies, a conceptual design framework for music therapy applications was developed.

By bringing emotional design theory into direct conjunction with the AHP method, the study sets out a systematic framework for interpreting user needs and, in turn, furnishes both theoretical insight and practical reference points for the design and ongoing optimization of music therapy products.

Notwithstanding the contribution of these findings, several limitations persist. One concerns the scale of the user research itself. The participant pool was comparatively small, with the sample drawn predominantly from university students, a sampling profile that may narrow the extent to

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which the results can be generalized to broader categories of users. A further constraint arises from the use of the AHP method: although it offers a structured framework for assessing user needs, the evaluative procedure still depends, to a nontrivial degree, on subjective judgments supplied by participants and experts. Under such conditions, the weights produced may be shaped by individual perceptions and preferred modes of evaluation.

Even so, methodological extension and practice-based verification remain open. In subsequent work, big-data analytics, user-behavior tracking, and related quantitative techniques could be brought into the research design so that evaluation outcomes become more objective and more reliably grounded. By contrast, the present study has remained centered on conceptual design exploration and the development of design strategies. A full product implementation—together with large-scale user testing—has not yet been carried out. The next phase of inquiry, then, may profitably turn to prototype development, usability assessment, and longitudinal validation of user experience, thereby permitting a closer examination of how effective and how broadly applicable the proposed design framework proves in real-world settings. Looking slightly further ahead, future studies may also incorporate artificial intelligence technologies, emotion-recognition algorithms, and immersive interaction systems for more fine-grained exploration.

Beyond meeting users' baseline auditory requirements, the design of music therapy applications should accord substantially more weight to shifts in affective state and to the psychological textures of users' lived experience (not merely to sound delivery as such). Looking ahead, as artificial intelligence and digital therapeutics continue to develop, music therapy products are likely to assume a progressively more consequential role in emotional health; in parallel, emotional design will emerge as a particularly salient trajectory for strengthening both therapeutic value and the quality of the user experience.

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