

RESEARCH ARTICLE

Music and Adolescent Mental Health: A Journey of Healing, Growth, and Self-Discovery

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ABSTRACT

Music, as an emotional expression and adjustment tool, has a significant impact on the mental health of teenagers. Through a four-week experiment, this study explored the influence of music on teenagers' emotional state, psychological resilience, anxiety level, self-cognition and life satisfaction. The subjects were divided into experimental group and control group. The experimental group listened to healing music for 30 minutes every day, while the control group conducted quiet meditation activities. The mental health status of the two groups of teenagers was measured and compared by psychological scales such as PANAS, RS, STAI, self-concept and life satisfaction. The results show that the experimental group is significantly better than the control group in emotion regulation, psychological resilience improvement and self-cognition, which proves that music has the potential to promote the mental health of teenagers. This paper discusses the theoretical and practical significance of these findings.

Keywords: Music therapy; Adolescent mental health; Emotional regulation; Psychological resilience; self-discovery

1. Introduction

Adolescence is an important stage in life, and individuals are facing challenges such as rapid changes in physiology and psychology, emotional fluctuations and identity crisis. During this period, mental health problems, such as anxiety, depression and emotional instability, often have a far-reaching impact on teenagers' growth and self-cognition. In recent years, music, as a non-drug intervention, has attracted more and more researchers' attention because of its unique role in emotional regulation and mental health improvement. Music is not only the carrier of emotional expression, but also has many functions such as improving mood, relieving stress and enhancing self-cognition. Studies have shown that music can affect dopamine secretion in the brain, and then produce a positive emotional response. For teenagers, music can help them to alleviate mood swings, promote the improvement of psychological resilience, and help to establish positive self-identity. The purpose of this study is to explore the role of music in adolescent mental health through experiments, and to provide basis for adolescent mental health education and intervention.

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2. The importance of music to teenagers

2.1. The role of music in emotional regulation

In recent years, emotional adjustment ability is widely regarded as the core component of mental health, especially in the special development stage of teenagers, emotional fluctuations are frequent and significant. Research shows that music, as a tool to perceive and express emotions, has unique advantages in regulating emotions^[1,2]. Music can not only trigger complex emotional experience through melody, rhythm and tone, but also help individuals find ways to release and vent negative emotions. Many empirical studies show that listening to soothing music can significantly reduce emotional problems such as anxiety and depression, and at the same time stimulate positive emotional experiences, such as pleasure, relaxation and peace of mind.

Among teenagers, music, as a widely used way of entertainment and relaxation, has a strong attraction. Compared with traditional interventions such as drugs or psychotherapy, music has the advantages of low cost, easy acceptance and no side effects^[3]. Therefore, it is not only of theoretical importance to study the potential role of music in adolescent mental health, especially its effect in emotional regulation, but also provides a broad prospect for the practical application of psychological intervention.

2.2. Music to enhance psychological resilience

Psychological resilience refers to the ability of an individual to maintain or restore psychological balance in the face of pressure, frustration or major life events. For teenagers, the cultivation of psychological resilience is very important, because teenagers are in a critical period to cope with academic pressure, interpersonal challenges and self-identity confusion. Teenagers with strong psychological resilience are more likely to maintain a positive attitude in the face of setbacks and can recover quickly from difficulties^[4].

Music, as an emotional support tool, is considered to improve the individual's psychological resilience. Studies have shown that music can enhance the individual's ability to cope with setbacks and challenges by regulating the emotional response system in the brain. In this study, we combine music with the improvement of psychological resilience, and explore whether music intervention can effectively improve their psychological resilience, so as to help them show stronger psychological adaptability in the face of pressure^[5].

2.3. Music promotes self-discovery and cognition of teenagers

Self-discovery is an important stage of teenagers' psychological development, and it is a process in which teenagers gradually form a stable self-concept and identity. In this process, music plays a unique role as a medium that can stimulate self-reflection and emotional expression^[6]. By listening to and participating in music activities, teenagers can understand themselves more deeply, express their inner feelings and find resonance in music.

Many teenagers find a connection with their inner feelings through music and use it as a tool to explore themselves. Music can not only help them release the backlog of negative emotions, but also become a channel for them to express themselves and strengthen their self-awareness. Lyrics, melodies and emotional expressions in music can often resonate with teenagers and help them better understand their relationship with the world when they grow up^[7,8]. Therefore, it is of great practical significance to study the influence of music on teenagers' self-cognition, which helps to better understand how to promote teenagers' self-discovery and growth through music intervention.

