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Cross-Cultural Music and Its Differential Effects on Consciousness State Regulation

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Abstract

In recent years, research exploring the influence of music on emotional and cognitive processes has grown substantially. Nonetheless, most existing studies are confined to single cultural settings, with limited attention paid to the comparative effects of cross-cultural music on the regulation of consciousness states. This study adopts a mixed-methods approach — combining controlled experiments, subjective self-reports, and physiological monitoring—to examine how participants′ emotional states, attentional focus, and physiological responses (including heart rate, respiratory rate, and brainwave activity) change when exposed to Chinese and Western musical forms, specifically Traditional Chinese music and Western classical music. The findings reveal significant differences in both emotional modulation and consciousness regulation between the two musical traditions. These effects appear to be strongly associated with the music′s structural properties, cultural origins, and the listeners′ individual psychological characteristics.

Keywords: Cross-Cultural Music; Consciousness States; Regulation; Differences

1. Introduction

Music, as a unique cultural medium that transcends language barriers, has played a vital role in human society since ancient times. Its regulatory effects on emotions have been widely studied. Research indicates that different types of music can evoke distinct emotional responses. For instance, cheerful music tends to elevate mood, whereas sad music often induces reflection or melancholy. In Music and Emotion: Theory and Research, Patrik N. Juslin (2001) systematically explored how music elicits various emotional states. Stefan Koelsch, a neuroscientist at the Free University of Berlin, found in his 2018 study that cheerful music activates the brain′s reward system, while sad music enhances activity in the prefrontal cortex, fostering contemplation and empathy. Similarly, an experimental study by a team at the Tokyo University of the Arts revealed that although sad music may temporarily evoke negative emotions, it can subsequently generate positive affective experiences, such as aesthetic satisfaction — highlighting the complexity of musical emotions. Therefore, music serves not only as a vehicle for emotional expression and aesthetic experience but also holds great potential in regulating states of consciousness. Scholars generally agree that music—through its distinctive acoustic features such as rhythm, melody, and harmony — can significantly influence a person's emotions, cognition, and physiological state. Thompson et al. (2005) noted that music can directly act upon the auditory cortex through acoustic resonance, thereby impacting broader neural networks. These effects extend beyond emotional regulation to include modulation of consciousness. Koelsch (2014) further demonstrated that music can trigger deep emotional experiences and alter consciousness by activating brain regions associated with emotion and memory. Specifically, music can modulate attention levels, induce meditative states, and even aid in alleviating disorders of consciousness by influencing neural activity within the thalamo-cortical network.

The influence of music on attention has also garnered increasing research interest. Some types of music have been shown to enhance attentional focus, while others may cause distraction. Emmanuel Bigand and colleagues (2013) found that stable musical structures can optimize the coordination of the brain's default mode network (DMN), whereas complex compositions increase cognitive load. Research by Vinod Menon's team at Stanford University (2015) indicated that rhythmic regularity—such as 60 BPM Baroque music—can enhance functional connectivity in the prefrontal cortex, thereby improving task-related attention.

However, the cultural variability of music's cognitive and neural mechanisms remains underexplored. Most existing studies are anchored in Western music paradigms, overlooking the potentially distinct impacts of diverse musical traditions on consciousness. This study aims to address this theoretical gap in the emerging field of cultural neuromusicology by comparing the neural mechanisms underlying how traditional Chinese and Western classical music regulate states of consciousness.

2. Methodology

This study integrates experimental procedures, subjective self-reports, and physiological measurements. Participants listened to both Chinese and Western music (specifically, traditional Chinese music and Western classical music) and reported their emotional states, attentional focus, and subjective experiences before and after listening. Simultaneously, physiological indicators were recorded throughout the process.

2.1. Participants

A total of 120 adults, aged between 18 and 40, participated in the study, with an equal number of males and females. None of the participants had professional music training or any known hearing impairments.

2.2. Grouping

Participants were randomly assigned to four groups (n = 30 per group), each exposed to a different type of music:

Group 1: Traditional Chinese music (Guqin)

Group 2: Western classical music (works by Bach)

Group 3: Traditional Chinese music (Pipa)

Group 4: Western classical music (works by Mozart)

2.3. Experimental Procedure

2.3.1. Emotion Assessment

Baseline emotional states were assessed using the PANAS (Positive and Negative Affect Schedule) scale.

