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# Research on the Innovative Use of Ethnic Music Elements in Modern Residential Decoration

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**Abstract** Ethnic music, as a symbol of the cultures of various ethnic groups, the use of its elements in residential space not only enhances the artistic value of the design, but also enhances the emotional expression of the space. This study explores the innovative use of ethnic music elements in modern residential decoration. Through literature review and actual design case analysis, the questionnaire method was used to assess the application effect of ethnic music elements in modern residential design. The results showed that the residential background music system with ethnic music elements significantly improved the subjects' sleep quality and quality of life, especially in terms of energy and mental health. Specific data analysis showed that subjects in the experimental group improved their sleep efficiency (SE) by 17.46% and extended their actual total sleep time (TST) by 75.14 minutes ($P<0.05$). The quality of life assessment also showed that the experimental group scored significantly higher than the control group in both the energy dimension and the mental health dimension. It was concluded that ethnic music elements not only enhanced the aesthetic value of the living space, but also played a positive role in promoting physical and mental health. In the future, the functional design of ethnic music combined with smart home systems will become a new trend to enhance the comfort and spiritual solace of modern residences.

**Index Terms** Ethnic music, modern residence, decoration design, background music, smart home, quality of life

## I. Introduction

Chinese national music elements are the cultural classics precipitated by the development of Chinese nationalities and regions over thousands of years, which are manifested in all aspects of life and various industries, and are the crystallization of the hard work and wisdom of Chinese people of all nationalities, as well as the external embodiment of culture [1], [2]. Ethnic music elements have two specific characteristics. First of all, it has historical inheritance, China as a country with 5000 years of culture, has unique advantages in history and culture, which also prompted the Chinese music culture after thousands of years of inheritance to form a unique oriental Chinese music culture characteristic system, so that China's national music elements are more characteristic and have more historical inheritance [3]-[5]. From this point of view, more elements of folk music is not only a kind of artistic display, but also remember the history of the development process, has a very important cultural significance.

Secondly, Chinese folk music elements have diversity [6]. After 5000 years of historical development, the elements of folk music formed by Chinese culture are rich and varied, for example, the erhu, guzheng, pipa and other musical instruments, the drumming and blowing music of the Qin and Han Dynasties, the Qing and Jin Dynasties, and the pipa music of the Sui and Tang dynasties are all the external embodiment of the elements of traditional Chinese folk music [7]-[9]. It exists in a variety of forms, but what is unchanged is that it possesses Chinese philosophical thinking and core spiritual system, which is the key feature for China to stand in the world [10]. Especially in the process of residential decoration design, if the national music elements can be integrated, then it can also make Chinese residential decoration design different from other countries, making it more national representative.

As the material life of Chinese residents is gradually satisfied, the demand for spiritual level is also becoming more and more diversified, in the process of purchasing houses, users not only require houses to have good quality, but also need to design more creative and cultural connotations [11]. This also prompts designers in the process of residential decoration design, must do a good job in the integration of cultural elements, to ensure that the interior design is more creative, the quality can be improved [12]-[14]. In particular, the combination with Chinese national music elements can show the cultural heritage of China on the basis of aesthetics, and it can make the whole design more rich in hierarchy and at a higher level, which not only inherits the traditional music culture of China, but also promotes the good development of the interior design industry [15]-[17].

Modern residential design is not only a functional spatial arrangement, but also carries the expression of culture, art and personality. With the improvement of living standards, people's demand for housing is no longer limited to comfort and convenience, but more attention is paid to the satisfaction of the spiritual level. While focusing on the functionality of the space, designers also need to incorporate deeper cultural values, so that the residence is no longer a simple shelter, but a space that carries individual emotions and cultural identity. In this context, ethnic music, as a profound cultural symbol, can add unique emotional expression and cultural connotation to modern residential design.

Incorporating ethnic music elements into modern residential decoration design can make the living space resonate with the emotions of users. As a carrier of the history and culture of various ethnic groups, ethnic music is one of the best examples of the combination of architecture and music, as its rhythms, rhythms and expressions are rich in cultural heritage. Through rational design, ethnic music can inspire a sense of cultural identity in indoor space and enhance the occupants' emotional dependence on the space. In addition, with the popularization of smart home technology, the combination of ethnic music and modern technology opens up new innovative paths for residential design. The smart home system can not only combine ethnic music with spatial functional requirements, but also provide a personalized living experience for the occupants by adjusting the type of music and playing time.

Therefore, this paper discusses how to effectively integrate the elements of ethnic music into modern residential decoration design, combined with smart home systems, to create a living space that has both cultural depth and meets the comfort needs of modern people. Through literature review, case study and questionnaire survey, this paper analyzes the influence of ethnic music elements on modern residential design, and tries to put forward an innovative design mode that integrates ethnic music.

