

Research Article

The Intervention of Music Education on Students' Mental Health Based on Fuzzy Computing

Ying Wang 

Art Teaching and Research Department, Henan Vocational College of Applied Technology, Zhengzhou, Henan 450000, China

Correspondence should be addressed to Ying Wang; wy0419@hati.edu.cn

Received 7 June 2022; Revised 27 July 2022; Accepted 4 August 2022; Published 28 August 2022

Academic Editor: Sagheer Abbas

Copyright © 2022 Ying Wang. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Music is an important way for people to express and communicate their thoughts and feelings. It not only has the functions of cultivating sentiment, developing intelligence, and promoting personality development but also has an energetic function on the spiritual fitness of pupils. As an important part of quality education in schools, music education has become a pioneer in the implementation of psychological intervention for students. Music education can cultivate sentiment and lively and optimistic mood by emotional images conveyed through various music and has a special role that cannot be replaced by other disciplines. However, the current music education in schools only focuses on the dissemination of music knowledge and there is no research on which type of music can effectively interfere with students' mental health. In order to be able to choose music that is effective for students' mental health intervention in music education, this paper will study the intervention research of music education on students' mental health based on fuzzy computing. This paper extracts the musical features such as average pitch, average pitch intensity, melody direction, pitch stability value, rhythm intensity, and beat, uses fuzzy computing to classify music, determines which types of music can improve students' mental health, and uses experiments to verify the validity of this research. The consequences of the research show that choosing effective music to intervene in students' mental health can greatly improve students' mental health problems. The scores of students' psychological status after the intervention are 0.73 times of those before the intervention. It demonstrates the validity of the study.

1. Introduction

Music education is an important part of school education. Music education includes vocational education and general education; the difference between the two lies in the purpose of education. The former cultivates specialized musical talents for the country. The latter aims to enhance students' aesthetics through music experience, purify the body and mind subtly, provide students with good mental health counseling, and find joy and happiness in learning music. Music education can unconsciously shape students' identity, strengthen students' personal values, promote students' physical and mental development, and cultivate students' sense of cooperation and students' love for music in various music activities. It is a favorable way to cultivate students' healthy psychology. However, there is still a lack of research on music classification and the psychological problems

corresponding to each type of music, and the influence of school music teaching on learning mental health has not reached expectations. Therefore, it is necessary to study the influence of music teaching on pupils' spiritual fitness.

At present, many researchers have studied the intervention effect of music teaching on students' spiritual fitness from multiple views. Sun explored how music teaching affects students' mental health and study score. The consequences showed that music teaching had an obvious energetic impact on students' mental health and helped to improve students' academic performance [1]. Wang compared the effectiveness of traditional education programs and programs that introduced interactive music services and determined the impact of introducing exclusive applications in the vocal training course on pupil incentive. Research has shown that the introduction of a contemporary interactive circumstance in vocal training ensures high student

incentive [2]. Li conducted in-depth research and analysis on the improvement of university pupils' spiritual fitness level by music teaching under the background of 5G and explored the train of thought and means of using music teaching to ease and settle the mental issues of this group of pupils [3, 4]. In response to the absence of a theoretical framework for technical consolidation in music instruction, Macrides explored its influence and importance in the design of music teaching within the framework of Technical Pedagogy Content Knowledge (TPACK). Homone proposed several methods of interdisciplinary music education curriculum and verified the effectiveness of these methods through the results obtained in the activities with students [5]. However, how to classify music according to its corresponding psychological conditions remains to be studied.

Fuzzy computing is widely used in various fields because of its accurate data classification characteristics. Liu and Tsai conducted deep study and analysis on intelligent identification and instruction of English vague text through collateral projection and area extension [6]. Wang et al. proposed an unsupervised emotion classification means on the strength of multistage vague computation and multi-norm integration [7]. Sunny et al. created a set of fuzzy computing software quality models [8]. Le and Tran proposed a new dental diagnosis system using an optimal tooth image segmentation method based on semisupervised fuzzy clustering for the segmentation task [9]. Murat used neural network and neurofuzzy computing technology to estimate dissolved oxygen, and the results showed that the radial basis neural network method was better than other methods in modeling the monthly average dissolved oxygen concentration [10]. Fuzzy computing has not yet been used in music classification.

In order to accurately obtain the type of music and its adaptive psychological symptoms and apply it to music education to achieve the purpose of intervening students' mental health, this paper will study the intervention research of music education based on fuzzy computing on students' mental health. This paper extracts the emotional features of music, including average pitch, average pitch intensity, melody direction, pitch stability, rhythm strength, and rhythm, uses fuzzy computing to classify music, and obtains the symptoms corresponding to each type of music. In the experimental part, the students are given music education and the mental health status of the students before and after the intervention is compared. The results show that this research can effectively improve the psychological level of students and prove the validity and feasibility of the research.

2. Intervention of Music Education on Students' Mental Health

The principle that music affects psychology is the rhythm and artistic conception of music. If a person is very manic, his heart rate will increase and his metabolism will speed up, and his heart rate will be adjusted to a normal level by slowing down the rhythm of music. On the contrary, depressed patients can also listen to exciting music to achieve the effect [11]. The mood of music can help relaxation and

imagination, so that it can reduce the stress state of the body or perform hypnosis. Students face different pressures at different learning stages and have different psychological problems. When educating students in music at each learning stage, teachers should adjust the course content according to the current students' psychological state to improve students' music literacy while adjusting students' psychology [12]. This paper will extract the emotional features of music, use the fuzzy calculation method to classify the emotion of music, and determine the symptoms corresponding to each type of music.

2.1. Music Emotional Feature Extraction. Music emotion description is carried out from 6 music features that can embody music emotion, including average pitch, average pitch intensity, melody direction, pitch stability value, rhythm strength law, and beat [13]. In this way, the qualitative evaluation in the traditional evaluation method can be processed into a quantitative process and prepared for calculation. The music feature extraction process is shown in Figure 1 [14].