3. Experimental design

3.1. Experimental materials and tools

The main materials of this experiment include specific healing music and mental health measurement tools. Healing music mainly chooses music with relaxing and soothing effects, such as piano music and guitar music, in order to trigger the subjects' positive emotional experience. In the course of the experiment, the music materials are carefully selected to ensure that there is no strong emotional fluctuation in the tracks, so as to avoid negative emotions or anxiety.

The experimental formula in this paper is as follows.

1. T test formula:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad (1-1)$$

Among them, \bar{X}_1 and \bar{X}_2 represents the average value of the experimental group and the control group respectively, s_1^2 and s_2^2 are the variance, n_1 and n_2 are the number of samples.

2. ANOVA formula:

$$F = \frac{MSB}{MSW} = \frac{\frac{SSB}{dfB}}{\frac{SSW}{dfW}} \quad (1-2)$$

Among them, MSB is the mean square between groups, MSW is the mean square within groups, SSB is the sum of squares between groups, SSW is the sum of squares within groups, and dfB and dfW are degrees of freedom.

3. Anxiety level change formula (standard deviation change):

$$\Delta A = \frac{\sum (A_t - A_0)}{n} \quad (1-3)$$

Among them, A_t represents the weekly anxiety value, A_0 represents the benchmark anxiety value, n represents the number of measured weeks.

The following standardized psychometric indicators are also used in this experiment.

1. Positive and negative emotional scale (PANAS): Positive and negative emotional changes are recorded by emotional questionnaire.

2. Resilience Scale (RS): Measure teenagers' ability to cope with setbacks and difficulties.

3. State-anxiety inventory (STAI): Quantify teenagers' anxiety.

4. Self-Concept Scale: measure the teenagers' cognition and affirmation of self-identity.

5. Satisfaction With Life Scale (SWLS): measure the satisfaction of the subjects with their overall life..

3.2. The experimental group and control group settings

In order to explore the specific influence of music on the mental health of teenagers, the subjects were randomly divided into experimental group and control group, with 100 teenagers in each group. The experimental group listened to healing music for 30 minutes every day for 4 weeks. The control group performed quiet meditation activities for 30 minutes every day for 4 weeks.

Experimental group: Music as an emotional adjustment tool, through daily listening, observed its influence on teenagers' emotions, anxiety, psychological resilience and so on^[9]. Control group: The control group does not touch music, but maintains a quiet state through meditation activities, thus excluding the influence of other non-musical intervention factors^[9]. Non-intervention control group: the subjects in this group did not intervene, as a comparison, in order to better isolate the influence of music.

Before the start of the experiment, all subjects took a baseline test to ensure that there was no significant difference in emotional state, psychological resilience, anxiety level, self-cognition and life satisfaction among the three groups^[10].

3.3. Experimental steps

The first stage: Before the experiment, all the subjects received the baseline test. The test contents include emotional state (using emotional state questionnaire), psychological resilience (using psychological resilience scale), anxiety level (using self-rating anxiety scale), self-cognition (using self-cognition questionnaire) and life satisfaction (using life satisfaction scale). Through these initial data, it is ensured that there is no significant difference in various indexes among the three groups of subjects, and the reliability of the research results is guaranteed.

The second stage: the subjects in the experimental group listened to 30 minutes of specific healing music every day. The selected tracks include light music, natural sounds and music specially designed for relaxation. All tracks have been scientifically verified and can effectively promote relaxation and emotional improvement. Keep the listening time consistent every day, and make sure the volume is moderate to prevent interference. The subjects in the control group performed 30 minutes of quiet meditation, including deep breathing and mindfulness meditation exercises. Subjects use meditation to guide the audio to keep calm, so as to ensure the quiet environment for each meditation to avoid external interference. The subjects in the non-intervention control group maintained their routine life and did not carry out any specific activities to provide control.

The third stage: every weekend, all three groups of subjects have a mental health status measurement, recording their changes in emotional state, psychological resilience, anxiety level, self-awareness and life satisfaction. Standardized questionnaire and self-rating scale were used to ensure the validity and reliability of the data. The data will be analyzed by statistical software to compare the changes among the three groups.

