


Research on music education: Integrating synaesthesia theory and colour psychology



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Music education can alleviate students' psychological stress and play a positive role in the healthy growth and development of students. Synaesthesia theory is a relatively special cognitive phenomenon that can achieve connections between different sensory organs. Colour psychology can influence the change of mental state through the change of vision. In this study, synaesthesia theory and colour psychology were applied to music education, and the traditional music education method was used as the contrast method to set up the experiment. The article focuses on the experimental results with regard to the Hamilton anxiety scale (HAMA) score of the use of traditional music by students. It shows that the music education mode integrating synaesthesia theory and colour psychology can better improve the classroom quality of music education, so as to better relieve the pressure of students and promote their healthy, happy and positive growth.

Contribution: Difficult learning tasks add pressure to the students' learning capabilities, which leads to psychological problems such as anxiety and stress. Music education can relax students' nerves and psychology, so as to relieve students' psychological pressure. The research applies synaesthesia theory and colour psychology to music education to improve the classroom quality of music, so as to better alleviate student pressures and promote healthy, happy and positive growth. This research represents data, which can be utilised by scholars in the field of religious education and public theology.

Keywords: synaesthesia theory; colour psychology; music education; psychological intervention; student health; HAMA.

Introduction

In modern life, the incidence rate of anxiety and depression is getting higher and higher, which has become one of the major psychological diseases in modern society and seriously threatens the physical and mental health of our people. Depression is one of the most common mood disorders in China at present. It is often accompanied by anxiety symptoms, manifested by mood swings and reduced appetite. Anxiety and depression have a high recurrence rate, long treatment cycle and high treatment cost, which will present a economic and psychological burden to patients and their families. In addition, patients with severe anxiety and depression often have self-harm, self-injury and even suicidal tendencies, which has great hidden danger to the life safety of patients and has caused a relatively serious burden on social security. Therefore, in addition to drug therapy, psychological intervention such as music intervention, visual art intervention, etc. is also a common way to treat depression. The principle is to relax the individual's psychology through techniques, so as to adjust the individual's body function and endocrine system, make the individual's body and mind relaxed and thus relieve the depression.

High school students are one of the groups with the most mental health problems, and the prevalence of anxiety and depression is very high among high school students. High school is an important place for most students to improve their comprehensive abilities and qualities, and the cultivation process of high school students is also a focus of attention for the government, schools, and society. As a result of various reasons, high school students will have many psychological problems, such as learning anxiety, social anxiety, employment anxiety, etc. Among them, learning anxiety refers to high school students' poor learning results in the learning process. At this time, high school students consciously failed to live up to the expectations of parents, schools, teachers and themselves and would have negative emotions such as self-reproach, inferiority complex and anxiety. Accompanying with learning anxiety is exam anxiety. Due to the impact of

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learning anxiety, students' learning ability and grades will further decrease, leading to unsatisfactory exam results and creating a vicious cycle, exacerbating students' fear and anxiety about various exams. Students with learning anxiety are prone to symptoms such as sweating, trembling, faster heartbeat, confusion and blurring when taking exams, and may even feel gloomy and dizzy.

Social anxiety refers to high school students' lack of social experience and social skills in social occasions, which makes them fall into an embarrassing situation. In the long run, students will have a sense of inferiority and self-abandonment when facing social occasions, and they will be afraid of social occasions and anxious. Employment anxiety refers to the employment problems that some high school students will face soon after graduation. However, some senior high school students don't have enough knowledge about themselves or their abilities, which leads to their inability to choose their suitable positions for employment. Some students have great anxiety about this, resulting in greater psychological pressure and employment anxiety. Higher psychological pressure and anxiety will have a negative impact on students' physical and mental health and behavior patterns, leading to various problems in their studies and life. Therefore, the mental health of senior high school students is a common concern of many scholars.

High school students are about to face the college entrance examination, which is a major turning point in their lives, adding additional learning pressure. During learning tasks, students are prone to greater psychological pressure, leading to various mental health problems (Fernández-Barris et al. 2023). Based on high school students' psychological status, social environment, interpersonal communication and other aspects, this study makes an in-depth analysis of the causes of students' psychological pressure and psychological problems. First of all, this article analyses the psychological pressure of high school students, which is caused by academic stress. As a result of the reform of the education system, the college entrance examination system has also changed. Under the influence of quality education, the current high school education focuses more on the development of students' comprehensive ability. However, because of the lack of social experience and the fact that parents and teachers have not experienced the new college entrance examination system, they are unable to provide effective suggestions, which makes students confused, nervous and uncomfortable while making career choices, causing greater psychological pressure (Ardeshirrouhanifard et al. 2021). This kind of psychological stress is also the main factor for high school students to have learning pressure and psychological problems. In addition, some high school students lack correct learning methods, which affects their learning efficiency, and their academic achievements fail to meet psychological expectations, resulting in anxiety and affecting their self-confidence (Cengiz et al. 2019). From the perspective of students and the influence of the external environment, there are differences in personality traits between students, and it will lead to differences in the psychological endurance and quality

level of high school students (Kilincalp & Haji 2019). The differences of students' personality traits are closely related to their growth environment, innate heredity, family environment and social environment.