2.1.1. Average Pitch. Music with a high pitch average usually conveys a feeling of emotion, excitement, and enthusiasm [15]. Average pitch is defined as follows:

$$\text{Range} = \frac{1}{n} \sum_{i=1}^n \text{Pitch}_i. \quad (1)$$

2.1.2. Average Sound Intensity. The strength of the sound is the strength of the music. In the score of the music, P is usually used for weak, F for strong, and it is marked on the top of the note [16]. If the solemn, majestic, impassioned, and other emotions are to be expressed, they are usually played with stronger strength. Average sound intensity is defined as follows:

$$\overline{\text{Intensity}} = \frac{1}{n} \sum_{i=1}^n \text{Intensity}_i. \quad (2)$$

2.1.3. Melody Direction. The performance of the melody is presented in the order of the notes, the ups and downs of the notes form unstable wavy lines, and each section of the piece has its own unique wavy line [17]. The shape and movement of the wavy lines reflect the emotional changes of the music. Melody direction is defined as follows:

$$\text{Dir}_{\text{Pitch}} = \frac{\sum_{i=1}^n (\text{Interval}_i \times \text{duration}_i)}{\sum_{i=1}^n (\text{duration}_i - \text{duration}_n)}. \quad (3)$$

2.1.4. Stable Value of Pitch. The stability of the sound can reflect the depth and intensity of the mood and is generally based on the average pitch to which all notes are compared. When not much different from the average pitch, the emotional fluctuation of the piece is small, showing a

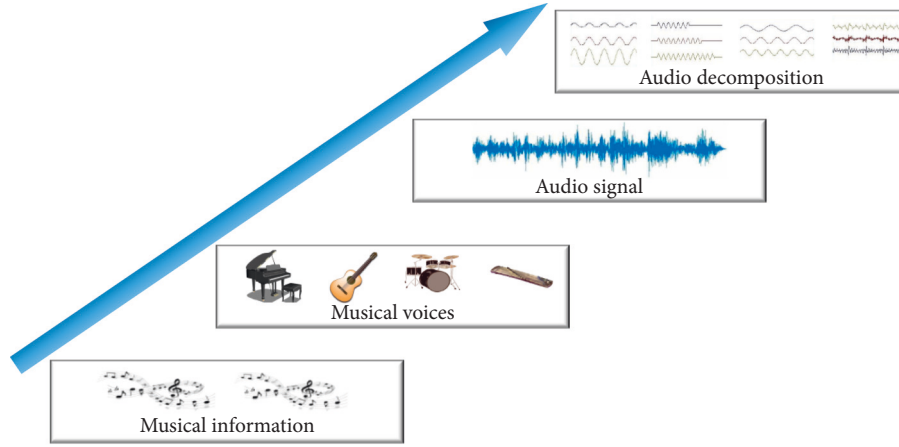


FIGURE 1: Music extraction process.

soothing mental mood, such as calmness, serenity, and relaxation [18]. Stable value of pitch is defined as follows:

$$P_{Rage} = \sqrt{\frac{1}{n} \sum_{i=1}^n (\text{Pitch} - \text{Rage})^2}. \quad (4)$$

2.1.5. The Law of Strength and Weakness of Rhythm. The brisk rhythm can fully reflect the life of a person, and the changing rhythm can express emotions such as majesty, rush, or anger. The calm rhythm reflects emotions such as relaxation, which makes people feel relaxed and happy [19]. Rhythm is defined as follows:

$$\text{Rhy} = \sum_{i=1}^{n-1} \left| \frac{\text{Interval}_{i+1} - \text{Interval}_i}{\text{Duration}_i} \right|. \quad (5)$$

2.1.6. Beats. The rhythm is the basic part of measuring the rhythm of music. Each piece of music has a fixed rhythm, which usually appears in the form of scores at the beginning of the piece [20]. Beat Meter can be found directly.

3. Fuzzy Algorithm

The fuzzy C-means clustering algorithm is a transformation method that uses membership to determine the size of clusters [21]. There are two important parameters which are the number of clusters c and the fuzzy weighting index m . The algorithm divides n vectors $x_k \in R^s$ into c groups ($k = 1, 2, \dots, n$), where s is the dimension of vector x_k , and obtains the cluster center of each group [22]. The basic steps are shown in Figure 2 [23].

Constraint conditions:

$$\sum_{i=1}^c u_{ik} = 1, \quad u_{ik} \in (0, 1). \quad (6)$$

Cluster center V calculation:

$$v_i = \frac{\sum_{k=1}^n u_{ik}^m x_k}{\sum_{k=1}^n u_{ik}^m}, \quad i = 1, 2, \dots, c. \quad (7)$$

Objective function calculation:

$$J(U, v_1, \dots, v_c) = \sum_{i=1}^c J_i \quad (8)$$

$$= \sum_{i=1}^c \sum_{k=1}^n u_{ik}^m d_{ik}^2,$$

$$u_{ik} = \frac{1}{\sum_{j=1}^c (d_{ik}/d_{jk})^{2/m-1}}, \quad (9)$$

$$i = 1, 2, \dots, c \quad k = 1, 2, \dots, n.$$

$d_{ik} = \sqrt{\sum_{q=1}^s (x_{kq} - v_{iq})^2}$ is the Euclidean distance between the K -th fuzzy group and the i -th cluster center, and m is the fuzzy weighting index, $m \in (1, +\infty)$, $2 \leq c \leq n$. If the variable is less than a certain threshold ξ relative to the final result, the algorithm stops and extracts the final membership table U and cluster center V ; otherwise, a new membership matrix is calculated according to formula (9), and return to Step (7) [24].

It can be calculated from the final membership matrix $U = \{u_{ik}\}_{c \times n}$ [25] that

$$i = \arg \max_{1 \leq i \leq c} u_{ik}, \quad k = 1, 2, \dots, n. \quad (10)$$

Using the fuzzy algorithm to cluster the six emotional feature vectors of average pitch, average pitch intensity, direction of melody, stable value of pitch, regularity of rhythm, and beat, it will play a positive role in intervening in human mental health. The music is divided into these four categories, and literature survey is used to obtain the corresponding symptoms of each type of music [26]. The music clustering results and their corresponding symptoms are shown in Table 1 [27].