## II. Modern Residential Decoration Integrating Ethnic Music Elements

In contemporary society, design is a very important concept that is present in every corner of our daily lives, and even every step of our work is influenced by the concept of design. Therefore, design plays an important role in society. Modern residential design as a branch of the people's living standards continue to rise, the requirements of modern residential design not only has a considerable practicality, but also requires modern residential design has a certain cultural refreshing role. The integration of folk music elements in modern residential decoration design can effectively meet the public's spiritual and cultural needs and make up for their spiritual world.

### *II. A.Modern residential decoration design needs and concepts*

#### II. A. 1) Modern Residential Decoration Design Needs

(1) Personalization needs. Personalization is one of the important needs of modern residential decoration design. In this era of emphasis on uniqueness and self-expression, everyone desires their own home to become a unique existence, which can accurately reflect their personalities, hobbies and unique lifestyles. This requires designers to have in-depth and comprehensive communication with homeowners to fully understand their preferences, occupational characteristics, family structure and other factors before embarking on the design, so as to be able to tailor-made to create a unique space [18].

(2) Comfort needs. Comfort is also an indispensable need, a comfortable home allows people to fully relax and rest after a busy day. To achieve this goal, it is necessary to consider and design from various aspects. Reasonable spatial layout, to ensure a natural and smooth transition between the various functional areas, to avoid constriction and congestion.

(3) Intelligent demand. Intellectualization has gradually become a popular trend and urgent need for modern residential decoration. With the rapid development and innovation of science and technology, the emergence of intelligent home systems has brought unprecedented convenience and efficiency to people's lives. Through intelligent control means, people can easily control various devices at home.

(4) Environmental demand. The enhancement of environmental awareness makes environmental protection decoration become the inevitable demand of modern residential decoration design. People are more and more concerned about the environmental performance of the decoration materials, tend to choose low formaldehyde, pollution-free green materials to ensure the health of their families.

#### II. A. 2) Modern Residential Decoration Design Concepts

(1) “People-oriented” design concept. “People-oriented” is the most central concept in residential decoration design, which means that designers need to put the needs, comfort and living habits of the residents in the first place during the planning and creation process. Home is the harbor of the soul, a comfortable, warm, relaxing living environment can greatly enhance the sense of well-being of the residents.

(2) Sustainable development design concept. In today's era, sustainable development has become an important concept that cannot be ignored in residential decoration design. This concept aims to reduce the negative impact

on the environment, realize the effective use of resources and recycling, and at the same time guarantee the quality of life for future generations. Energy-saving design is the key to sustainable development. Through rational planning and technical means, the energy utilization efficiency of the residence can be improved.

(3) The design concept of aesthetics and art. Aesthetics and art play an important role in residential decoration design, and they give the living space a unique charm and personality. Aesthetic principles include proportion, symmetry, balance, rhythm and rhyme. Reasonable use of these principles can make the space layout more harmonious and beautiful.

(4) Personalized design concept. In residential decoration design, the concept of personalization aims to create a unique space that meets the personality and taste of the occupants. Everyone has a unique life experience, hobbies and aesthetic preferences, which should be reflected in residential design.

### *II. B.Innovative practices in modern residential decoration design*

#### II. B. 1) Expression of the value of folk music elements

Ethnic music elements, as the treasures of ethnic music culture, are deeply rooted in the long history. They are not only a collection of musical expressions such as melodies, rhythms, harmonies, modes, patterns, instruments and singing styles, but also a symbol of the unique cultural identity and artistic wisdom of each ethnic group. These elements have been inherited and innovated by countless generations over a long period of time, gradually forming distinctive local characteristics and ethnic flavors. The melodies are either melodious or exciting, the rhythms are either bright or soothing, and the harmonies are either harmonious or contrasting, all of which imply each ethnic group's perception of life and praise of nature. The characteristic musical instruments and singing styles, moreover, closely link the music with the language, customs and beliefs of the ethnic groups, showing the rich and colorful cultural connotations. These elements of national music are not only the source of artistic creation, but also an important carrier of national cultural inheritance, which transcends time and space, allowing future generations to appreciate and feel the unique charm and profound heritage of the music culture of various ethnic groups.

#### II. B. 2) Residential and Ethnic Music Interoperability

Music and architecture are heterogeneous in terms of philosophical nature and aesthetic characteristics, while there is is isomorphism in terms of “the way of existence of the two arts, the creative thinking of the artists, the means and methods, and the connotations and meanings”. The core of architectural art and musical art in the same period is in fact a reflection of the worldviews upheld by different cultural fields in this period. Architecture, as a visual spatial art, and music, as an auditory temporal art, have a deep and invisible connection in a particular historical period. Both architectural space and folk music must pass through three important carriers, namely the creator, the transmitter and the user. For architectural space, the designer is the creator of the building, the builder is the transmitter, and the residents are the users. And the creator of folk music is the composer, the transmitter is the performer, and the user is the listener [19].

