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# An exploration on influencing factors for personalized music selection in recreational fitness running activities

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**Abstract:** With the implementation of China's national fitness program, recreational fitness running has become one popular activity. Since there are less restrictions on the location for running, many runners like to listen to music during exercise to reduce the boringness or fatigue of running. Although it is supported that music can elevate mood for athletes, improve their athletic ability and enhance the effectiveness of training, it is also subject to different factors such as people's psychological state, education level, hobbies, and personality. In this vein, how to plan personalized music to fit various conditions of leisure fitness running became an important issue. From the users' perspective, this research explores behavior of runners in the process of running, observes and interviews the personalized selection of music, and sorts out the framework and dimensions that could be further explored in the future, including interactive convenience, environmental factors and running state.

**Keywords:** personalized; music selection; recreational fitness running

## 1. Research background

With the rapid development of the economy, people have higher and higher requirements on the quality of life and begin to pay attention to physical and mental health and figure management. In accordance with the goals of the "13th five-year plan for sports development" implemented by the general administration of the sport of China, the national strategy of national fitness has been further promoted, and the development of mass sports has reached a new level. China's National Fitness program (2016-2020) has been effectively implemented, and the public service system for national fitness has been increasingly improved. On the basis of policy encouragement, economic development, popularization of national fitness awareness and promotion of consumption ability, China's leisure fitness has been greatly developed. Running is a kind of sport with a low threshold of participation and high popularity, which has a high participation basis in mass sports activities in China.



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According to the 2014 National Fitness activity survey bulletin, running is the second most popular activity for users over the age of 20 who regularly participate in physical exercise.

Studies have shown a marked shift in runners' attitudes toward running or running events. The number of runners who used to focus on competitive sports and take running seriously has become less and less, and the number of runners who now focus on entertainment for the purpose of experience has become more and more dominant. Another report found that nearly 300 million runners use running as a form of physical activity, regardless of frequency or intensity. The report also pointed out that in 2019, China's running b-end service pain point is a lack of professional running services, and the upgrade direction is to improve professional sports services. Therefore, the runner's experience should be studied and analyzed from a more specialized perspective.

In running training, there are mainly two kinds of situations that cannot achieve the desired effect: one is to blindly increase the intensity of exercise and damage physical health; the other is weak willpower, thus reducing the amount of exercise. None of these behaviors can meet expectations such as improving one's physical fitness or losing weight. Therefore, to find a reasonable way to guide, to ensure the exercise effect, while ensuring the body's healthy function, has become an important issue in running training. Many runners today like to listen to music during their running workouts to reduce the boredom or fatigue associated with running. Mobile Internet platforms have also spawned a number of music apps for running workouts, showing music as a possible solution.

From a psychological point of view, different physical exercise methods can produce a good state of mental balance benefits. The state of mind of individuals participating in physical activities generally develops towards a benign direction and helps to improve and reduce the negative state of mind and improve the overall psychological benefits of emotions (Yang Jian, 2003). Physiologically, the incidence of arthritis was 13.3% among competitive runners, 10.2% among sedentary people, and only 3.5% among fitness runners. The journal suggests that running is beneficial to joint health for people who run for general fitness (JOSPT, 2017).

Recreational fitness running is simply a kind of non-competitive sport that can achieve the effect of physical fitness, but at the same time can make people enjoy themselves in running. The area restriction of recreational fitness running is not strong. People can choose indoor running or outdoor running, which is a relatively free exercise way. Recreational fitness running is very popular in China, and fitness software, music software and related industries related to fitness run have developed rapidly. According to this context, the main purpose of this study is to improve runners' sports experience by studying the influence and mechanism of personalized music selection on leisure fitness running. It is hoped that this study can reduce the adverse influence of runners on the overall process of leisure fitness running and guide runners to improve their running ability and physical quality. For Chinese runners, the mainstream fitness app commonly used in running is Joyrun, while the general population is more inclined to use KEEP. By contrast, KEEP is more suitable for people in leisure fitness running. In terms of ability, it can be divided into K1 zero basis, K2 beginner, K3