Junior and senior postgraduates face the pressure of further education, and college students face the pressure of study, interpersonal communication, employment, and so

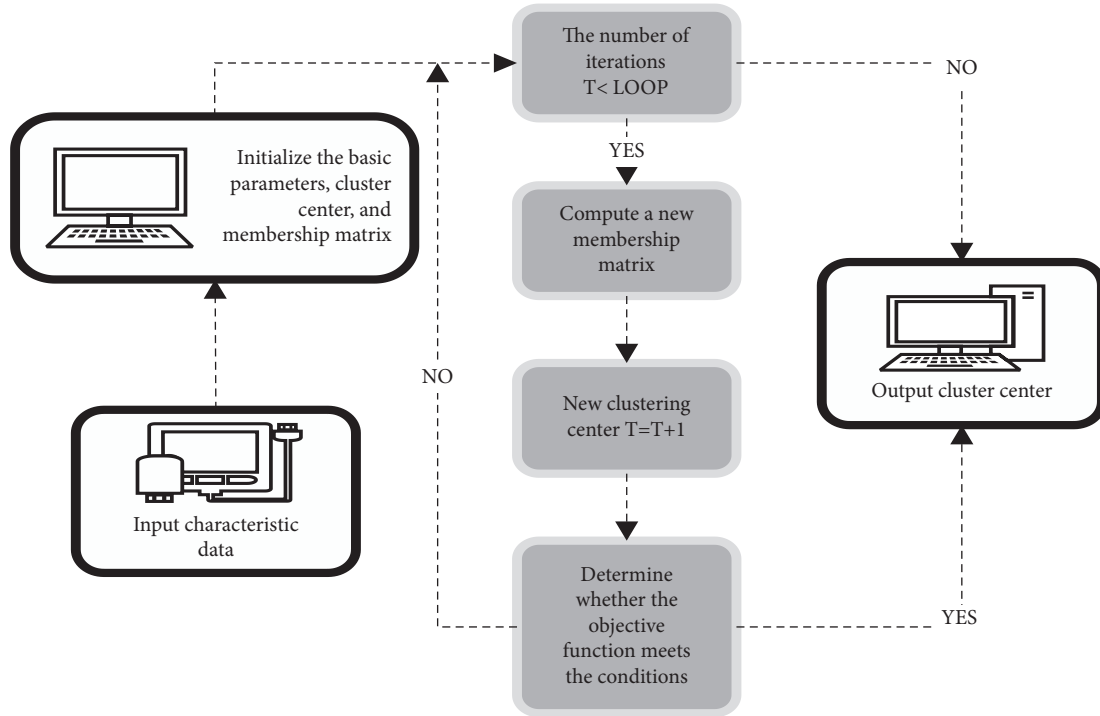


FIGURE 2: Fuzzy algorithm steps.

TABLE 1: Music clustering results and their corresponding symptoms.

Serial number	Classification	Symptoms	Recommend music
I	Lively and cheerful	Fatigue Anxiety Neurasthenia	《Beach on holiday》 《Water music》 《The icing on the cake》 《The eighth symphony》 《Fantasia and ode》 《Trio in G major》 《Pleasant goat》
II	Slow pace	Insomnia Manic	《A midsummer night's dream》 《Lullaby》 《Piano prelude》 《The plum flower three lane》 《Annie's wonderland》
III	The rhythm of freedom	Melancholy High pressure	《Symphony no. 40 in B minor》 《Rhapsody in blue》 《Hungarian dance》 《Imposing》
IV	The emotions	Depressed Sad	《Symphony of destiny》 《The golden snake dance》 《Fate》 《Pathetic》

on. When teachers arrange music education courses, the content of the course can be adjusted over time according to the psychological state of students at each stage and play a role in intervening students' mental health.

4. Intervention Experiment of Music Education on Students' Mental Health Based on Fuzzy Computing

This paper selects 10 postgraduates and 10 college students as subjects and conducts experimental research on music education intervention for subjects. The mental health status of the participants is measured by using the mental health diagnostic test, including learning anxiety, interpersonal sensitivity, depression tendency, anxiety tendency, and impulsive tendency, and the statistical results of the two tests before and after the test are compared and analyzed. The comparison of students' mental health level with the high-score reference standard is shown in Table 2.

TABLE 2: Mental health level of students (before the intervention).

Factor	Reference	Intervention object	
		Postgraduates	College students
Learning anxiety	8	12.44 ± 1.48	9.57 ± 0.59
Interpersonal sensitivity	8	7.83 ± 1.63	10.96 ± 1.37
Depression	8	6.59 ± 0.55	6.72 ± 0.64
Anxiety tendency	8	9.39 ± 1.41	8.53 ± 1.22
Impulsiveness	8	6.46 ± 0.64	7.64 ± 0.79
Total score	40	41.71	43.42

Learning anxiety: after the music education intervention, the students' learning anxiety is measured and compared with the data before the intervention. The experimental results are shown in Table 3 and Figure 3.

As shown in Table 3 and Figure 3, regarding the students' learning anxiety, before the music education intervention, the confidence interval of postgraduates' learning anxiety is

TABLE 3: Student learning anxiety data sheet.