Figure 1 shows the multidimensional transformation framework of architecture and folk music. Architectural space is firstly formed by architects in their minds, then transformed into two-dimensional drawings by means of cartography, and then actually built by constructors, thus transformed into three-dimensional space to be transmitted to users, who have different psychological feelings when they move around in it. Ethnic music is also formed in the mind of the composer first, and then transformed into a two-dimensional score, and then by the performer according to their own understanding of the two-dimensional score translated into a one-dimensional sound, transmitted to the listener, the listener receives a one-dimensional sound, and thus produce a resonance of thought and psychological fluctuations. It can be seen that the architectural space and folk music, after being transmitted through the three carriers, are ultimately attributed to a unified zero-dimensional thought. In such a multi-dimensional transmission and transformation process, architectural space and folk music reflect a strong interoperability between them.

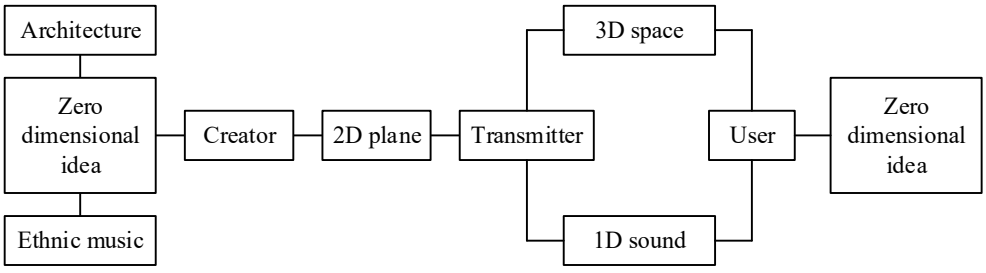


Figure 1: The interoperability between residences and ethnic music

#### II. B. 3) Innovative Practices in Modern Residential Decoration

With the rise and spread of ethnic cultures around the world, ethnic cultural elements in contemporary residential decoration design have gradually become an important design trend. The integration of ethnic culture can not only enrich the diversity of the living space, but also add a strong cultural flavor and unique aesthetic value. Designers can innovate a fusion design that meets modern life by combining ethnic cultural elements with the functional needs of contemporary residential design. For example, in the traditional music of Tibetans, Mongolians, Uyghurs and other ethnic groups, there are strong regional characteristics. Designers can create intelligent living spaces with unique ethnic characteristics by combining these elements with modern building materials and technology. For example, designing intelligent homes in residential space to realize the playback of residential background music makes the living space more modern and comfortable on the basis of maintaining the heritage of ethnic music. In addition, the combination of national music and modern residential decoration design can also be realized through the use of innovative technology.

## III. Residential background music function system design and construction

With the continuous development of society, people's requirements for buildings are getting higher and higher, in addition to the requirements on quality, higher requirements are also put forward in terms of aesthetics, environmental protection and other aspects. In the modern residential decoration design work, should be intelligent and innovative as the main design thrust, give full consideration to the multimodal perception of the national music, build residential background music function system, in order to realize the intelligent control of housing decoration design, to meet the user's entertainment needs and provide support for the spiritual solace, presenting the innovative effect of residential decoration design, increase the value of the building's value of use and value of the building in all aspects. The result is to increase the use value of the building and the value of all aspects.

### *III. A. Multimodal Interaction Design Method for Background Music*

#### III. A. 1) Residential Background Music Intelligence Requirements

In the current design of residential decoration, how to effectively realize and satisfy the audience's living needs is always the research focus of residential decoration design in the new era. With the development of smart home technology, it brings a new way for the audience to satisfy their residential needs, combining the elements of ethnic music with intelligent technology as a way to satisfy the audience's needs for quality of life, material life, living environment and spiritual life in many aspects.

The contemporary public is in a state of rapid development both physically and psychologically, and a large portion of them have their own hobbies and social needs. For example, our common entertainment activities such as square dancing in the park, playing chess and going to KTV to sing are welcomed and loved by the public. Intelligent lighting and intelligent audio-visual systems in the residential background music function system can create a comfortable entertainment space, so that the public can leave the house, very convenient and comfortable and friends and family members to spend leisure time together, but also as a channel to communicate with the outside world information exchange and communication, to alleviate the public easy to be alone to produce a sense of loss and depression.