progression, K4 reinforcement, and K5 challenge. The main action mechanism is the change of motion speed, so as to achieve the purpose of motion intensity change. According to the effect of exercise, the main mode of exercise is usually to reduce fat and improve the level of exercise according to the demand. The corresponding running mode is mainly variable speed running. The speed range varies from person to person. Its action mechanism is to improve cardiopulmonary endurance and muscle endurance through the change of movement speed and moderate acceleration, so as to achieve the corresponding exercise effect. Compared with speed change, the common application software does not provide the option of running at a constant speed. Using a constant speed running mode in a marathon can make athletes run farther. Whether the same model is suitable for recreational fitness running, and whether these runners are willing to use uniform running for recreational fitness running, remains to be explored.

## 2. Literature review

### *2.1 Introduce music into the leisure fitness running*

In recent years, many experts have introduced music therapy into the field of sports training, Music plays an important role in psychology. Different kinds of music can evoke different emotions. Regulate negative emotions can listen to stimulating music, the second is to choose calm music, finally is meditation. There are many researches on music therapy in the aspect of psychological emotion. Yung et al. (2002) used music to interfere with preoperative anxiety in patients undergoing urethral prostatectomy, and found that the preoperative blood pressure, heart rate and anxiety state of patients receiving music intervention were significantly lower than those without music intervention, indicating that music intervention could alleviate preoperative anxiety. Barrera et al. (2002) conducted a music intervention experiment on hospitalized children with cancer and found that children receiving music therapy experienced a decrease in anxiety and a significant increase in comfort. Many scholars believe that the theory of involuntary attention and the filter theory of selective perception are the main mechanism by which music relieves exercise fatigue. They believe that the central nervous sensory transmission ability will limit the processing process of sensation into consciousness (Yang Feifei, 2013).

Research in the field of introducing music into sports shows that music can improve athletes' mood, improve their athletic ability, reduce the subjective sense of fatigue in the middle and low-intensity sports training, and enhance the training effect (Yang Feifei, 2013). Wei Huilin et al. (2017) believe that music has four positive effects on mass middle-distance running, including alleviating negative emotions, reducing fatigue, enjoying the process of running, and facilitating the recovery of fatigue. The Rating of Perceived Exertion is often used to investigate athletes' feelings of fatigue during exercise. Victor b.waite (1996) used 24 college students to cycle in a fast-paced music environment (140-150 beats/min) and a quiet environment. The results showed that subjects who exercised to fast-paced music had lower RPE scores than those who exercised to quiet music, and the subjects felt less tired.

Studies have shown that some patients with diseases such as stroke or Parkinson's can adjust their body posture through music (Tao Lei, 2017). Some scholars have also used different research methods to explore the influence of music on body posture. Liu Ruibo (2016) on aerobic exercise to promote the inhibitory function of music intervention behavior characteristic experiment of sub-components on executive function inhibition function on experimental research, the experiment using the GO reaction and NOGO accuracy both behavioral indicators for monitoring inhibition function changes of the indicators, confirmed the conclusion music intervention to improve sports aerobics. At the same time, he monitored the changes of brain nerves by means of ERP technology. In the ERP characteristic experiment of music intervention aerobic exercise to promote inhibitory function, he showed that moderate-intensity aerobic exercise combined with music intervention was more efficient in processing cognitive resources, resulting in better behavioral performance. Tao lei (2017) studied the effects of music on muscle fatigue, heart rate change and psychological system from physiology, set up an experiment on the adjustment of music to running training, and obtained the corresponding functional relationship between music rhythm BPM and running speed V. In addition, the main modes and requirements of running were investigated in the study. Based on this, the functional design of the running assistant music playing system was designed.

In the academic research on the adjustment effect of music on sports, most of them only focus on the effect of music rhythm on sports. In order to study the professional nature of recreational fitness running, it is necessary to increase the influence of music volume and other multidimensional factors on sports. However, the categories of music are different due to different psychological states, educational levels, hobbies, and personality factors, so the selection of music needs to pay attention to individuality.