Intervention object		The measured results	The average
Postgraduates	Before the intervention	12.44 ± 1.48	13.03
	After the intervention	8.46 ± 1.69	8.43
College students	Before the intervention	9.57 ± 0.59	9.5
	After the intervention	6.32 ± 0.47	6.2

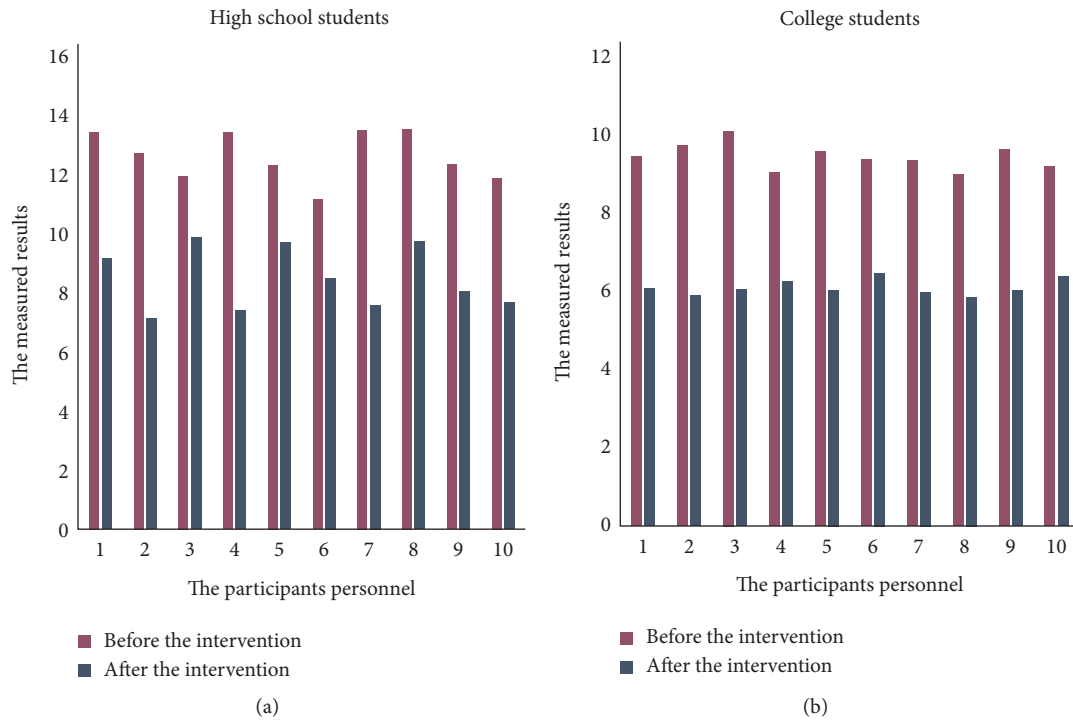


FIGURE 3: Data graph of student learning anxiety.

12.44 ± 1.48 and the average is 13.03. The confidence interval of the learning anxiety of college students is 9.57 ± 0.59 , and the average value is 9.05. The two groups of data are significantly higher than the high-score reference standard. The students are facing heavy learning pressure. This is not conducive to the physical and mental development of students. After using music education to intervene students' mental health, the average learning anxiety of postgraduates is 8.43, which is still higher than the high-score reference standard, but significantly lower than before the intervention. The learning anxiety of college students dropped to 6.2 after the intervention, which has been reduced to lower than the high-score reference standard. This shows that music education has obvious effect on students' mental health. Music education can adjust bad emotions and cultivate healthy emotions. By providing music education courses, creating music appreciation environment, and organizing music practice activities and other forms of music education activities, it can bring students a relaxed and happy mood. Music with free rhythm and fast changing rhythm can be taught in the classroom with emphasis. This kind of music is emotionally charged, conveying passionate and cheerful emotions. This kind of music can help relieve or ease the pressure brought by learning.

Interpersonal sensitivity: after the music education intervention, the students' interpersonal sensitive issues are measured and compared with the data before the intervention. The experimental results are shown in Table 4 and Figure 4.

For interpersonal sensitivity issues, the average of postgraduates' interpersonal sensitivity is 7.38, which is slightly lower than the high-score reference standard. The average value of college students' interpersonal sensitivity is 10.98. The higher value indicates that college students are more troubled with interpersonal communication problems. Inability to integrate into groups, social fears, and other problems may be faced. After using music education to intervene students' mental health, the sensitivity of interpersonal communication in both groups is significantly reduced. The average of postgraduates drops to 5.67, and the average of college students drops to 7.41. Both groups of data are lower than the high-score reference standard. Music education has greatly improved students' interpersonal problems. Music education can overcome barriers between people and promote harmony between people. Activities such as music groups, concerts, music salons, and music competitions have a positive impact on the psychology of students and allow them to break down isolation, share

TABLE 4: Student interpersonal sensitive data sheet.

Intervention object		The measured results	The average
Postgraduates	Before the intervention	7.83 ± 1.63	7.38
	After the intervention	5.69 ± 0.46	5.67
College students	Before the intervention	10.96 ± 1.37	10.98
	After the intervention	7.34 ± 0.62	7.41

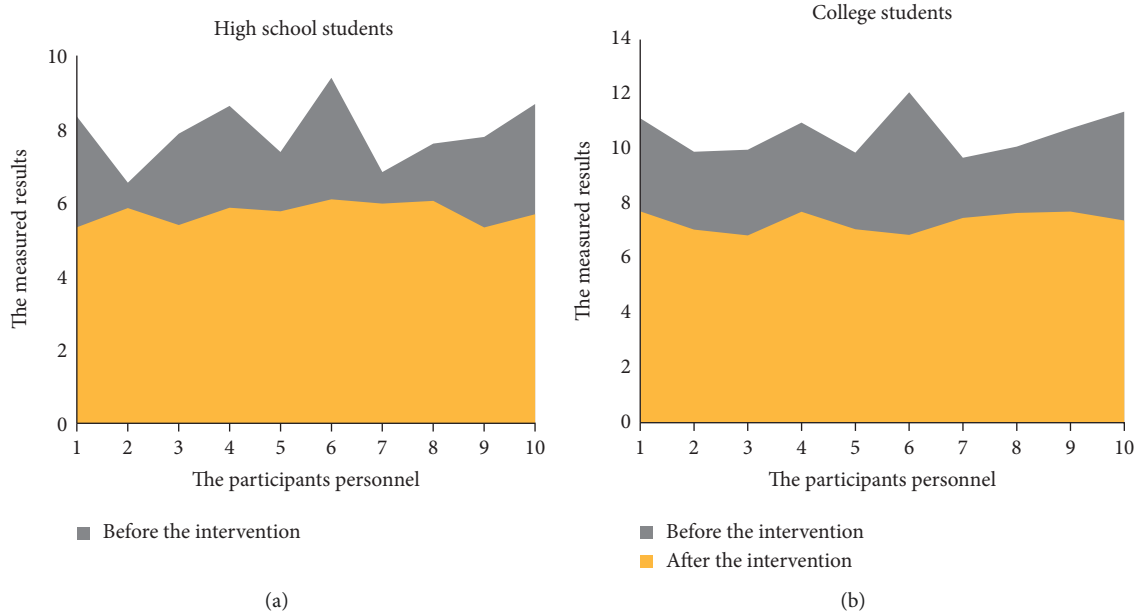


FIGURE 4: Sensitive data graph of student interpersonal communication.

themselves, and improve interpersonal harmony. When organizing these events, cheerful and lively music can be chosen. This kind of music is lively, agile, free, and easy. It can put the listener into a happy atmosphere, relax the body and mind naturally, reduce students' nervousness when facing crowds, and better conduct interpersonal exchanges.