#### III. A. 2) Multimodal approach to interaction design

Figure 2 shows the multimodal interaction design method for residential background music. When designing the residential background music functional system, it is necessary to grasp the three key elements of “human - scene - intelligence”, and the design that conforms to the scene can enhance the user's desire to communicate and sense of trust. When designing, first lock the target user group and the core scene, the user is the core, the scene for the interaction between the product and the user to increase emotional resonance. Then look for interaction channels that match the user and the scene, look for appropriate senses and modes based on the user's situational tasks, and balance the multi-channel output according to the needs of the scene tasks. Finally, according to the range of human senses, the dimensions and precision of the machine modality are refined, which in turn improves the residential background music function system and makes the system a center of intelligent and natural interaction.

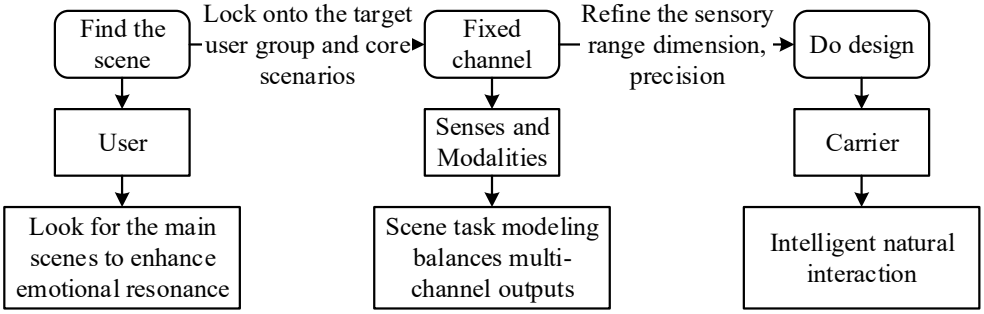


Figure 2: Multimodal interaction design methods

(1) User scene focus. Scene refers to a specific user scene, a scene story based on the real life of the user, and an exploration of the product and service environment. Scene is a kind of multi-dimensional space, containing users, background information, purpose, activities and events, etc. Scene is the key to the construction of the story. In the multimodal interaction design of the housing background music function system, it is necessary to accurately position the scene according to the target group's living habits, real-time status, spatial environment and social needs to find the main scene. Then analyze the behavioral characteristics of the specific scene, excavate user pain points, find user needs, so that the product can maximize the satisfaction of the user's functional needs, emotional needs and use needs.

(2) Attention and Sensory Interaction. Attention is the ability of people to pay attention to external things through their senses, and any form of information transfer will consume attention. Users mainly rely on the visual, auditory, tactile and other sensory systems to interact with the product, reasonable and effective sensory interaction can effectively deliver interactive information, and will not cause cognitive burden and behavioral barriers to the user. Sensory interaction is a human-computer interaction process in which multiple senses participate together, and the sensory interaction information of the product is the external stimulus that causes the user's attention to change, and the degree of stimulation generated by the information will affect the attention.

### *III. B. Construction of residential background music function system*

#### III. B. 1) Background Music System Design Ideas

The application of housing background music function system is mainly to enhance the comfort and taste of the residence, but also in many aspects to bring practical value to the user. In modern residential decoration design, background music can effectively stimulate the user's enthusiasm, make the home process more pleasant and relaxed, and assist in realizing the user's spiritual comfort. In modern residential decoration, the background music function provides users with a comfortable and pleasant living environment. Users can listen to their favorite folk music to relieve loneliness and improve the quality of life.

In the design of modern residential decoration, taking into account the different needs of different residential spaces for ethnic music elements, and in order to better meet the needs of users for the creation of home atmosphere, this paper proposes the construction of residential background music system. Through carefully selected ethnic music, it can stimulate the user's emotional expression and enhance the user's quality of life.

#### III. B. 2) Background music system topology

Residential background music system is mainly user-driven, respectively, on the smart home console, terminal and smart home gateway control, smart home application service platform as a carrier, and console, terminal and mutual collaboration, the family LAN and WAN for the communication network to provide security, the parts of the joint realization of the normal operation of the smart home, the specific composition of the framework shown in Figure 3. The smart home terminal contains devices such as smart lights, smart speakers, etc., and the console contains cell phones, computers, touch screens, etc. When interaction is realized, the console provides an interactive interface to ensure that the user can accurately view the home status in real time and help the user to give commands, and connects the terminal devices through the intelligent gateway to linkage control, and provides local scenario function and device management function under the premise of ensuring network security, so that the terminal devices can accurately respond to the user's commands in a timely manner.