The fourth stage: after the experiment, the three groups of subjects will receive the final test to evaluate the changes of various mental health indicators during the experiment. The final test will use the same evaluation tools as the baseline test for comparison. By comparing the final data of experimental group, control group and non-intervention control group, this paper analyzes the specific influence of music on adolescent mental health, paying special attention to the differences between experimental group and non-intervention control group, so as to verify the intervention effect of music. The analysis results will provide an important reference for future related research.

4. The experimental results and analysis

4.1. Analysis of emotional state changes (PANAS scale score)

According to the score of PANAS scale, the positive emotion score of the experimental group was 20 in the first week. With the continuous listening to healing music every week, the positive emotion gradually improved and rose to 30 in the fourth week. This shows that music intervention can significantly improve the positive emotions of teenagers. The negative emotion score of the experimental group was 15 in the first week, and gradually decreased with time, and decreased to 8 in the fourth week. The score of positive emotion in the non-intervention control group was 21 in the first week, and only slightly decreased to 20 in the fourth week, with almost no change. The score of negative emotion dropped from 16 to 15, which showed that the change of emotional state was extremely limited without any intervention. The decline of negative emotions is closely related to the emotional adjustment function of music, which proves that music can effectively reduce the negative emotional experience of teenagers.

The positive emotion score of the control group changed little, starting with 22 points, and finally only slightly increased to 24 points, indicating that meditation activities also helped to slightly improve the mood, but the effect was far less than that of the music intervention group. The negative emotions in the control group changed slightly, from 16 to 13, and the change was not as significant as that in the experimental group. This shows that the effect of meditation on reducing negative emotions is limited. The experimental data clearly shows the positive influence of music on the emotional state, and the experimental group is superior to the control group in improving the positive emotion and reducing the negative emotion, indicating that music intervention has a significant effect on improving the emotional state of teenagers^[11]. The specific score table and change curve are shown in **Table 1** and **Figure 1**.

Table 1. Changes of emotional state in experimental group and control group (PANAS scale score).

Group	Week	Positive Affect Score (Average)	Negative Affect Score (Average)
Experimental Group	1	20	15
Experimental Group	2	25	12
Experimental Group	3	28	10
Experimental Group	4	30	8
Control Group	1	22	16
Control Group	2	23	15
Control Group	3	23	14
Control Group	4	24	13
No Intervention Control Group	1	21	16
No Intervention Control Group	2	21	15
No Intervention Control Group	3	20	15
No Intervention Control Group	4	20	15

Thus, a variation diagram as shown in **figure 1** can be drawn.

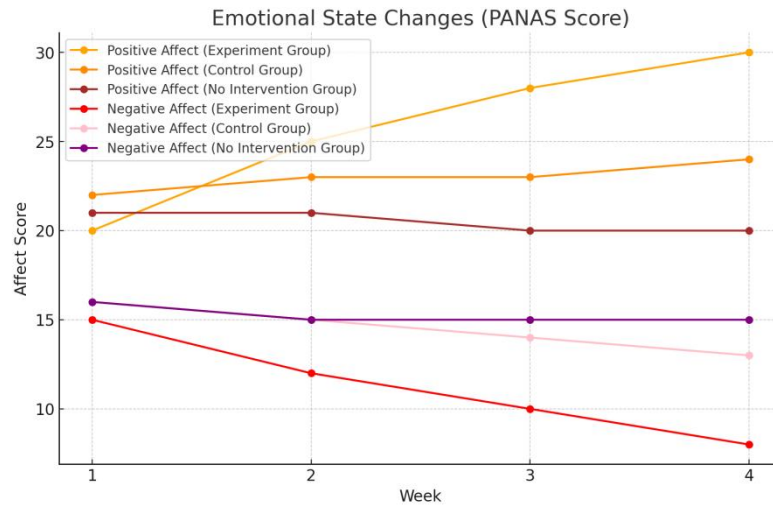


Figure 1. Emotional state change curve.

4.2. Psychological resilience (RS scale score) analysis

According to the score of RS scale, the initial score of psychological resilience in the experimental group was 55 in the first week, and with the continuous music intervention every week, its resilience score gradually increased, and finally reached 70 in the fourth week. This shows that music intervention has significantly enhanced the psychological resilience of teenagers. With the passage of time, teenagers can more actively cope with challenges and restore their psychological balance.