Depression tendency: the students' depression tendency is measured after the music education intervention and compared with the data before the intervention. The experimental results are shown in Table 5 and Figure 5.

For students' depression tendency, the confidence interval for depression tendency of postgraduates is 6.59 ± 0.55 . The confidence interval of depression tendency of college students is 6.72 ± 0.64 , and the average depression tendency of postgraduates and college students is lower than 7 points, which indicates that the depression tendency of students is not high. However, students usually face various pressures such as academic pressure and setback pressure. It may lead to increased depression due to excessive stress. Therefore, it is necessary to intervene in the students' psychological state. After using music education to intervene students' mental health, the average depression tendency of students is reduced to about 5. Music education has a significant effect on students' psychological state intervention. For the depression of students, music with free rhythm can be used more in music teaching. Its open and bright tunes, strong rhythmic themes, and strong and powerful styles can introduce students into this intense and bright mood,

express their emotions, broaden their minds, and achieve the effect of eliminating depression.

Anxiety tendency: after the music education intervention, the students' anxiety tendency is measured and compared with the data before the intervention. The experimental results are shown in Table 6 and Figure 6.

As shown in Figure 6 and Table 6, before the intervention, the confidence interval of anxiety tendency of postgraduates is 9.39 ± 1.41 and the confidence interval of anxiety tendency of college students is 8.53 ± 1.22 , and the average value is higher than 8, which is higher than the high-score reference standard. It shows that students are more prone to anxiety because of the various pressures they usually face and the pressure cannot be relieved. After the psychological intervention in the form of music education, the anxiety of the students is significantly reduced. The confidence interval of anxiety tendency of postgraduates is reduced to 7.14 ± 0.63 , and the mean value is reduced to 7.26. The confidence interval of anxiety tendency of college students is reduced to 6.39 ± 0.24 , and the mean value is reduced to 6.37. The overall values of the two groups tend to be normal, and music education has a good effect on relieving students' anxiety. The emotions carried by the music itself can affect the mood of the audience. The use of cheerful and lively music in music education can stimulate the spirit of students, eliminate fatigue, and achieve the purpose of relaxing body and mind and relieving anxiety.

TABLE 5: Student depression tendency data table.

Intervention object		The measured results	The average
Postgraduates	Before the intervention	6.59 ± 0.55	6.38
	After the intervention	5.08 ± 0.45	5.17
College students	Before the intervention	6.72 ± 0.64	6.72
	After the intervention	5.23 ± 0.92	5.09

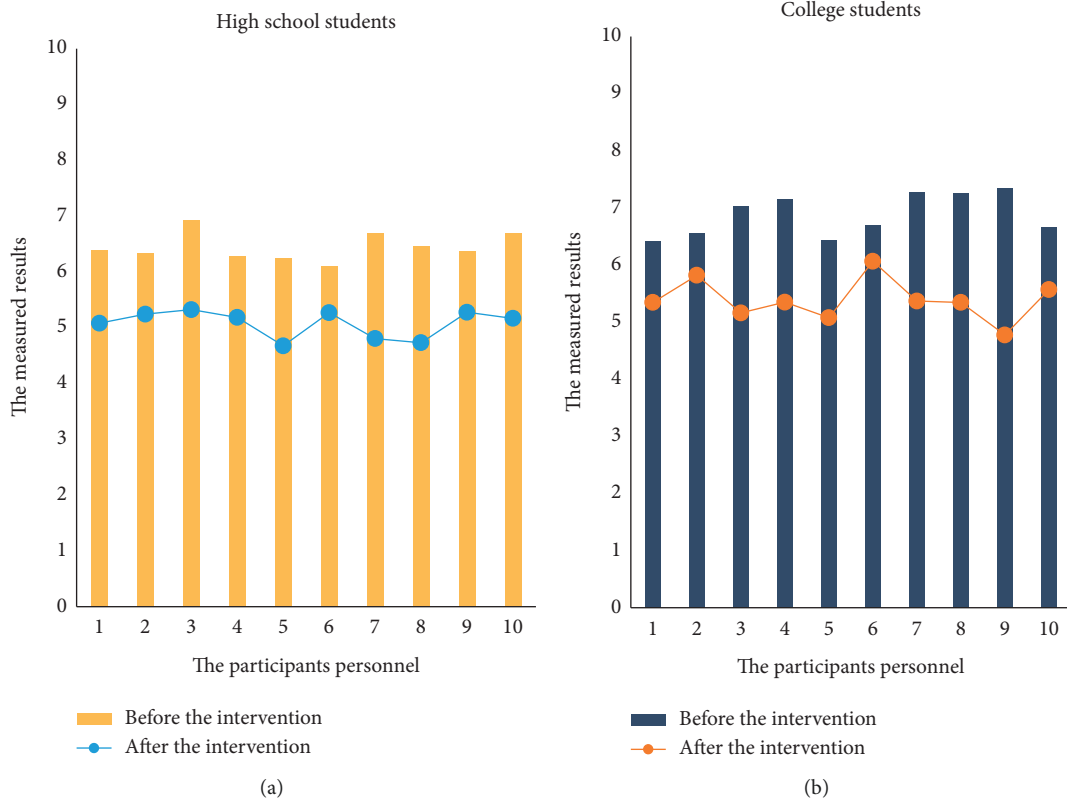


FIGURE 5: Data graph of students' depression tendency.