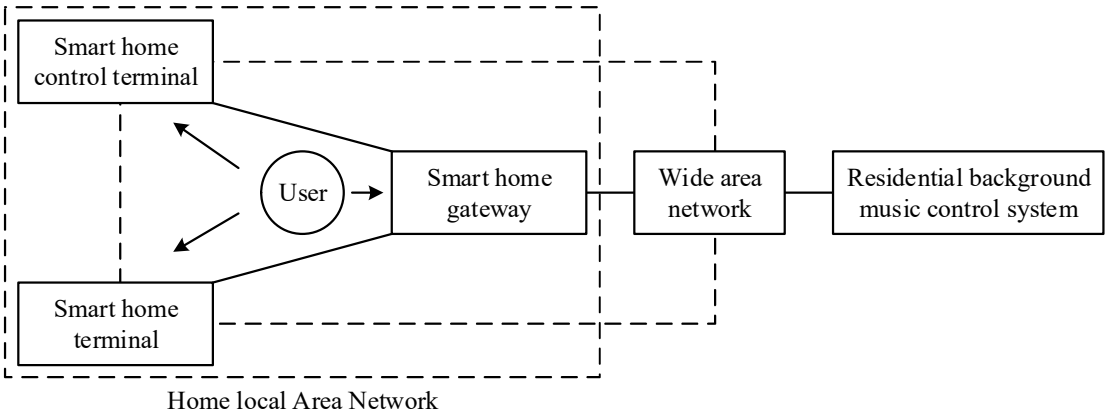


Figure 3: Topological structure of the background music system

This system contains areas mainly for the entrance area, living room area, bedroom area, bathroom area (toilet) and kitchen area, the entrance area involves intelligent door locks, human body sensors, lighting control, indoor voice control. The living room area involves lighting control, background music and multimedia control. Bedroom area involves lighting, air conditioning control, sleep voice reminder. All intelligent functions are controlled by the centralized integrated system, which collects and records information through different intelligent sensors, including information on energy use and regulation, indoor and outdoor air quality, water, electricity and gas use, and alarms. The information data stream is received and uploaded to the cloud on demand, and communication is realized using IoT gateways and other protocols to achieve the purpose of remote control of intelligent equipment and receive alarm information when necessary. At the end of the use of each device or when it is in standby mode, the usage feedback information is uploaded regularly and stored in the cloud server to form a system log.

## IV. Validation analysis of residential background music function system

With the continuous improvement of people's living standards, people's requirements for modern residential decoration also continue to improve, modern residential decoration design directly affects people's living experience. China has a long history and unique national music culture, the application of national music elements to modern residential decoration design can enhance the grade of modern residential decoration design, make modern residential decoration design more unique, and better meet people's living needs.

### *IV. A. Validation of sleep quality and quality of life performance*

#### IV. A. 1) Subject-controlled experiments

The study subjects were selected from the insomnia patients in the Neurology Clinic of the Affiliated Hospital of S University of Traditional Chinese Medicine from July 2023 to July 2024, and were initially screened as the study subjects for this study. After that, strictly in accordance with the diagnostic criteria, inclusion and exclusion criteria for re-screening, to exclude the shedding loss as well as the exclusion of the sample, we will have been included in the study subjects a total of 90 cases to be analyzed.

The above samples were divided into experimental group and control group, each with 45 cases. The experimental group (EG) carried out the treatment with the residential background music function system of modern residential decoration, while the control group (CG) carried out the verification with the traditional insomnia treatment. The subjects' sleep status and quality of life were mainly tested, and the observation indexes of sleep status mainly included rapid eye movement sleep latency (RL), sleep efficiency (SE), actual total sleep time (TST), number of awakenings (AT), and sleep latency (SL). In this study, the quality of life of the subjects was evaluated mainly through the SF Health Survey Scale, which consists of eight dimensions, including physical function, physical function, somatic pain, general health, energy, social function, emotional function, and mental health (SH1~SH8). The scale has been shown to have strong reliability and validity in existing studies and is suitable for use in assessing quality of life.

This paper mainly uses SPSS software to carry out statistical analysis, quantitative information that meets the normal distribution is expressed as mean ± standard deviation, t test, categorical or hierarchical information is expressed as the number of cases, percentage, rank sum test, $P < 0.05$ for the difference has statistical significance.

**IV. A. 2) Statistical analysis of sleep status**

The purpose of designing the housing background music function system in modern residential decoration is to effectively improve the user's sleep quality, based on which, under the control monitoring carried out for four months, the comparative results of the sleep status of the two groups of subjects were obtained as shown in Table 1. The a in the table indicates P<0.05 compared with the control group after the experiment.

As can be seen from the table, the experimental group of subjects in the housing background music function system, the overall sleep state has been significantly improved, and there is a significant difference between the sleep state with the control group of subjects (P<0.05).