## *2.2 A form of motivation for recreational fitness running*

Driven from the National Fitness boom, will China's five major domestic music player software including QQ Music, Kuwo, Kugou, NetEase Music, Xiami Music as well as the outstanding apps in running and fitness, such as KEEP, Codoon Sports, Joyrun, Mi Sport and NIKE RUNNING CLUB. Through comparison, it is found that most of the music for fitness software is used in combination with external application software, and the running music is presented in the form of playlists. The main behaviors of users are divided into creating playlists by themselves and choosing the recommended playlists by the system. The songs on the playlist are highly selective. The recommended playlists are mainly about passion, while the playlists created by individuals vary from person to person. Different people have different choices for songs. Therefore, in essence, users need to learn how to create their own playlists or choose their own playlists to help them maximize their effectiveness in recreational fitness runs. On a deeper level, users' choice of songs has personalized differences, so we need to provide users with personalized choice of music selection strategy.

A large number of patents are to first know the running state and then select the music with appropriate rhythm through certain means or ways for adjustment. The key process

is shown in figure 1. Zhang Jingling (2012) disclosed a music instrument that can adjust the rhythm with the movement rhythm. During the movement, the instrument is held in the hand, and the ball balls in the instrument move with the body's up and down, striking the wall set inside the instrument to form the rhythm point. Meanwhile, the rhythm point will be stored by the music player of the instrument. With the acceleration or deceleration of the movement, the music frequency of the music player can be adjusted, so as to adapt the music to the movement rhythm and reduce the dull feeling in the movement. However, these patents only focus on the pace, vibration, speed and heart rate of movement, while other explicit physiological data that can help guide the selection of music, such as breathing level, need to be concerned.

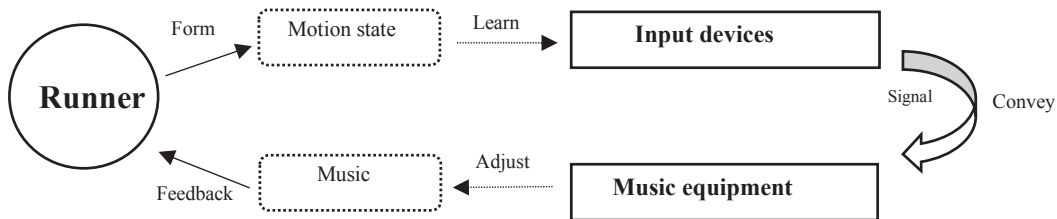


Figure 1 Music adaptation

Only a few patents attempt to drive the running rhythm through music rhythm. For example, Lin Xiqun (2017) provides a control method for the treadmill to control the speed through preset music BPM changes. According to the set music BPM information, the mobile terminal automatically selects the corresponding music, and feedback the music BPM information and speed information to the treadmill. During the speed change, the speed of the running belt of the treadmill accelerates or decelerates smoothly as the BPM of the music changes, so that when the runner runs, the runner's running speed synchronizes with the music. The mechanism of action is contrary to the above. The key process is shown in figure 2. This kind of music is driven mainly by the machine recognizing the rhythm of the music and then controlling the operation of the machine, indirectly guiding the runner to run. And the patent of music directly guiding runners to run is mainly through the APP end to the first choice in advance to achieve music guiding running.