TABLE 6: Student anxiety tendency data table.

Intervention object		The measured results	The average
Postgraduates	Before the intervention	9.39 ± 1.41	9.63
	After the intervention	7.14 ± 0.63	7.26
College students	Before the intervention	8.53 ± 1.22	8.18
	After the intervention	6.39 ± 0.24	6.37

Impulsive tendency: after the music education intervention, the students' impulsive tendency is measured and compared with the data before the intervention. The experimental results are shown in Table 7 and Figure 7.

The confidence interval of impulsive tendency of postgraduates is 6.46 ± 0.64 , and the confidence interval of impulsive tendency of college students is 7.64 ± 0.79 , both of which are lower than the high-score reference standard. However, it is still necessary to pay attention to the psychological guidance of students at ordinary times to prevent their impulsive emotions from continuing to increase. After giving music education to students, the average impulsive tendency of postgraduates drops to 4.89. The average of

college students' impulsive tendencies drops to 5.23. Compared with the preintervention, there is a significant reduction, and music education has greatly improved the impulsive emotions of students. For students' impulsive problems, they can explain more music with refreshing and comfortable rhythm in class. This kind of music has a soothing style and refreshing and delicate melody. The sound is ethereal, light, and full of picture. It can bring students into the picture expressed by the music and calm the restlessness in their hearts.

Comprehensive level: the students' comprehensive mental health level is obtained by integrating the evaluation results of the students' learning anxiety,

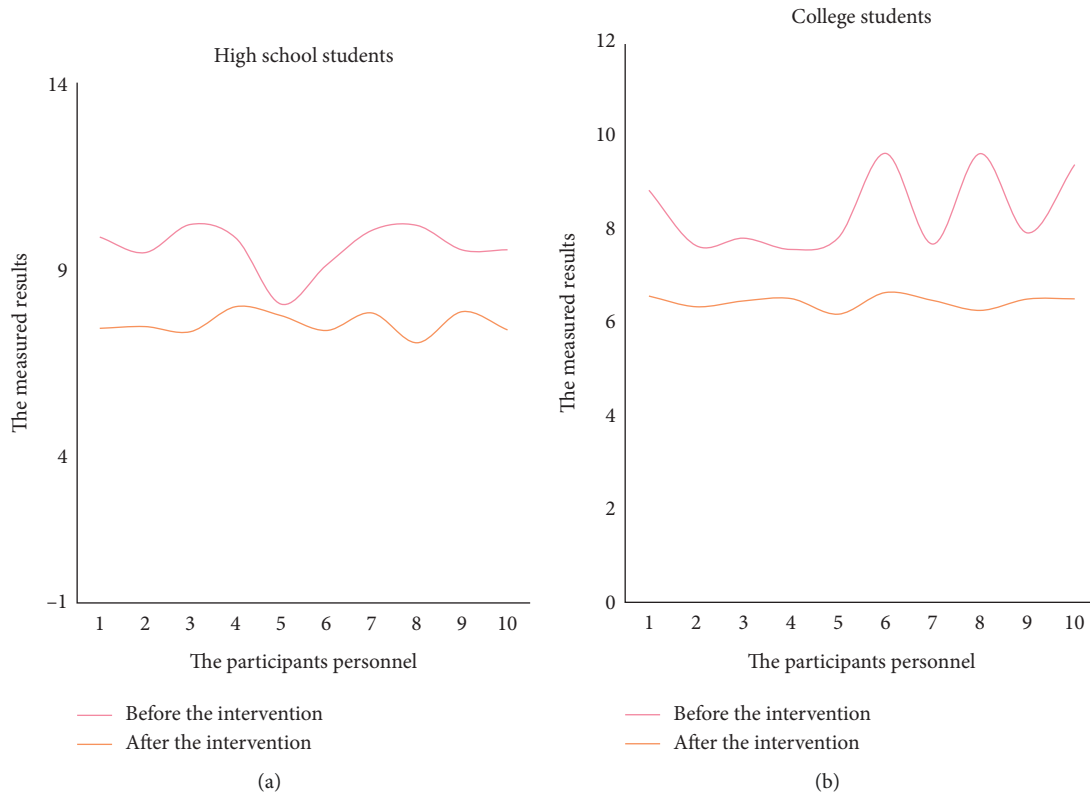


FIGURE 6: Data graph of students' anxiety tendency.

TABLE 7: Student impulsivity data table.

Intervention object		The measured results	The average
Postgraduates	Before the intervention	6.46 ± 0.64	6.61
	After the intervention	4.89 ± 0.27	4.89
College students	Before the intervention	7.64 ± 0.79	7.28
	After the intervention	5.26 ± 0.43	5.23

interpersonal sensitivity, depression tendency, anxiety tendency, and impulsive tendency. The comprehensive mental health level before and after the experiment is compared and analyzed, and the experimental results are shown in Table 8.

The total score of the high-score reference standard is 40 points. Before the intervention, the total score of postgraduates' mental health is 41.71, the total score of college students' mental health is 43.42, and the average score of students' mental health is 42.57. The overall score is higher than the high-score reference standard, indicating that the student's mental health is not ideal and needs to be psychologically guided and relieved in time. After using music teaching to intervene students' mental health, the total score of mental health of postgraduates is reduced to 31.26, the total score of mental health of college students is reduced to 30.54, and the average score of students' mental health is 30.9. The overall data have been greatly reduced. The psychological status of the students after the intervention is 0.73 times that before the intervention, and the psychological status of the students has tended to a healthy level. This result

supports the purpose of this study and shows that using fuzzy computing to screen out suitable repertoires for music education can effectively intervene in students' mental health. Through the intervention of music education, students can not only relieve stress and enhance self-confidence but also improve their interpersonal skills. Students' self-satisfaction is also enhanced when they participate in musical activities.