It has been reported that a continuous and complete sleep process is the key to ensure sleep quality. Normal sleep mainly consists of two sleep phases, rapid eye movement (REM) and non-REM, and a complete sleep process should include 5-7 cycles of REM and non-REM, with one cycle completed in about 80 min. The REM of the audience with greater sleep quality problems was significantly longer than that of the normal population, which may have a strong relationship with the lack of a sense of sleepiness. The results of this study showed that the differences between the two groups of subjects in RL, SE, TST, AT and SL were not statistically significant when compared before the experiment (P>0.05), and after the experiment, the RL and SL of the experimental group of subjects were significantly shorter than those of the control group (P<0.05), the TST was significantly prolonged, the SE was significantly increased, and the AT was significantly decreased, which is in line with the findings of the existing related studies. It indicates that the introduction of residential background music function system in modern residential decoration design can significantly optimize the sleep process of the audience and improve the quality of sleep. The reason for this is that the elements of ethnic music can assist the audience to relax in their daily life, which is a systematic and active intervention process that can assist the audience to relax their whole body and mind and realize a pleasant peak experience. By regulating the immune and neuroendocrine systems, it relieves the tension of muscles, blood vessels and nerves of the whole body, regulates the function of autonomic nerves and the excitability of the sympathetic nervous system, stabilizes respiration and rhythm, and improves the quality of sleep.

Table 1: The sleep of the two groups was compared

| Group | Test | RL/min | SE/% | TST/min | AT | SL/min |
|---|---|---|---|---|---|---|
| EG | Before | 122.15±12.71 | 76.48±3.62 | 362.51±28.15 | 5.18±0.27 | 20.55±2.76 |
| | After | 80.93±8.93a | 93.94±5.24a | 437.65±12.37a | 3.03±0.43a | 12.78±2.14a |
| | *t* | 12.794 | -6.815 | -6.276 | 8.753 | 12.651 |
| | *P* | 0.002 | 0.000 | 0.005 | 0.001 | 0.003 |
| CG | Before | 122.54±12.78 | 78.45±2.73 | 388.41±16.42 | 5.12±0.46 | 17.85±2.93 |
| | After | 98.95±8.42 | 84.34±6.54 | 392.51±17.35 | 4.18±0.51 | 16.34±4.76 |
| | *t* | 8.517 | 5.123 | 2.769 | 8.427 | 7.578 |
| | *P* | 0.000 | 0.001 | 0.000 | 0.002 | 0.005 |

**IV. A. 3) Statistical analysis of quality of life**

For the quality of life of the two groups of subjects, this paper was conducted through the SF survey scale. The obtained data were compared between and within groups using independent and paired samples t-tests for the quality of life of the two groups of subjects. Table 2 shows the results of the comparison of the subjects' quality of life, and * in the table indicates P<0.05.

Analysis of the statistical results showed that after the comparison experiment, the difference between the experimental group and the control group subjects in terms of the energy dimension (SH5) and the mental health dimension (SH8) of the SF survey scale was statistically significant (P<0.05). While the differences between the two groups of scores in physical functioning dimension (SH1), physical functioning dimension (SH2), somatic pain dimension (SH3, general health status dimension (SH4), social functioning dimension (SH6) and emotional functioning dimension (SH7) scores were not statistically significant (P>0.05). Paired t-tests were used to compare the scores of the dimensions of the SF survey scale between the experimental and control groups before and after the experiment within the groups. The results showed that before and after the experiment, the within-group comparisons of the scores of the dimensions (physical functioning, somatic pain, general health status, energy, social functioning, mental health and emotional functioning) of the experimental and control subjects, except for the dimension of physiological functioning, showed statistically significant differences (P<0.05).