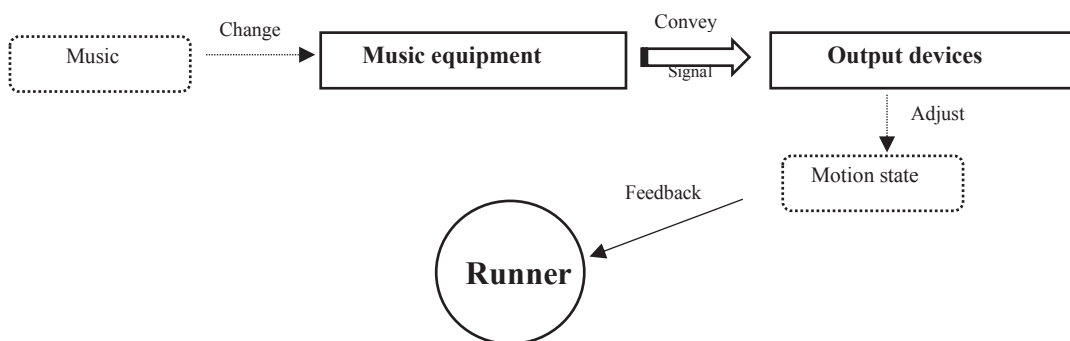
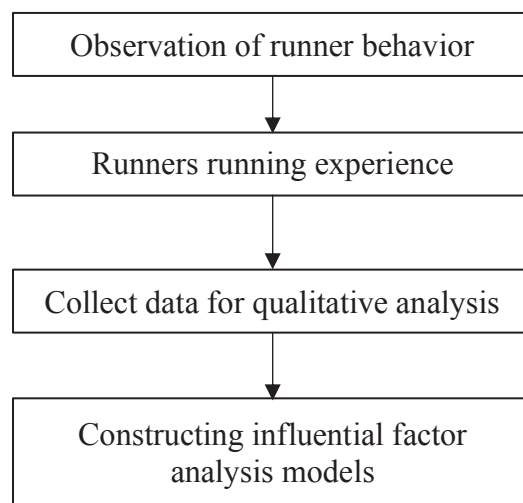


Figure 2 Adaptive adjustment of sports equipment

None of the above patents can analyze individual differences from the psychological of people. Moreover, the running mode needs to be set in advance, so it is unable to perceive the runner's psychological state of movement from the device, so as to adjust the music automatically and moderately to encourage or guide the runner to strengthen the running amount and improve the exercise effect.

### **3. Research Methodology**

According to the above research purposes, the research process can be divided into three parts :(1) the investigation of runners' sports behavior; (2) runner's running experience; (3) establish the influencing factor analysis model. The research process is shown in figure 3:



*Figure 3 Research Process*

In order to better study the influence of personalized music selection on leisure fitness running, the research and analysis are conducted from the user level at first. The methods used include user behavior observation method and user interview method. In the behavior observation of users, the running state of runners is recorded by taking photos and writing records. The time of observation is evening, the place is open track and field sports track for the masses and the surrounding path. The main contents of observation include users' social behavior, running equipment, running path and running state.

Based on the observation of recreational fitness running users, two semi-structured interviews were conducted with the users and recorded by means of sound storage. A total of 8 people were interviewed for the first time, mainly including undergraduate and postgraduate students in universities and those who have graduated within 1 to 2 years. The age group was 18-26 years old, with 50% male and 50% female. The sports venues of the interviewees mainly included the track and field stadium of Guangdong University of Technology and the nearby roads. Record the interview in the form of text. The identity of the subjects of the second interview was similar to that of the first. The identity of the subjects of the second interview was similar to that of the first. The influence and function

of the introduction of music into leisure fitness running were interviewed, and the recording and text records were made. The contents of the interview were as follows:

Table 1 Interview Guide

	The First Time	The Second Time
Interview purpose	Exploring runner needs	Exploring the use of music by runners during running
Content	What business are you in?	What are the goals and needs of running?
	What is the purpose of a recreational fitness run?	Do you listen to music during your run?
	What kind of place will you choose to run?	What applications are used?
	What's your age?	What songs are you listening to?
	What is the way to participate in recreational fitness running?	How to choose a song?
	How often do you run?	How are people in the running process?
	Are there any products or equipment used to assist running?	How does the rhythm and volume of music affect people?
	Is there any dissatisfaction in the running process? How will it be resolved?	
	Are there any specific running gear/accessories?	
	Is there a psychology that doesn't want to run because of running fatigue?	
Interviewee	People who take part in recreational fitness runs	People aged 18 to 26 taking part in recreational fitness run

## 4. Summary

### 4.1 User behavior observation

Through the observation of runners, several main phenomena were found :(1) many runners will finish using mobile phones before running, and occasionally use mobile phones during running. But the majority of mobile phone users during the run were younger runners, and the faster runners seemed to be more focused on the run than most. (2) young runners are more likely to exercise as a team; (3) due to a large number of people on the track, attention should be paid to avoid collisions, among which the running route of runners and walkers overlaps obviously. (4) the overall running equipment is mainly light, with fewer people using professional equipment. The people listening to music during running are mainly young people. (5) the behavior of relaxation after running is mainly slow walking, and some people



relax in stretching; (6) by comparison, it was found that road runners, especially those on the side roads beyond the runway, seemed to be more inclined to play music outside, and the music was more cheerful, and the crowd was basically male. Therefore, when conducting in-depth user research on the music level, we need to pay attention to the difference between playing music outside and listening to music with headphones.