The new college entrance examination system, has an increased amount of learning, and the competition among students has become more intense. When students cannot relieve this pressure by themselves, it will directly affect students' psychological state and academic performance, leading to the aggravation of students' psychological pressure and the formation of various psychological problems (Hernández-Moreno et al. 2020). From the perspective of social environment and interpersonal communication, bad interpersonal communication methods and interpersonal relationships will increase students' psychological pressure (Seagrave et al. 2021).

In high school, although interpersonal communication is limited, high school students still need to deal with some interpersonal problems with studies and life. As a result of personality and growth reasons, some high school students are not good at interpersonal communication. In addition, bad interpersonal relationships will lead to students' negative psychology such as jealousy, which makes students unwilling to help each other and is unable to make progress in their studies together. If teachers, parents and schools do not pay attention to this problem, students are likely to have psychological pressure and lead to various psychological problems if they study and live in this environment for a long time (Ma et al. 2022). Music education can relieve students' emotions, and mood thus relieving and releasing students' psychological pressure. Improving the teaching quality of music education can effectively relieve students' psychological pressure and play a positive role in students' growth and development.

Traditional music education has a single educational form. In order to improve the effect of music education on students' mental health, this research innovatively combines synaesthesia theory and colour psychology to optimise the form of music education. Synaesthesia theory is a relatively special cognitive phenomenon. Through the theory of synaesthesia, individuals can achieve the interconnection of sensory organs, such as vision and hearing, smell and vision. Applying synaesthesia theory to music education will help improve students' perception of music and facilitate the effectiveness of music education. Colour psychology can visually affect the psychological state of students through the change of colour, and the change of colour vision will strengthen the synaesthesia effect, thus strengthening the influence of music education. The research applies synaesthesia theory and colour psychology to music education to improve the classroom quality of music education, so as to better alleviate students' pressure and promote students' healthy, happy and positive growth. The improvement path of music education includes: closely combining music education with multimedia technology, enabling students to enjoy and learn music at both auditory

and visual levels through images, videos and other forms. Combining music education with teaching props, to encourage students' impression and learning experience and strengthen their perception and understanding of music.

Subjects and methods

Study setting

The experiment was conducted in a high school in Beijing, where different third-year high school classes were evaluated for their psychological status through a survey questionnaire. Based on the scoring results, two classes with relatively consistent overall mental health status were selected as the experimental subjects for comparative experiments. The experimental period is set to be from 01 March 2022 to 31 March 2022. Within 1 month of the experiment, the music education of one class (Class A) was improved, and the music education was improved and innovated by using the synergy theory and colour psychology. For the other class (Class B), a general form of music education is adopted. After 1 month of teaching, Hamilton Anxiety Scale (HAMA), Comprehensive Quality of Life Assessment Questionnaire (cqoli-74) and other survey tools were used to assess the psychological stress of the two classes, and the effect of music education was evaluated by the teachers' comprehensive performance scores of music class students. The psychological stress of students can be expressed by formula (1):

$$\text{Stress} = L_s + S_s + E_s \quad [\text{Eqn. 1}]$$

In formula (1), L_s represents academic pressure, S_s represents social pressure, E_s represents exam pressure.

Design

In some research results, it has been proved that music education can play a relaxing and soothing role in students' mood, thus releasing students' psychological pressure and regulating their psychological state (Woody 2021). Therefore, improving the teaching quality of music education plays a positive role in the healthy growth and development of students. In the long-term research process, some scholars have combined synaesthesia theory with music education to improve the quality of music education. Synaesthesia theory, also known as synesthesia theory and synaesthesia theory, is a relatively special cognitive phenomenon. Through synaesthesia, individuals can realise the communication of sensory organs, such as vision, hearing, and smell. The research applies synaesthesia theory and colour psychology to music education to improve the classroom quality of music education, so as to better relieve students' pressure and promote students' healthy, happy and positive growth. At a city high school, two classes are selected to do experiments. The improvement and innovation of music education in one class (Class A) adopt synaesthesia theory and colour psychology. The ways to improve include: closely combining music education with multimedia technology, through images, videos and other forms, so that students can enjoy and

learn music at the dual levels of hearing and vision; The other class (class B) adopted the general form of music education. After 1 month of teaching, the psychological pressure of the two classes were assessed by using the HAMA, the cqoli-74 and other survey tools, and the effectiveness of music education was assessed by using the teachers' comprehensive performance scores of students in the music class. The basic information of the two classes is shown in Table 1.