Table 2: The comparison results of the quality of life of the subjects

| Index | Group | Before | After | *t* | *P* |
|---|---|---|---|---|---|
| SH1 | EG | 58.41±22.16 | 55.68±20.23 | 1.614 | 0.121 |
| | CG | 57.39±23.18 | 59.78±23.15 | 0.636 | 0.539 |
| | *t* | 0.234 | 0.463 | - | - |
| | *P* | 0.793 | 0.672 | - | - |
| SH2 | EG | 42.57±43.48 | 51.64±36.52 | -3.176 | 0.002* |
| | CG | 40.59±43.93 | 44.53±38.72 | -3.795 | 0.000* |
| | *t* | -0.672 | 0.958 | - | - |
| | *P* | 0.493 | 0.345 | - | - |
| SH3 | EG | 54.52±20.78 | 63.06±17.68 | -5.724 | 0.002* |
| | CG | 55.06±20.66 | 64.13±17.82 | -3.945 | 0.001* |
| | *t* | 0.276 | 0.278 | - | - |
| | *P* | 0.753 | 0.813 | - | - |
| SH4 | EG | 32.06±12.63 | 35.45±13.28 | -5.336 | 0.002* |
| | CG | 32.37±15.28 | 35.16±12.17 | -5.761 | 0.000* |
| | *t* | 0.351 | 0.175 | - | - |
| | *P* | 0.728 | 0.846 | - | - |
| SH5 | EG | 38.24±15.37 | 59.86±10.64 | -12.558 | 0.002* |
| | CG | 37.95±15.06 | 50.24±12.36 | -10.392 | 0.001* |
| | *t* | -2.176 | -4.328 | - | - |
| | *P* | 0.836 | 0.002* | - | - |
| SH6 | EG | 58.72±20.93 | 62.06±21.93 | -3.857 | 0.002* |
| | CG | 58.36±20.64 | 62.06±21.53 | -3.118 | 0.000* |
| | *t* | -0.313 | 0.253 | - | - |
| | *P* | 0.828 | 0.816 | - | - |
| SH7 | EG | 43.35±41.82 | 65.67±36.74 | -5.779 | 0.005* |
| | CG | 43.16±39.64 | 56.32±43.42 | -2.783 | 0.002* |
| | *t* | -0.025 | -0.959 | - | - |
| | *P* | 0.936 | 0.271 | - | - |
| SH8 | EG | 40.68±12.65 | 67.35±32.18 | -9.127 | 0.003* |
| | CG | 40.27±10.81 | 53.59±6.72 | -6.932 | 0.000* |
| | *t* | -0.317 | -2.176 | - | - |
| | *P* | 0.856 | 0.028* | - | - |

Quality of life, also known as quality of existence or quality of life, is a comprehensive concept of multidimensional functioning such as physical, psychological, and social functioning, and insomnia, as a common physical and mental disorder, has a significant impact on quality of life. Some studies have shown that quality of life is positively correlated with quality of sleep, and the quality of life of audiences with sleep disorders is significantly lower than that of audiences with good sleep. Related studies have clearly indicated that quality of life can be used to assess the evaluation of insomnia on the quality of self-survival of the audience.

In this study, the SF scale was used to evaluate the changes in the quality of life of the audience before and after the experiment, and the results of the study showed that, except for the statistically significant difference in the scores of the SF energy dimension and the mental health dimension in the experimental group and the control group ($P<0.05$), the inter-group comparison of the scores of the remaining dimensions was not statistically significant ($P>0.05$). Within-group comparisons showed that the scores of the experimental and control groups were higher than those before the intervention except for the physiological function dimension ($P<0.05$), indicating that the residential background music function system incorporating elements of ethnic music in modern residential decorations improves the overall quality of life of the audience and is better than the control group in improving the energy and mental health of the audience. In addition, this study was only a 4-month comparative trial, and the advantages in terms of improvement in the quality of life of the audience may take a longer period of time to be realized.

### *IV. B. Validation of the housing background music function system*

#### IV. B. 1) Attractiveness of functional system characteristics

In order to effectively analyze the feasibility of the modern residential decoration design that integrates the elements of folk music in the smart home environment, the five main characteristics of the housing background music function system are verified, namely, convenience, safety, fun, energy saving, and emotionality, and we want to find out through the survey which characteristics of the housing background music function system are more appealing to the target group to use. In order to make the results more accurate, a matrix of single-choice questions was selected, allowing each target user to make a choice of attractiveness for each feature, with a total of four degrees, namely unattractive (0 points), generally attractive (1 point), attractive (2 points) and very attractive (3 points). In the experimental group issued a total of 45 questionnaires, the effective recovery of 45, after the statistics to obtain its characteristics of attractiveness matrix results shown in Figure 4.

As can be seen from the figure, in terms of very attractive dimensions, the most attractive is convenience, which accounts for 55.97%, and the second and third in the list are fun and safety, which account for 37.05% and 28.06% respectively. The least attractive is energy efficiency, which accounts for only 22.11%. In addition, it is impossible to accurately derive the attractiveness and ranking of each feature just from the dimension of “very attractive”, so this paper calculates the score of each feature through the point system, multiplying the number of people by the number of points and adding up to get the total score, which results in the highest total score of 248 points for convenience, and the lowest score of 178 points for energy-saving, and the second to third highest score of 178 points for energy-saving. The lowest is energy efficiency with 178 points, and the 2nd to 4th places are fun, safety, and emotion respectively.