2.3.2. Music Listening

Each group listened to the assigned musical piece for 10 minutes in a controlled environment.

2.3.3. Subjective Experience Report

After the listening session, participants completed a subjective experience questionnaire, reporting perceived changes in emotional state, attention, and meditative awareness.

2.3.4. Meditative State Assessment

The Mindfulness-Based Stress Reduction (MBSR) scale was employed to evaluate the depth of the meditative state experienced.

2.3.5. Physiological Measurement

During the music listening phase, heart rate, respiratory rate, and brainwave activity were continuously monitored using non-invasive biometric devices.

2.4. Data Analysis

2.4.1. Statistical Analysis

The collected data were analyzed using SPSS software. Independent sample t-tests and ANOVA were conducted to compare differences in emotional regulation, attention levels, and meditative states across the four groups.

2.4.2. Multivariate Analysis

To explore the multi-dimensional impact of music on consciousness, a multivariate analysis was conducted, integrating both subjective self-reports and physiological measurements.

3. Results of Emotion Change Assessment

3.1. Baseline Emotion Assessment (PANAS Scale)

All participants were within the normal range of emotional state before the experiment, with no extreme emotional values.

Table 1. Overall Baseline Emotion Characteristics (N=120)

Dimension	Mean value(M)	Standard deviation(SD)	Score range
Positive emotions(PA)	28.8	7.1	15-42
Negative emotions(NA)	16.2	5.7	8-32

The results showed no significant differences in baseline emotions across groups ($p>0.05$), indicating balanced grouping.

Table 2. Inter-group Baseline Comparison (ANOVA)

Group	Mean PA	Mean NA	P-value（PA）	P-value（NA）
Guqin group	29.1	15.7	0.885	0.798
Bach group	28.6	16.4	-	-
Pipa group	28.4	16.0	-	-
Mozart group	29.2	16.6	-	-

3.2. Changes in Values Before and After Music Intervention

Table 3 and Figure 1 illustrate the changes in positive affect (PA) across different music groups before and after the experiment, based on paired-sample t-test results. The figure clearly shows that positive emotions increased in all groups following the listening session. The most substantial increases were observed in the Bach and Mozart groups. While the Guqin and Pipa groups also showed increases in positive affect, these were relatively smaller but still statistically significant. These results suggest that different types of music exert varying effects on positive emotional states, with Western classical music—particularly works by Bach and Mozart—producing more pronounced enhancements in positive affect.

Table 3. Changes in Positive Emotions (PA) (Paired Sample t-test)

Group	Pre-test PA	Post-test PA	Change value	T-value	P-value
Guqin group	29.1	31.6	+2.5	3.42	0.002
Bach group	28.6	33.9	+5.3	6.01	<0.001
Pipa group	28.4	30.3	+1.9	2.18	0.037
Mozart group	29.2	35.7	+6.5	7.89	<0.001