The resilience of the control group increased slightly from 52 points in the first week to 55 points in the fourth week. Although the resilience was slightly improved, the growth rate was much lower than that of the experimental group. This shows that the effect of simple meditation on improving psychological resilience is relatively limited. During the whole experiment, the psychological resilience of the experimental group was significantly improved, which showed that music played an important role in enhancing teenagers' ability to cope with stress and frustration^[12]. The resilience score of the non-intervention control group hardly changed during the whole experiment, from 53 points in the first week to 52 points in the fourth week. This shows that the psychological resilience of teenagers remains stable without any intervention, and there is no significant improvement. Compared with the control group, music intervention can help teenagers improve their psychological resilience more effectively and make them have stronger resilience and coping ability. The specific score table and change curve are shown in **Table 2** and **Figure 2**.

Table 2. Changes of psychological resilience in experimental group and control group.

Group	Week	Resilience Score (Average)
Experimental Group	1	55
Experimental Group	2	60
Experimental Group	3	65
Experimental Group	4	70
Control Group	1	52
Control Group	2	53
Control Group	3	54
Control Group	4	55
No Intervention Control Group	1	53

Table 2. (Continued)

Group	Week	Resilience Score (Average)
No Intervention Control Group	2	53
No Intervention Control Group	3	52
No Intervention Control Group	4	52

Thus, a variation diagram as shown in **figure 2** can be drawn.

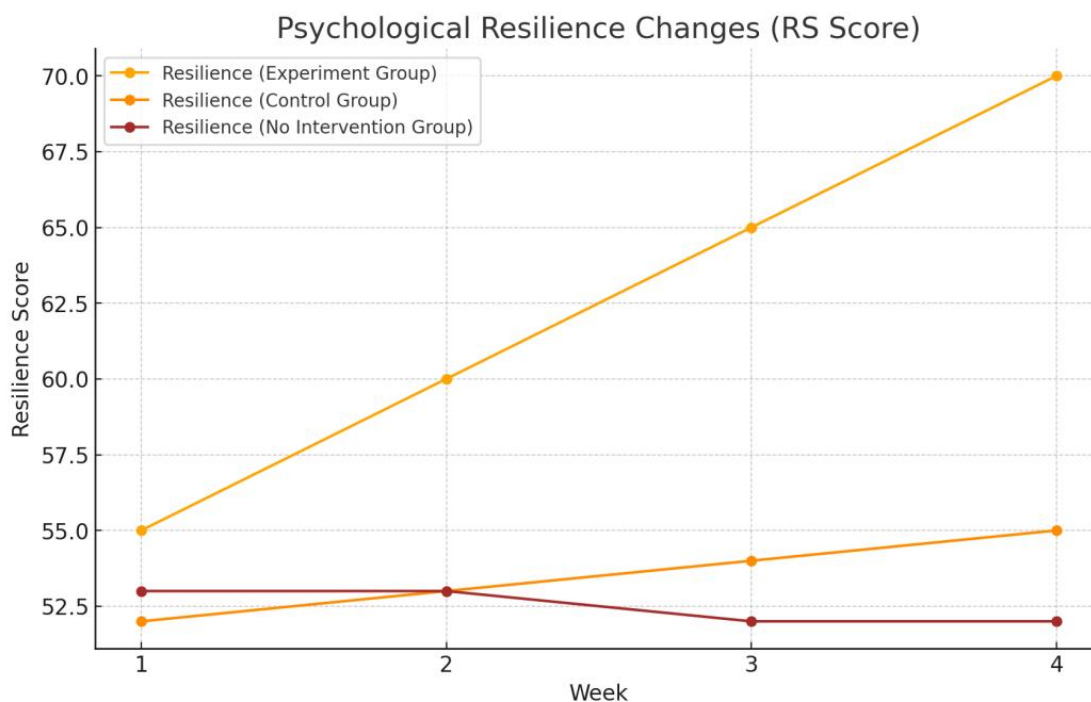


Figure 2. Curve of psychological resilience.

4.3. Analysis of anxiety level change (STAI scale score)

According to the score of STAI scale, the anxiety level of the experimental group was 40 at the beginning of the first week, and with the music intervention, the anxiety level gradually decreased to 25 at the fourth week. This shows that music can significantly reduce the anxiety level of teenagers and make them show more peaceful emotions in the face of stress or tension.

The anxiety level of the control group decreased from 41 points in the first week to 35 points in the fourth week. Although meditation also played a certain role in reducing anxiety, its effect was obviously not as good as that of the experimental group^[13]. In the control group, the change of anxiety level is relatively gentle, and the decline is limited. The anxiety level of the non-intervention control group hardly changed during the whole experiment, from 42 points in the first week to 41 points in the fourth week. This shows that the anxiety level of teenagers is basically stable without any intervention. The experimental data show that music intervention has a significant effect on reducing the anxiety level of teenagers. In contrast, meditation activities in the control group also play a certain role, but the effect is not as obvious as music. The specific score table and change curve are shown in **Table 3** and **Figure 3**.