Table 1 shows the basic information of the two classes. It can be seen that the age distribution of Class A and Class B is mainly 16–18 years old. Psychological stress is mostly concentrated in the middle level and the academic level is mostly average. The distribution of attribute levels between Class A and Class B is also relatively consistent, which meets the criteria for conducting comparative experiments.

Results

Compare the changes of HAMA scores of the two classes before and after the experiment, so as to analyse the effect of the proposed music education improvement strategy. The changes of HAMA scores of the two classes are shown in Table 2.

In Table 2, it can be seen that before the experiment, the HAMA score of class A was 25.71 – 3.03 and the HAMA score of class B was 26.15 – 3.49. There was little difference between the two classes. On the 15th day of the experiment, the HAMA score of class A was 18.26 – 2.54 and the HAMA score of class B was 21.84 – 3.07, both of which decreased significantly, but the decline of class A was even greater. On the 30th day of the experiment, the HAMA score of class A was 7.57 – 1.40 and that of class B was 11.38 – 1.58. The HAMA score of both classes decreased significantly, but that of class A was even greater. Compare the Hamilton Depression Scale (HAMD) scores of the two classes before and after the experiment to analyse the effect of the

TABLE 1: Basic information of the two classes.

Attribute	Category	Class A (n = 50)	Class B (n = 51)	p
Age	< 16	11	10	> 0.05
	16 – 18	39	40	
	> 18	0	1	
Degree of psychological stress	Nothing	0	0	> 0.05
	Light	12	10	
	Moderate	30	32	
	Severe	8	9	
Academic record	Bad	10	11	> 0.05
	Average	20	18	
	Good	12	12	
	Excellent	8	10	

TABLE 2: Hamilton Anxiety Scale score changes of two classes.

Class	Experiment time (days)			p
	0	15	30	
Class A	25.71 – 3.03	18.26 – 2.54	7.57 – 1.40	< 0.01
Class B	26.15 – 3.49	21.84 – 3.07	11.38 – 1.58	< 0.01
p	> 0.05	< 0.01	< 0.01	-

TABLE 3: HAMD score changes of two classes.

Class	Experiment time (days)			<i>p</i>
	0	15	30	
Class A	26.05 – 3.14	19.10 – 2.35	8.84 – 1.21	< 0.01
Class B	25.33 – 3.08	22.07 – 2.46	12.45 – 2.03	< 0.01
<i>p</i>	> 0.05	< 0.01	< 0.01	-

TABLE 4: Comprehensive Quality of Life Assessment Questionnaire-74 score changes of two classes.

Dimension	Experiment time	Group		<i>p</i>
		Class A	Class B	
Psychological function	Before experiment	47.62 – 10.05	48.21 – 9.86	> 0.05
	After experiment	75.29 – 8.32*	61.64 – 7.46*	< 0.01
Somatic function	Before experiment	44.42 – 10.08	45.63 – 9.73	> 0.05
	After experiment	66.85 – 10.52*	60.04 – 10.10*	< 0.01
Social function	Before experiment	45.48 – 9.27	45.16 – 9.55	> 0.05
	After experiment	66.15 – 10.28*	60.14 – 8.77*	< 0.01
Material life	Before experiment	48.05 – 10.17	47.64 – 10.08	> 0.05
	After experiment	57.38 – 8.46*	62.05 – 7.92*	< 0.01

*, *p* < 0.05 compared with that before the experiment.

proposed music education improvement strategy. The changes of HAMD scores of the two classes are shown in Table 3.

In Table 3, it can be seen that before the experiment, the HAMD score of class A was 26.05 – 3.14 and that of class B was 25.33 – 3.08. There was little difference between the two classes. On the 15th day of the experiment, the HAMD score of class A was 19.10 – 2.35, and the HAMD score of class B was 22.07 – 2.46, both of which decreased significantly, but the decline of class A was even greater. At the 30th day of the experiment, the HAMD score of class A was 8.84 – 1.21, and the HAMA score of class B was 12.45 – 2.03. The HAMD score of both classes decreased significantly, but the decline of class A was greater. Comparing the changes of cqoli-74 scores of the two classes before and after the experiment, so as to analyse the effect of the proposed music education improvement strategy, the changes of cqoli-74 scores of the two classes are shown in Table 4.