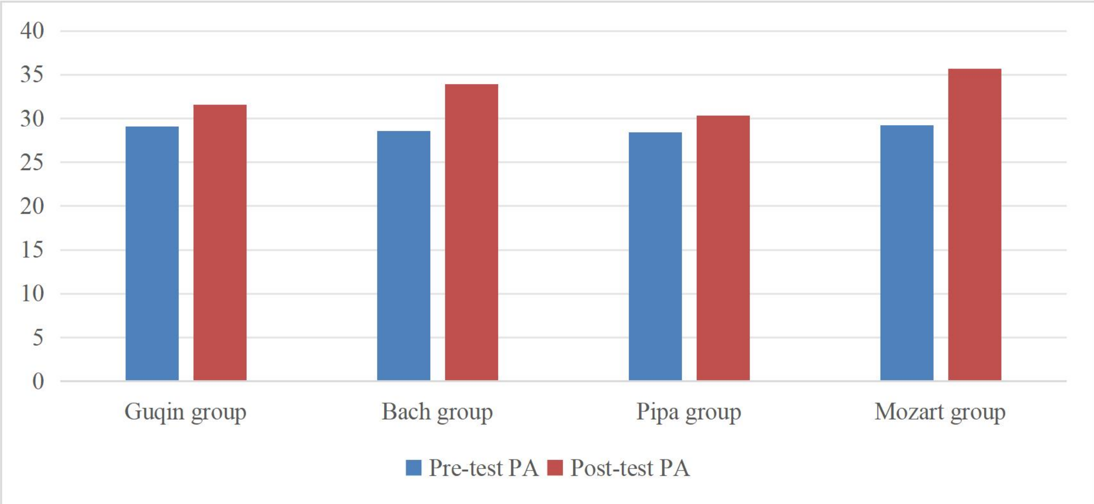

Figure 1. Changes in Positive Emotions For Each Group Before and After

The data indicate that all groups experienced a reduction in negative emotions after the experiment, with the most significant decreases observed in the Mozart and Bach groups. Statistical analysis confirms that these reductions are statistically significant, particularly in the Bach and Mozart groups. The Guqin group also exhibited a significant decrease in negative emotions, whereas the reduction in the Pipa group was not statistically significant. These findings suggest that different types of music vary in their effectiveness at reducing negative emotional states, with Bach and Mozart’ s compositions being the most effective in this regard.

Table 4. Changes in Negative Emotions (NA)

Group	Pre-test PA	Post-test PA	Change value	T-value	P-value
Guqin group	15.7	14.1	-1.6	-2.38	0.024
Bach group	16.6	13.6	-3.0	-4.21	0.001
Pipa group	16.3	15.2	-1.1	-1.52	0.140
Mozart group	16.8	12.9	-3.9	-5.88	<0.001

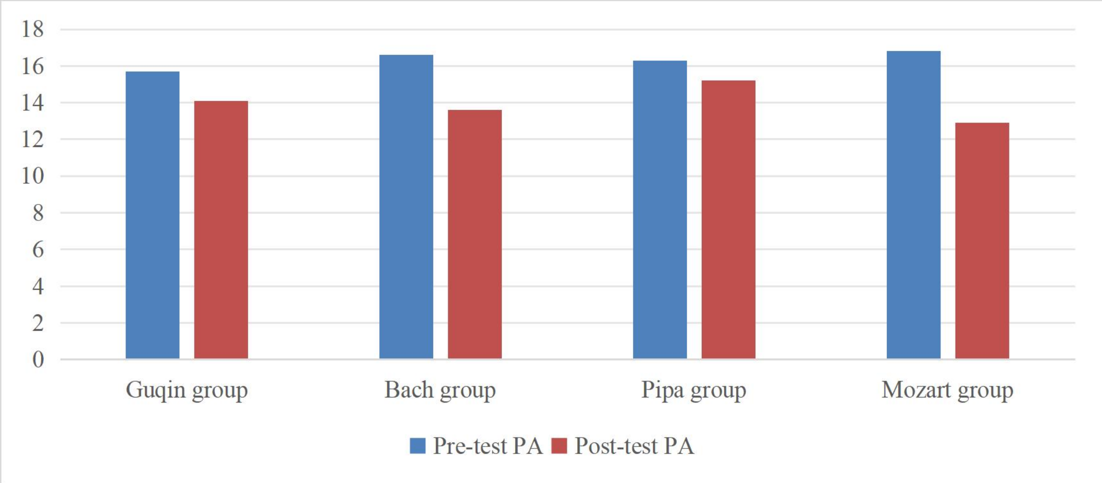

Figure 2. Changes in Negative Emotions For Each Group Before and After

The figure provides insights into the correlation between physiological indicators and emotional changes. Heart rate variability (HRV) and alpha (α) wave power exhibit positive correlations with changes in positive affect and negative correlations with changes in negative affect, suggesting that these physiological indicators may serve as reliable markers of improved emotional states. In contrast, respiratory rate shows a weak negative correlation with positive affect changes and a weak positive correlation with negative affect changes, indicating a less favorable association with emotional well-being.