In this stage of user behavior observation, it can be preliminarily found that the group of people engaged in leisure fitness running, their labels are mostly light and relaxed. Alone for a leisure fitness run, will be more inclined to the auxiliary role of music, and the use of music for the crowd is mostly young groups. Therefore, when conducting user interviews, more attention should be paid to the views of the group of people who are doing leisure fitness running alone.



*Figure 4 A place where user behavior is observed*

#### *4.1 User interview*

A phenomenon based on the observation of the user's behavior. Two interviews were conducted with the selected users, and word frequency analysis was carried out on the results of the two interviews. This study tries to obtain the tendency and viewpoint of the people who do the leisure fitness running through the word frequency analysis. For the follow-up user research, this paper explores a kind of crowd behavior analysis dimension that can be used to analyze leisure fitness running. The top 30 with high word frequency were selected, and the results were as follows:

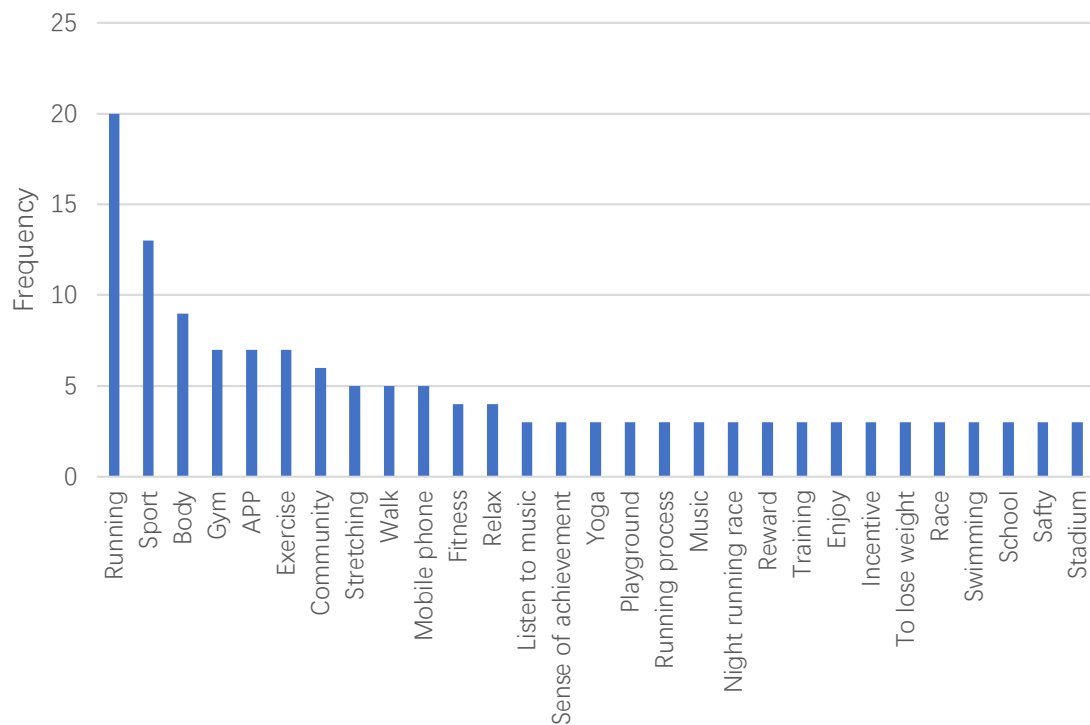


Figure 5 Word frequency analysis from the first user interview

From this figure can be observed directly, in the user interviews, although mainly around the observation and research on outdoor people, but can't deny that in the gym to discuss leisure jogging is still hot, therefore, from the area of research, should be an outdoor and indoor environment of the two main research. The analysis of mobile applications also needs attention. And will classify the words, mainly can be classified into action, place, emotion, equipment, and others. Combined with the content of the interview, the action words show that the main needs of participants in the leisure fitness run are training and fat loss, followed by learning and work-pressure oriented exercise. Equally useful types of exercise to meet these needs include swimming, yoga, and walking, among