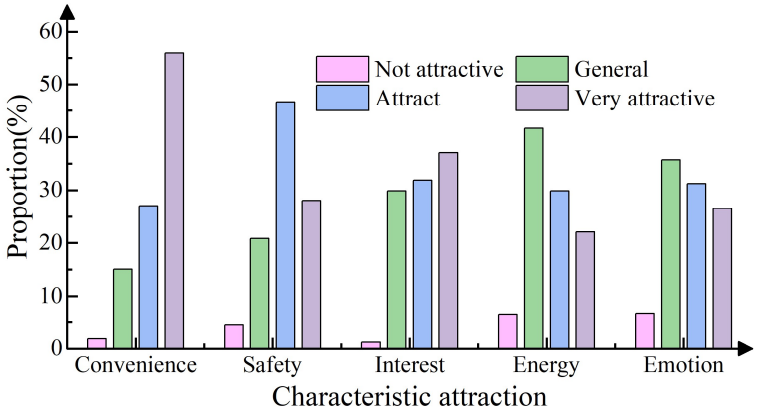


Figure 4: The result of the feature attractiveness matrix

#### IV. B. 2) Comparative experiments on design practices

In order to further illustrate the feasibility of this paper's housing background music function system integrating ethnic music elements, this paper invites 10 subjects in the experimental group of the previous paper to experience the simulation of experience scenarios after experiencing the system of this paper (EG) and the system of the Youdao platform (CG) respectively. Firstly, they were clearly informed of the unified user experience objectives, user needs, pain points and potential expectations in this experience. Secondly, we build a user journey to record the whole process of users completing an arbitrary entertainment scene on the two platforms, including user behavior, interaction mode, and information architecture. Two questionnaires are designed based on different platform experience dimensions, and after users complete them, they are asked to score and evaluate the two comparative platform experiences. The experience evaluation mainly includes space layout (T1), smart home (T2), interaction experience (T3), interface design (T4), and emotional value (T5), and the Likert five-level scale is used for data statistics, with 1~5 representing very dissatisfied, dissatisfied, average, satisfied, and very satisfied, respectively. The comparison results of the two platforms are shown in Figure 5.

As can be seen from the figure, under the comparison results of experience design practice of different systems, the housing background music function system integrating ethnic music elements proposed in this paper is more satisfied by the experiencers. In terms of smart home, interactive experience, interface design and emotional value, the excellence got higher evaluation results from users, verifying the feasibility of this paper in integrating ethnic music elements in modern housing decoration design, and verifying the value benefits of this design practice.

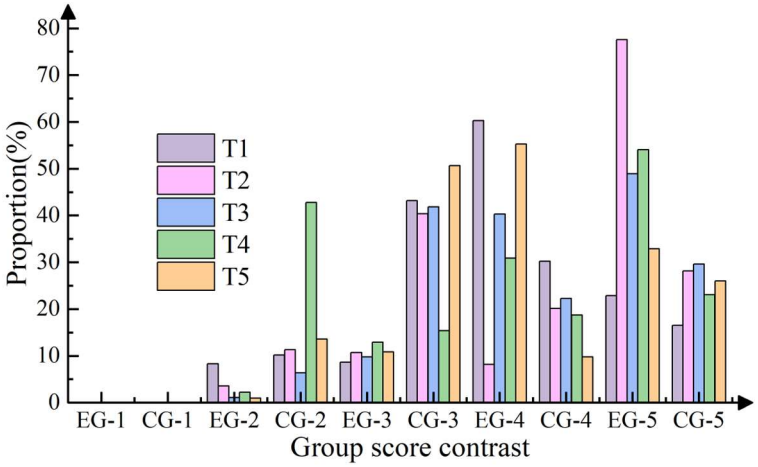


Figure 5: Comparative experiments in design practice

## V. Conclusion

The application of ethnic music elements in modern residential decoration design has important cultural and functional values. This study verifies the effectiveness of ethnic music elements in enhancing the emotional expression of residential space and the quality of life of users through experiments and comparative analysis. The results of the study show that after the integration of ethnic music elements into the residential background music system, the sleep quality and quality of life of the subjects in the experimental group were significantly improved, especially in terms of energy and mental health. In addition, the integration of ethnic music not only fulfills the expectations of the occupants for spiritual and cultural needs, but also enhances the uniqueness and artistic value of the residential design.

Specific data showed that subjects in the experimental group experienced a 17.46% increase in sleep efficiency (SE) and a 75.14-minute increase in total sleep time (TST). The quality of life assessment also showed that the experimental group scored significantly higher than the control group in the energy and mental health dimensions ($P<0.05$). These results indicate that the application of ethnic music elements in modern residential decoration not only provides a higher quality living environment for the occupants, but also effectively enhances their physical and mental health.

In the future, with the continuous development of smart home technology, the combination of ethnic music and smart home systems will become a trend in modern residential design. Through intelligent control and multimodal interaction design, ethnic music can meet the personalized needs of the occupants while enhancing the cultural connotation and comfort of the living space.

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