In Table 4, at the beginning of the experiment, the psychological function score, physical function score, social function score and material life score of class A are not much different from those of class B, indicating that the quality of life between the two classes is almost the same at the beginning of the experiment. After the experiment, the scores of psychological function, physical function, social function and material life of class A and class B decreased significantly, indicating that the quality of life of the two classes has been greatly improved after music education. After the experiment, class A's psychological function score, physical function score, social function score and material life score decreased more than class B, indicating that class A adopted better teaching methods. To sum up, integrating colour psychology and synaesthesia theory into music education can better play the psychological stress relief effect of music education, solve students' psychological problems and improve their living standards.

Discussion

The results of this study show that, through different forms of music education, the HAMA score of Class A using music education and combining colour psychology and Synaesthesia theory has decreased from 25.71 ± 3.03 to 7.57 ± 1.40 , which is lower than that of Class B using traditional music education forms. In addition, the HAMD score of Class A also decreased from 26.05 – 3.14 to 8.84 – 1.21, while the variation range of Class B was from 25.33 – 3.08 to 12.45 – 2.03. Compared with Class B, the cqoli-74 score of Class A also showed a larger downward trend. To sum up, it can be seen that the psychological changes of the students in the class who adopted the music education of colour psychology and synaesthesia theory have been more positively affected before and after the education, and the psychological state has also produced a more obvious improvement effect.

Among the high school students, the rate of anxiety, depression and other psychological diseases is high, which has a negative impact on the development of high school students, and also causes a greater psychological and economic burden on students' families. Depression is one of the most common mood disorders in China at present. It is often accompanied by anxiety symptoms and manifested as low mood and reduced appetite of individuals. Anxiety and depression have a high recurrence rate, long treatment cycle, high treatment cost and if the degree is serious, it will directly affect the life, health and safety of patients, so it has been widely valued by researchers. In the current clinical treatment, in addition to drug treatment, psychological intervention is also a common way to treat depression, such as music intervention, visual art intervention, etc. The principle is to relax the individual's psychology through music or pictures with good visual effects to adjust the individual's body function and endocrine system, so that the individual's body and mind are comfortable to relieve depression and anxiety. There are many reasons for high school students to suffer from depression and anxiety, such as learning anxiety, social anxiety and employment anxiety. In terms of learning anxiety, high school students have poor learning performance because of various reasons, including poor self-control, poor understanding, slow learning progress and poor learning methods. In high school, academic achievement is the most important standard to measure and evaluate the quality of a student and also the most important evaluation index for parents, teachers and students themselves. Therefore, when the academic performance drops or is not ideal enough, students will have greater psychological pressure, which will evolve into anxiety and depression, leading to anxiety and depression. Accompanying with learning anxiety is exam anxiety. As a result of the existence of learning anxiety, students' learning ability and outcome will also be reduced, resulting in unsatisfactory students' test results, which will cause fear and anxiety about all kinds of tests. During the test, students suffering from test anxiety feel unconsciously nervous, sweat, shiver and even feel dizzy. Test anxiety seriously affects students' performance in the exam, making students unable to fully utilise their knowledge, leading to low test scores that do

not reach their due level. This further aggravates students' anxiety psychology and causes more serious learning anxiety. When students are in this situation for a long time in social activities, they will have inferiority complex and will also have resistance and anxiety during social events.