Table 3. Changes of anxiety level in experimental group and control group.

Group	Week	Anxiety Level (Average Score)
Experimental Group	1	40
Experimental Group	2	35
Experimental Group	3	30
Experimental Group	4	25
Control Group	1	41
Control Group	2	39
Control Group	3	37
Control Group	4	35
No Intervention Control Group	1	42
No Intervention Control Group	2	42
No Intervention Control Group	3	41
No Intervention Control Group	4	41

Thus, a variation diagram as shown in **figure 3** can be drawn.

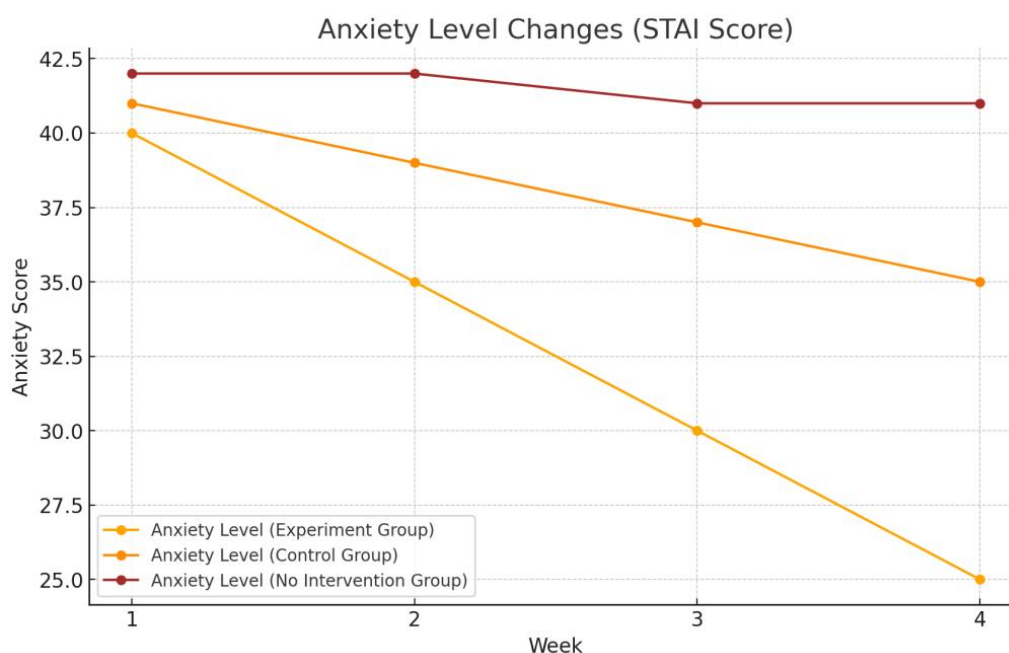


Figure 3. Graph of anxiety level change.

4.4. Self-awareness (self-concept scale score) analysis

According to the score of self-concept scale, the self-cognition score of the experimental group was 60 in the first week, and gradually increased to 75 in the fourth week with the music intervention. This shows that through the emotional adjustment and reflection of music, teenagers gradually have a more positive and clear understanding of themselves and enhance their self-concept and identity.

The self-cognition score of the control group was 58 in the first week, and finally rose to 61 after four weeks of meditation activities, with a small change. Although meditation can promote self-cognition, its effect is obviously not as significant as that of the experimental group. The self-cognition score of the non-

intervention control group hardly changed during the whole experiment period, from 59 in the first week to 58 in the fourth week. This shows that without any intervention, the self-awareness level of teenagers has remained basically stable, and there has been no significant improvement.

The experimental data show that the experimental group has made remarkable progress in improving self-cognition. Music intervention helps teenagers to better reflect on themselves and express their emotions, thus enhancing their self-concept. However, the change of self-cognition in the control group is relatively smooth, which shows that the role of music in promoting self-cognition of teenagers is more significant than that of simple meditation, and it is obviously better than that of the non-intervention control group. The specific score table and change curve are shown in **Table 4** and **Figure 4**.

Table 4. Changes of self-cognition in experimental group and control group.