This paper extracts the emotional characteristics of music and uses the fuzzy calculation method to classify the emotion of music to determine the types of music and their corresponding psychological problems that can play a positive role in human mental health. After classifying music by fuzzy algorithm, the curriculum arrangement can be adjusted in time according to the current psychological state of students in music education. This teaching method can not only improve the aesthetic quality of students but also play an effective role in guiding and intervening in students' mental health problems. Experiments show that this form of music education significantly improves the mental health of students and confirms the feasibility of the study. Correct

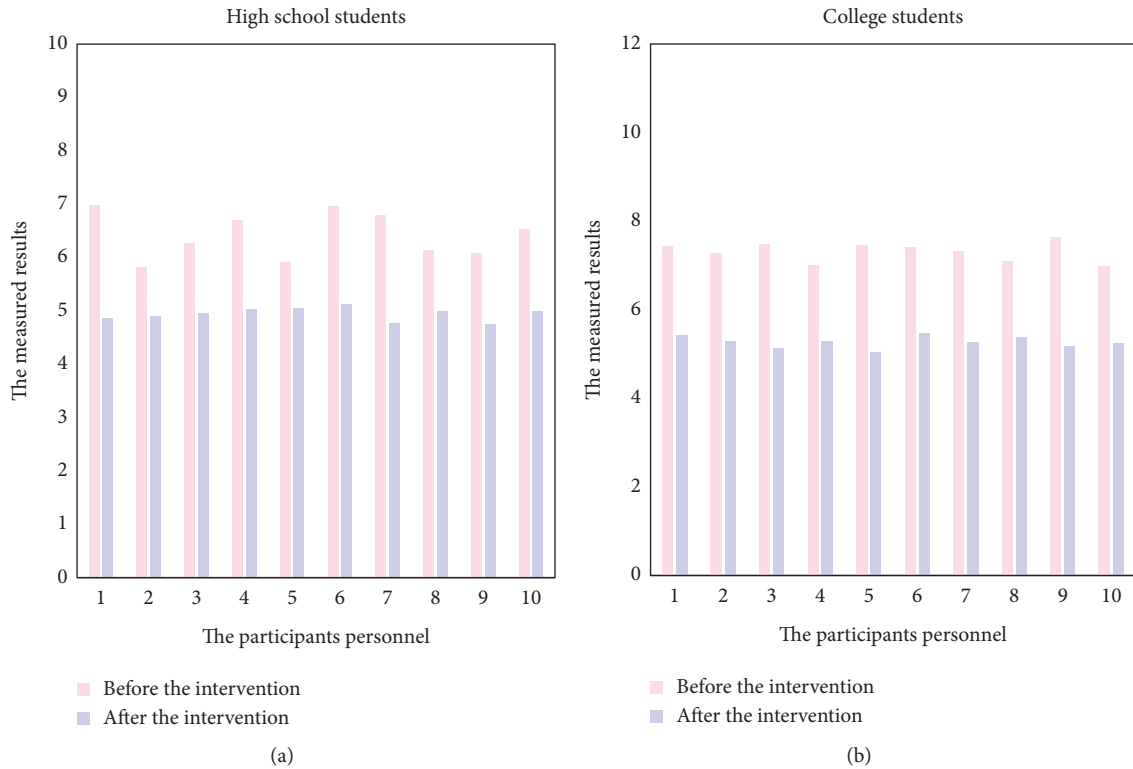


FIGURE 7: Student impulse tendency data graph.

TABLE 8: Data table of students' comprehensive mental health level.

Intervention object	Before the intervention		After the intervention	
	Postgraduates	College students	Postgraduates	College students
The measured results	41.71	43.42	31.26	30.54
The average	42.57		30.9	

music education can regulate students' emotions and reduce students' stress. Really effective music can bring a relaxed and pleasant mood to students and improve their mood. Correct music education can enhance students' interpersonal skills and can begin to understand others correctly and comprehensively to care more about and understand others. By holding various music activities, the communication and interaction between students can be enhanced, and in the relaxed and pleasant atmosphere of music, students can better relax, share themselves, and improve interpersonal harmony.

5. Conclusions

The time students spend at school is an important step in improving their physical and mental health. Also, their mental health is directly related to their academic success and quality of life. In order to adapt to the growing demand and demand for talent training, colleges and universities continue to promote school psychological education, and music education is an important means of intervening in students' mental health. In order to improve the effect of

music education on students' mental health intervention, it is necessary to choose suitable music in the process of music education. In this paper, music feature extraction is carried out according to the characteristics of music and then the emotional feature vector is clustered by fuzzy computing, so as to classify music, which can select music corresponding to students' psychological problems in music education and effectively improve students' mental health level. The experiment shows that, after the intervention of music education, the students' psychological status score is 0.73 times that before the intervention, which proves the validity of the research. The introduction of music education has a certain influence on improving students' mental health, but students' psychology is unstable and develops and changes rapidly. Therefore, the evaluation of students' mental health in this study can only reflect the students' recent mental health and does not exclude the influence of natural development facts such as adaptability and growth. The music education in this study only explores the influence of music types on students' mental health and does not conduct research on factors such as music education activities or the duration of music courses, and more scientific and detailed

research is needed. However, researching, developing, and implementing a series of steps to improve students' musical skills and techniques can be very beneficial in reducing the occurrence of stressful behaviors, developing and improving social resilience.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares no conflicts of interest.

Acknowledgments

This study was funded by two projects: (1) Project Open Source: Research on Promoting Innovative Development of College Students' Ideological and Political Education with Chinese Traditional Music by Zhengzhou Social Science Federation (project number: 1097); (2) Open Source Project: Research on Innovation Inheritance and Development Strategy of Yellow River Music Culture in the Network Environment of We Media by Henan Provincial Department of Science and Technology. (project number: 212400410168). The author would like to thank these projects for supporting this work.