The principle of using colour psychology to treat patients' psychological problems and regulate their emotions is that in synaesthesia theory, the feeling of vision for colour can be transformed into other feelings, such as red, yellow and other warm colours will give people a warm feeling and remind people of things such as sun, fire and so on. Blue, cyan and purple are easy to make people calm or melancholy, and remind people of the sky, water and other things (Kothgassner et al. 2022). Therefore, by studying the impact of various colour changes on people's psychology, we can use colour psychology to adjust people's emotions and psychology, so as to alleviate people's psychological pressure and eliminate people's psychological problems. Music education can relieve students' emotions and psychological pressure, thus relax students' mood. Improving the teaching quality of music education can more effectively relieve students' psychological pressure and play a positive role in students' healthy growth and development (Chang et al. 2020). The improvement paths of music education include: closely combining music education with multimedia technology and enabling students to enjoy and learn music at the dual levels of hearing and vision through images, videos and other forms; combining music education with teaching props, so as to deepen students' impression and learning experience and strengthening students' perception and understanding of music. In the music education reform proposed by the research, teachers are required to combine multimedia technology and teaching props in music education to deepen students' impression and understanding (Huang et al. 2020). Using multimedia technology, music can be expressed in the form of audio, video and even images. For different scales and different music, the emotional colours they represent are different. If these differences are displayed with different colours, the synaesthesia of hearing and vision can be realized in the multimedia teaching mode, which affects students' psychology and emotion, so that students can feel and understand music from the visual, auditory and psychological levels at the same time, improve the effect of music education and alleviate students' psychological pressure. During the beginning of the experiment, the HAMA and HAMD scores of Class A were not significantly different from those of Class B, indicating that the psychological stress of the two classes was basically the same at the beginning of the experiment. After 30 days of experimentation, the HAMA and HAMD scores of Class A and Class B significantly decreased. The HAMA score of Class A decreased from 25.71 – 3.03 to 7.57 – 1.40 and the HAMA score of Class B decreased from 26.15 – 3.49 to 11.38 – 1.58. The HAMD score of Class A also decreased from 26.05 – 3.14 to 8.84 – 1.21, while the variation range of Class B was from 25.33 – 3.08 to 12.45 – 2.03. It shows that the psychological stress of the two classes has been greatly relieved through music education. The decrease in HAMA and HAMD scores

in Class A is greater than that in Class B, indicating that Class A adopts better teaching methods. In addition to this research, other scholars also conducted analysis and treatment research on the psychological problems of teenagers. Based on the research on the psychological status, social environment, interpersonal communication and other aspects of high school students, the reasons for students' psychological stress and psychological problems were deeply analysed. Among the students who received the questionnaire, 40.9% of the students were anxious because of learning pressure. This research proposed the treatment method of psychologists. After treatment, the anxiety group decreased by 3.4% (Cai et al. 2021). Compared with this study, traditional psychotherapy treatment methods have not achieved significant improvement effects. In previous studies, colour psychology is often applied to the treatment of adolescent psychological problems. For example, using colour block colleges to treat adolescent emotional disorders; adjusting the physiological signals of teenagers, such as pulse and blood pressure, by alternating colour and rhythm, in order to regulate their emotions. After the HAMA questionnaire survey, the scores of adolescents adjusted by colour psychology decreased from 30.52 – 1.56 to 23.64 – 2.01 (Salzmann et al. 2021; HadaviZade 2022). Compared with this study, only colour psychology is used to treat adolescents' psychological problems, and its relief effect is weak. To sum up, integrating colour psychology and synaesthesia theory into music education can better play the psychological stress relief effect of music education, solve students' psychological problems and improve their living standards.

Conclusion

The psychological problems of senior high school students are serious. Therefore, based on the original music education, this study uses the combination theory and colour psychology to reform music education. The reform effect shows that after the experiment, the HAMA score and HAMD score of Class A and Class B have significantly decreased. The HAMA score of Class A has decreased from 25.71 – 3.03 to 7.57 – 1.40, and the HAMD score has also decreased from 26.05 – 3.14 to 8.84 – 1.21. The HAMA score of Class B decreased from 25.71 – 3.03 to 7.57 – 1.40, and the HAMD score of Class B decreased from 25.33 – 3.08 to 12.45 – 2.03. It shows that the psychological stress of the two classes has been greatly relieved through music education. After the experiment, the decrease in HAMA and HAMD scores in Class A was greater than that in Class B, indicating that Class A adopted better teaching methods. To sum up, the integration of colour psychology and synaesthesia theory into music education can better play the psychological decompression role of music education, solve students' psychological problems and improve students' living standards. Music education can relieve students' mood, relax their mood and thus relieve and release students' psychological stress. Improving the teaching quality of music education can more effectively relieve the students' psychological stress and play a positive role in the healthy growth and development of students. In this study, the theory of synaesthesia and colour

psychology are applied to music education to improve the quality of music education classes, so as to better alleviate the pressure of students and promote their healthy, happy and positive growth. However, the experimental objects of this study have strong limitations, and only two classes in a high school were tested. Later, this method can be verified again by expanding the scope of the research objects. Although the main application object of music education combining synaesthesia theory and colour psychology is for high school students with psychological pressure at present, it is expected that this method will be extended and applied to more groups with psychological pressure through continuous in-depth research in the future, aiming at alleviating psychological problems for more people.

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Competing interests

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J.Y. is the sole author of this research article.

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Data availability

The authors confirm that the data supporting the findings of this study are available within the article.

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