Group	Week	Self-Concept Score (Average)
Experimental Group	1	60
Experimental Group	2	65
Experimental Group	3	70
Experimental Group	4	75
Control Group	1	58
Control Group	2	59
Control Group	3	60
Control Group	4	61
No Intervention Control Group	1	59
No Intervention Control Group	2	59
No Intervention Control Group	3	58
No Intervention Control Group	4	58

Thus, a variation diagram as shown in **figure 4** can be drawn.

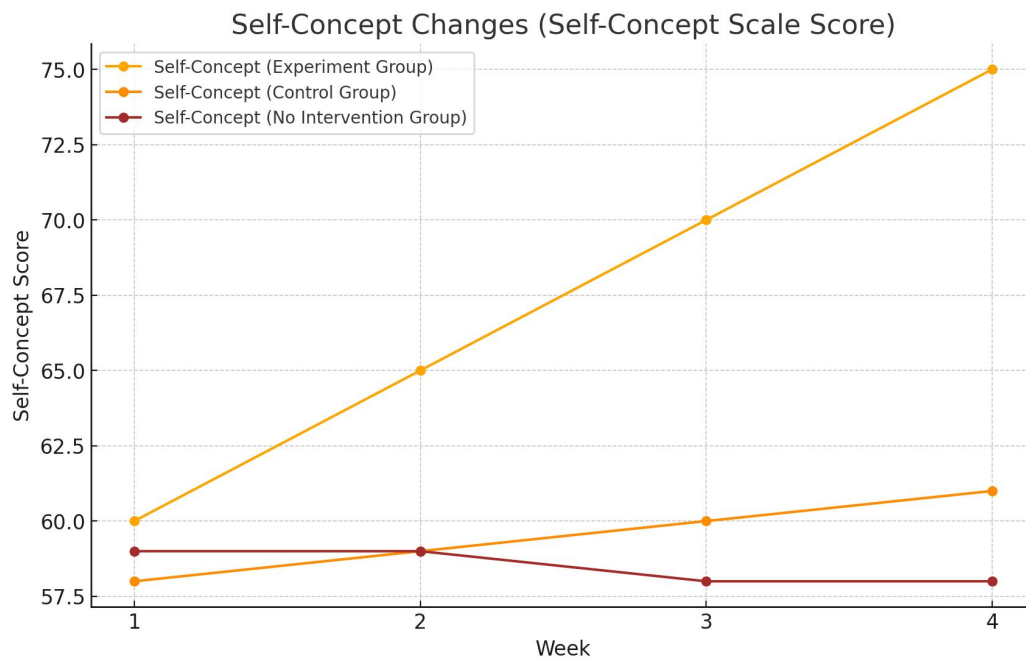


Figure 4. Curve of score change of self-concept scale.

4.5. Analysis of life satisfaction (SWLS scale score)

According to the SWLS scale score, the life satisfaction score of the experimental group started from 65 points in the first week, and gradually rose to 80 points in the fourth week with the music intervention. This shows that music intervention has a significant positive impact on teenagers' overall life satisfaction, and listening to music makes their happiness and satisfaction continuously enhanced.

The life satisfaction score of the control group rose from 63 points in the first week to 66 points in the fourth week, and the change was relatively smooth. This shows that meditation activities have a positive impact on life satisfaction, but the effect is not as significant as that of the experimental group. The life satisfaction score of the non-intervention control group remained almost unchanged during the whole experiment period, from 64 points in the first week to 63 points in the fourth week^[14]. This shows that without any intervention, the life satisfaction level of teenagers has remained basically stable, and there has been no significant improvement.

The experimental data show that the life satisfaction score of the experimental group increased significantly during the whole experiment, which was much higher than that of the control group and the non-intervention control group. Music intervention can not only help teenagers to adjust their emotions and improve their psychological resilience, but also enhance their overall life satisfaction. In contrast, although meditation activities help to improve life satisfaction, the effect is relatively limited, while there is little change in the non-intervention group. This shows that music has unique advantages in promoting teenagers' happiness and life satisfaction. The specific score table and change curve are shown in **Table 5** and **Figure 5**.

Table 5. Changes of life satisfaction between experimental group and control group.

Group	Week	Life Satisfaction Score (Average)
Experimental Group	1	65
Experimental Group	2	70
Experimental Group	3	75
Experimental Group	4	80
Control Group	1	63
Control Group	2	64
Control Group	3	65
Control Group	4	66
No Intervention Control Group	1	64
No Intervention Control Group	2	64
No Intervention Control Group	3	63
No Intervention Control Group	4	63

Thus, a variation diagram as shown in **fig. 5** can be drawn.