References

- [1] J. Sun, "Exploring the impact of music education on the psychological and academic outcomes of students: mediating role of self-efficacy and self-esteem," *Frontiers in Psychology*, vol. 13, no. 2, pp. 23–26, 2022.
- [2] Y. L. Wang, "Music education: which is more effective – traditional learning or the introduction of modern technologies to increase student motivation?" *Learning and Motivation*, vol. 77, no. 6, pp. 49–54, 2022.
- [3] J. Li and X. Ning, "A study on the application of music education to improve college students' mental health in the context of 5G," *Wireless Communications and Mobile Computing*, vol. 2021, no. 4, Article ID 5423459, 131 pages, 2021.
- [4] E. Macrides and C. Angeli, "Domain-specific aspects of technological pedagogical content knowledge: music education and the importance of affect," *TechTrends*, vol. 62, no. 2, pp. 36–40, 2018.
- [5] A. Homone, "Interdisciplinary aspects in organizing the Music Education lessons. Artes," *The Journal of Musicology*, vol. 24, no. 1, pp. 229–235, 2021.
- [6] L. Liu and S. B. Tsai, "The rise of data politics: digital China and the world," *Studies in Comparative International Development*, vol. 56, no. 1, pp. 45–67, 2021.
- [7] B. Wang, W. He, Z. yang, and S. f. xiong, "An unsupervised sentiment classification method based on multi-level fuzzy computing and multi-criteria fusion," *IEEE Access*, vol. 8, no. 2, pp. 59–63, 2020.
- [8] J. K. Sunny, T. John, and A. J. Varghese Kureethara, "A fuzzy computing software quality model," *AIP Conference Proceedings*, vol. 2080, no. 1, pp. 79–86, 2019.
- [9] H. S. Le and M. T. Tran, "Dental diagnosis from X-Ray images: an expert system based on fuzzy computing," *Biomedical Signal Processing and Control*, vol. 39, no. 6, pp. 30–35, 2018.
- [10] A. Murat, "Estimation of dissolved oxygen by using neural networks and neuro fuzzy computing techniques," *KSCSE Journal of Civil Engineering*, vol. 21, no. 5, pp. 6–9, 2017.
- [11] W. Magee, R. Siegert, S. Taylor, B. Daveson, and G. Lenton-Smith, "Music therapy assessment tool for awareness in disorders of consciousness: assessment of awareness in DOC," *Archives of Physical Medicine and Rehabilitation*, vol. 98, no. 10, pp. e85–e86, 2017.
- [12] M. Ettenberger, "Music therapy in the neonatal intensive care unit: p," *British Journal of Music Therapy*, vol. 31, no. 1, pp. 12–17, 2017.
- [13] J. F. Mondanaro, P. Homel, B. Lonner, J. Shepp, M. Lichtensztein, and J. V. Loewy, "Music therapy increases comfort and reduces pain in patients recovering from spine surgery," *American Journal of Orthopedics*, vol. 46, no. 1, pp. E13–E22, 2017, N.J.
- [14] M. J. Crawford, C. Gold, H. Odell-Miller et al., "International multicentre randomised controlled trial of improvisational music therapy for children with autism spectrum disorder: TIME-A study," *Health Technology Assessment*, vol. 21, no. 59, pp. 1–40, 2017.
- [15] M. V. Bruggen-Rufi, A. C. Vink, and R. Wolterbeek, "The effect of music therapy in patients with huntington's disease: a randomized controlled trial. Journal of huntington," *Disease*, vol. 6, no. 1, pp. 63–72, 2017.
- [16] L. Liu and S. B. Tsai, "Intelligent recognition and teaching of English fuzzy texts based on fuzzy computing and big data," *Wireless Communications and Mobile Computing*, vol. 2021, no. 1, Article ID 1170622, 10 pages, 2021.
- [17] A. Akhtari and Akbar, "Design of an adaptive neuro-fuzzy computing technique for predicting flow variables in a 90 degrees sharp bend," *Journal of Hydroinformatics*, vol. 19, no. 3/4, pp. 572–585, 2017.
- [18] N. Spiro, C. L. Farrant, and M. Pavlicevic, "Between practice, policy and politics: music therapy and the Dementia Strategy, 2009," *Dementia*, vol. 16, no. 3, pp. 259–281, 2017.
- [19] S. Broder-Fingert, E. Feinberg, and M. Silverstein, "Music therapy for children with autism spectrum disorder," *JAMA*, vol. 318, no. 6, pp. 523–524, 2017.
- [20] P. M. Bernard, Q. Nadine, and B. Elisabeth, "Fasciatherapy and reflexology compared to hypnosis and music therapy in daily stress management," *International Journal of Therapeutic Massage & Bodywork*, vol. 10, no. 3, pp. 4–13, 2017.
- [21] T. Chen, T. Han, and Y. Cao, "Polynomial-time algorithms for computing distances of fuzzy transition systems," *Theoretical Computer Science*, vol. 727, no. 1, pp. 24–36, 2018.
- [22] B. J. Raghuram, "A mapreduce computing base fuzzy classifier extraction for No-sql data classification," *International Journal of Applied Engineering Research*, vol. 13, no. 11, pp. 8766–8773, 2018.
- [23] T. N. Kapetanakis, I. O. Vardiambasis, E. I. Lourakis, and A. Maras, "Applying neuro-fuzzy soft computing techniques to the circular loop antenna radiation problem," *IEEE Antennas and Wireless Propagation Letters*, vol. 17, no. 9, pp. 1673–1676, 2018.
- [24] V. Yadaiah, "R. A fuzzy logic based soft computing approach in cbir system using incremental filtering feature selection to identify patterns," *International Journal of Applied Engineering Research*, vol. 13, no. 5, pp. 2432–2442, 2018.

- [25] Y. Hajoui, O. Bouattane, and M. Youssfi, "New hybrid task scheduling algorithm with fuzzy logic controller in grid computing," *International Journal of Advanced Computer Science and Applications*, vol. 9, no. 8, pp. 547–554, 2018.
- [26] S. L. Sharmila, C. Dharuman, and P. Venkatesan, "Neuro-fuzzy system with evolutionary computing for classification," *International Journal of Pure and Applied Mathematics*, vol. 113, no. 11, pp. 37–45, 2017.
- [27] D. Kumaraswamy and B. V. Sanker Ram, "Fuel cell power conversion enhancement using fuzzy based soft computing technique," *Indian Journal of Science and Technology*, vol. 10, no. 23, pp. 1–11, 2017.