which walking and yoga are activities that most people enjoy in addition to fitness running, and which can be easily accomplished. Places mainly include gyms, communities, school playgrounds and so on. The common feature of these places is that only people are allowed to stay in. In terms of equipment, it is indicated that most of the mobile application software used by people during the leisure fitness run is the software with voice broadcasting function, including the mobile music playing software and the fitness software with voice broadcasting function. In terms of emotion, most of the words are positive feelings such as achievement and enjoyment, while the opposite is dull and monotonous feelings.

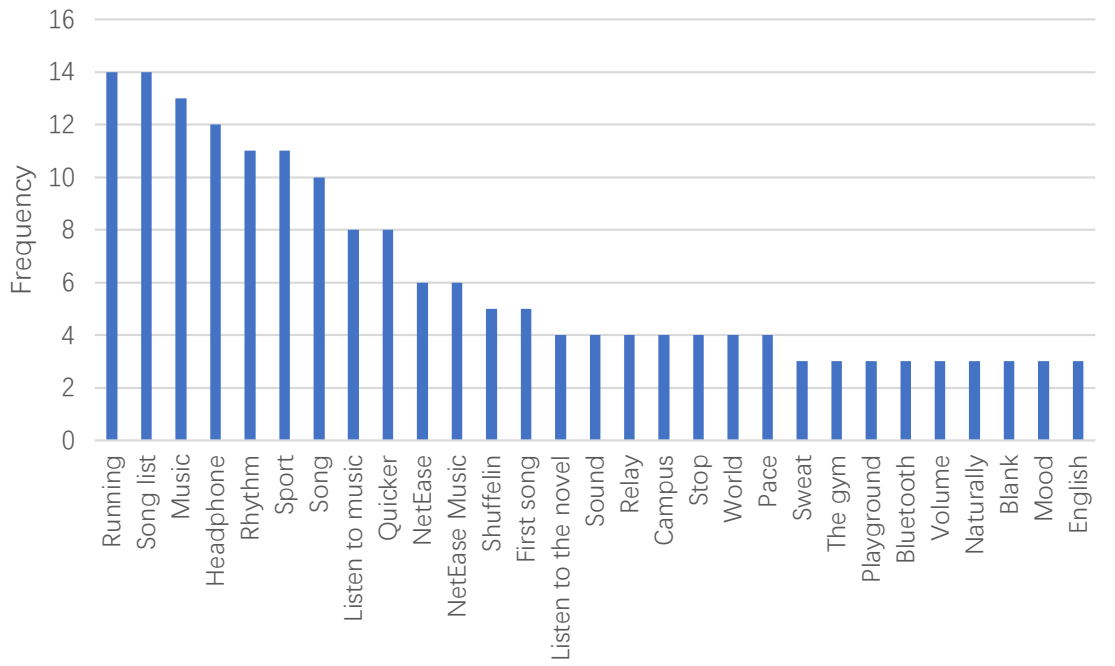


Figure 6 Word frequency analysis from the second user interview

When the participants aged 18 to 26 were interviewed about the use of music in recreational fitness running. It should be pointed out that since 2017, when colleges and universities in Guangdong province of China encouraged the use of the mobile software sports world campus, undergraduate students have been required to run for leisure and fitness every year because of the running index. When using such software, the majority of respondents expressed disgust. They generally agree that recreational running should be a personal choice rather than a supervised run. And this segment of the population cannot choose their own application software. However, in the process of running, many interviewees still use mainstream music player software to assist running, to solve the boring feeling in the process of running. At the same time, it is worth noting that after the completion of the running exercise index, the population still engaged in recreational fitness running is mainly in love with recreational fitness running. This kind of interviewees expressed that they enjoyed the feeling of sweating and believed that after running, they could allow themselves to complete the emotional catharsis.