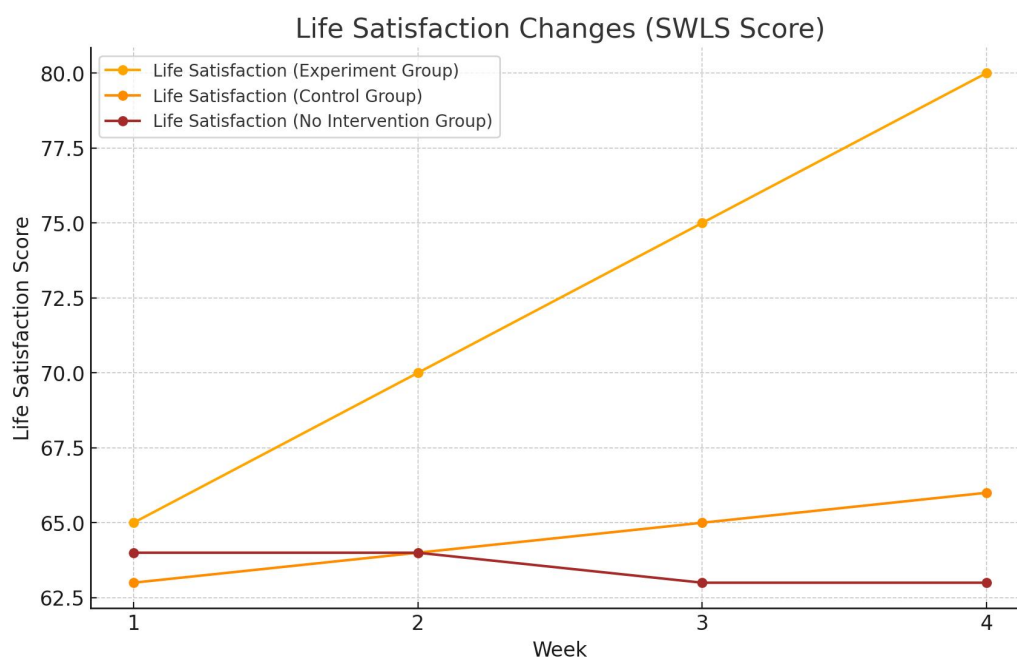


Figure 5. Curve of life satisfaction.

5. Discussion

5.1. The regulatory role of music in emotional state

The experimental results indicate that music intervention has a significant regulatory effect on the emotional state of adolescents. In the experimental group, positive emotions increased significantly over four weeks, from 20 in Week 1 to 30 in Week 4, while negative emotions gradually decreased from 15 to 8. In contrast, the control group showed minimal change in positive emotions, and the decline in negative emotions was also limited. The no-intervention control group showed almost no change, with both positive and negative emotions remaining stable. This suggests that music is more effective than meditation and no intervention in regulating emotions. Previous studies have shown that music can activate the brain's reward system, inducing pleasurable emotions and enhancing positive feelings. Music can effectively alleviate negative emotions such as anxiety and stress, helping individuals restore emotional balance. For adolescents, music is not only a medium for emotional expression but also a tool for managing emotions. The experimental data further confirm this, showing that music intervention leads to faster and more significant improvements in emotional state, particularly in managing negative emotions.

5.2. The role of music in improving psychological resilience

Psychological resilience refers to the ability to quickly regain emotional balance when facing stress and adversity. For adolescents, developing this ability under academic, family, and social pressures is crucial for healthy growth. The experimental data show that music intervention significantly improved the psychological resilience of adolescents. The scores in the experimental group increased from 55 to 70, while the control group only rose slightly to 55, and the no-intervention control group showed almost no change, with scores fluctuating between 53 and 52. Music enhances psychological resilience mainly by regulating emotions and boosting self-efficacy. By helping adolescents quickly recover from negative emotions, music reduces emotional distress. The resonance in music allows adolescents to feel emotional support from others, strengthening their confidence and ability to face challenges. The experimental results suggest that music not

only aids short-term emotional regulation but also contributes to long-term resilience, supporting the use of music as a psychological intervention.