In contrast, people other than undergraduates have more freedom of choice. However, few people are willing to choose fitness apps. They generally believe that using running fitness apps for auxiliary exercise, mostly intense exercise, is more likely to make people tired. Runners who had participated in the marathon were more likely to use fitness apps such as Codoon and Joyrun.

The majority of the respondents who used music for auxiliary running were single runners, and they said that when many people ran together, everyone's rhythm was not the same, and running would be restricted, resulting in poor running experience. At the same time, when using music-assisted running, most people will choose personal playlists created by music apps such as NetEase Music and Xiami Sports, such as personal favorite music, or

specially created playlists for running. Looking at their playlists, it was found that most of the songs were foreign language or RAP music, and the songs were generally light or exciting. Others reported listening to novels while running but speaking at a slightly faster pace than usual. Since the music selected by individuals is not planned, most of the respondents pointed out that when running, based on the running state at that time and the mood is not the same as usual, they will encounter some phenomena that they want to change songs even though they like them.

Respondents cited the lack of wheezing and footfalls as reasons for listening to brisk music in headphones as a way to run more smoothly, as well as the song being more melodic and the pace of the run naturally following the music. But the default playlist, which is generally based on excitement, doesn't apply to the entire run. Therefore, changing songs becomes an inevitable phenomenon in the running process.

### 4.3. Construct analysis dimension

Combined with the two interviews, it can be pointed out that in the research on the influence of personalized music selection on leisure fitness running, runners need to be explored in the following dimensions:

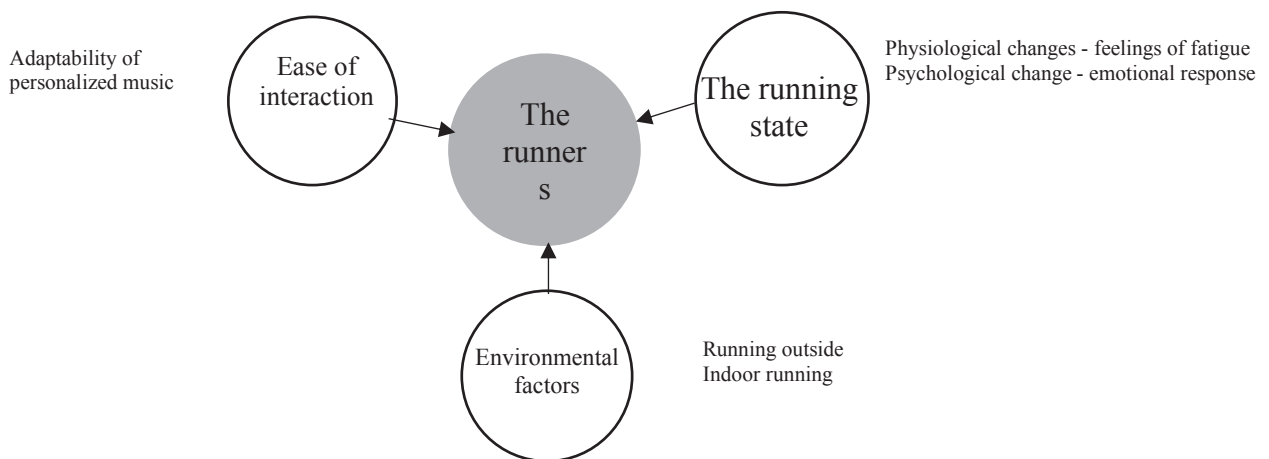


Figure 7 Research dimensions of recreational fitness running

When making personalized music strategy decisions, three factors need to be taken into account, including the ease of interacting with or operating the device, the runner's running state, and the impact of different running environment factors.

Interaction from the device and the convenience of operation, the selection of personalized music often unable to adapt to running the whole stage, resulting in song phenomenon is more, the design of the runner interact with the device need considering the convenience in song, devices need to fully cooperate with runners behavior or physiological state, according to the perceived runners adjusted independently.

From the running state of runners, fatigue can make runners become lazy, its running behavior will automatically adjust itself, studies have shown that music can adjust the listener attitude-behavior, personalized music can also play the same utility, conduct strategic choice of music or strategic adjustment, to play the order of the music will be a need to consider the direction of the design. Music is also distracting runners on fatigue effect, different music is likely to be perceived fatigue was mixed, individual choice of music also needs to achieve the same effect, soft or the cheerful music also need to get a kind of auxiliary means, to make runners in the process of running, as much as possible to reduce the music of the impact of change on running.

In terms of environmental factors, different runners choose different places for leisure and fitness running, and the atmosphere brought by different places has different influences. For example, runners who run outdoors are more likely to sing along with music than those who run indoors. Therefore, the influence of the environment on the runner's psychological state should be taken into account when designing the classification of environmental factors.

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## 5. References

- General administration of sport of China. (2016). *The 13th five-year plan for sports development*. 2016-05-05.
- Institute of sports science, general administration of sport, China. National physical fitness monitoring center. (2015). *Survey bulletin of 2014 national fitness activities (part 1)*. China sports daily, 004.
- Fei Sheer, *Is running still popular? Interpret the global running development report*. Retrieved June 1, 2019, from <http://iranshao.com/articles/5691-the-state-of-running-2019>.
- Iresearch institute. *Report on China's running service industry in 2019*. Iresearch. Retrieved September 23, 2019, from <http://www.199it.com/archives/940904.html>.
- Yang Jian. (2003). *The interaction between the youth to participate in sports activities and mental health benefits*. (Doctoral dissertation, east China normal university).
- JOAPT. (2017). Running and osteoarthritis: does recreational or competitive running increase the risk?. *Journal of Orthopaedic & Sports Physical Therapy*, 47(6), 391-391.
- KEEP v6.32.2. Retrieved December 17, 2019
- Zhang Hongyi. (1999). Music therapy (I). *Chinese journal of viral diseases* (1), 51-52.
- Yung, P. M. B. , Chui-Kam, S. , French, P. , & Chan, T. M. F. . (2002). A controlled trial of music and pre-operative anxiety in chinese men undergoing transurethral resection of the prostate. *Journal of Advanced Nursing*, 39(4), 352-359.
- Barrera, M. E. , Rykov, M. H. , & Doyle, S. L. . (2002). The effects of interactive music therapy on hospitalized children with cancer: a pilot study. *Psycho-Oncology*, 11(5), 379-388.
- Yang Feifei. (2013). *Effects of music auditory stimulation on aerobic platform exercise fatigue during exercise* (Master's thesis, nanjing university of physical education).
- Wei Huilin, hao xiangli, & hou ying. (2017). Research on the use of music in national fitness run. *Sports world (academic edition)*(05), 50-51.

- White, V. B., & Potteiger, J. A. (1996). *Comparison of passive sensory stimulations on RPE during moderate intensity exercise. Perceptual and motor skills*, 82(3), 819-825.
- Tao lei. (2017). *Research on the adaptive effect of music on running training and its application* (Master's thesis, zhejiang university of technology).
- Liu Ruibo. (2016). *Music intervention effect of aerobic exercise on college students' inhibition function - evidence from ERP*. (Doctoral dissertation).
- Bida consulting. China sports and fitness APP market research report of the third quarter of 2019. Retrieved October 28, 2019, from [https://mp.weixin.qq.com/s/r9dhm8lvhmX7sW3G484\\_fQ](https://mp.weixin.qq.com/s/r9dhm8lvhmX7sW3G484_fQ).
- Imedia report. China's online music market monitoring report in 2019. Retrieved March 7, 2019, from <https://www.iimedia.cn/c400/63766.html>.
- Zhang jingliang, xu xiujuan, mi liang, cui yanli, yu ting, & li youyong, et al. (2012). *A musical instrument that can adjust the rhythm with the rhythm of movement*. CN.
- Lin xiqun, & du nanxiong. (2017). *A control method of controlling the speed on the treadmill by preset music BPM changes*. CN.

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