5.3. The role of music in reducing anxiety level

Anxiety is a common psychological issue among adolescents, especially under academic and social pressures. The experiment used the STAI scale to measure anxiety levels, and the results show that anxiety in the experimental group decreased from 40 to 25, while the control group saw a decrease from 41 to 35. The no-intervention control group remained almost unchanged, with scores between 42 and 41. Music can induce a relaxation response, reducing physical tension and, consequently, anxiety. Research has shown that soothing music can lower heart rate, blood pressure, and cortisol levels, all of which are closely related to anxiety relief. Music provides a channel for emotional release, allowing adolescents to let go of inner tension. The experimental results further demonstrate that music is more effective than meditation in reducing anxiety. Compared to meditation, music can stimulate the brain's emotional center more quickly and directly, thus more effectively relieving anxiety.

5.4. The role of music in promoting self-awareness

Self-concept is a core element of adolescent psychological development, involving an understanding of identity, ability, and values. The experimental results indicate that music intervention significantly enhanced self-concept in adolescents. The scores in the experimental group increased from 60 to 75, while the control group only rose from 58 to 61, and the no-intervention control group showed almost no change, with scores remaining between 59 and 58. Music provides a pathway for emotional expression and self-reflection, helping adolescents freely express their inner feelings and explore themselves. The lyrics and melodies in music evoke emotional resonance, allowing adolescents to reflect on their life experiences, deepen their understanding of identity, and promote self-acceptance. In contrast, while meditation can help with relaxation, it is limited in promoting deep self-reflection and does not enhance self-concept as effectively as music.

5.5. The impact of music on life satisfaction

Life satisfaction is an important indicator of well-being. The experimental results show that music intervention significantly increased life satisfaction in adolescents, with scores in the experimental group rising from 65 to 80. In the control group, scores only increased from 63 to 66, while in the no-intervention control group, scores remained nearly unchanged, decreasing slightly from 64 to 63. Music enhances overall life satisfaction by improving emotions, reducing anxiety, and strengthening psychological resilience, helping adolescents better cope with life's pressures. Additionally, music promotes self-concept and identity, encouraging adolescents to adopt a more positive outlook on life and the future, thereby increasing happiness. While meditation also helps to some extent with life satisfaction, its effect is not as pronounced as music, possibly because meditation is more static and lacks the strong emotional resonance and psychological impact that music provides.

Conclusions

Music Significantly Improves Adolescents' Emotional States. The positive emotion scores of the experimental group significantly increased over the four-week period, while negative emotions significantly decreased, demonstrating that music can effectively regulate adolescents' emotional states. As a tool for emotional expression and catharsis, music helps teenagers better release stress, reduce the burden of negative emotions, and improve overall emotional well-being.

Music Effectively Enhances Adolescents' Psychological Resilience. The psychological resilience scores of the experimental group significantly improved over the four weeks, showing that music plays an important role in enhancing adolescents' ability to cope with stress and setbacks. By regulating emotions and boosting self-efficacy, music enables adolescents to recover psychological balance more quickly when facing challenges and strengthens their mental toughness.

Music Interventions Significantly Reduce Anxiety Levels. Compared to the control group, the experimental group showed a significant reduction in anxiety levels, indicating that music interventions are highly effective in alleviating adolescent anxiety. Music helps to trigger a relaxation response and emotional release, providing a quick and effective way to ease anxiety, and helping adolescents maintain psychological calm when dealing with academic and life pressures.

Music Promotes Adolescents' Self-awareness and Self-discovery. The self-awareness scores of the experimental group significantly increased, showing that music can foster adolescents' self-reflection and self-discovery. Through emotional resonance, music helps adolescents better understand themselves, strengthen their sense of identity, and promote the formation of a healthy self-concept.

Music Significantly Increases Adolescents' Life Satisfaction. The life satisfaction scores of the experimental group significantly improved, indicating that music not only enhances emotional and psychological resilience but also increases adolescents' overall satisfaction with life. By alleviating stress and enhancing self-identity, music encourages a more positive outlook on life and boosts overall happiness.

Broad Prospects for the Application of Music Interventions in Adolescent Mental Health Education. This study shows that music, as a non-pharmacological and side-effect-free mental health intervention, can effectively promote emotional regulation and psychological adaptation in adolescents. Compared to traditional static meditation activities, music interventions offer faster and more direct psychological regulation effects. In future adolescent mental health education and interventions, music can serve as an important auxiliary tool, helping adolescents better cope with emotional fluctuations, relieve anxiety, enhance psychological resilience, and improve self-awareness and life satisfaction.

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