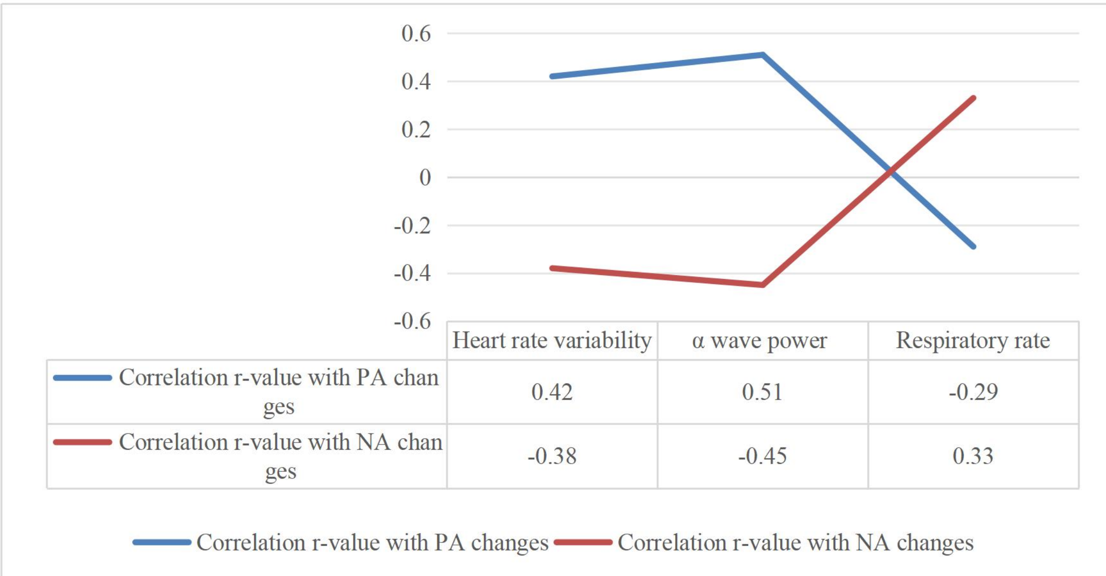

Figure 3. Correlation between Physiological Indicators and Emotional Changes

3.3. Analysis of Emotional Change Patterns

3.3.1. Western Classical Music Group (Bach/Mozart)

Positive emotions showed greater increases, with the Mozart group exhibiting a 22.3% rise in PA, and the Bach group an 18.5% rise.

Negative emotions decreased more significantly, with the Mozart group showing a 23.2% reduction in NA, and the Bach group a 17.9% reduction.

3.3.2. Traditional Chinese Music Group

Emotional changes were more moderate, with PA increasing by 8.6% in the Guqin group, and by 6.7% in the Pipa group.

Guqin music exhibited a distinctive "melancholy-to-calm" transformation pattern, where NA initially increased by 1.2 points, followed by a subsequent decrease of 2.8 points.

3.3.3. Cross-Cultural Comparison (Independent Sample t-test)

Western classical music (Bach/Mozart) resulted in significantly greater increases in positive affect (PA) compared to traditional Chinese music ($t = 4.32$, $p < 0.001$).

Guqin music demonstrated greater emotional stability, as reflected in smaller fluctuations in negative affect (NA) ($t = 2.87$, $p = 0.005$).

3.3.4. Correlation Between Physiological Indicators and Subjective Emotional Reports

There was a moderate to high correlation between physiological measures and subjective emotional reports, supporting the validity and reliability of the measurements.

4. Attention and Cognitive Function Assessment Results

4.1. Changes in Attention and Cognitive Level

Table 6. Changes in Attention Level Before and After the Experiment (Digit Span Test)

Group	Pre-test scores	Post-test scores	Change value	T-value	P-value
Guqin group	6.2±1.1	7.1±1.3	+0.9	3.45	0.002
Bach group	6.0±1.2	7.8±1.1	+1.8	6.12	<0.001
Pipa group	6.3±1.0	6.7±1.2	+0.4	1.87	0.072
Mozart group	6.1±1.3	8.2±1.0	+2.1	7.89	<0.001

Note:The score range for the digit span test is 3-9, with higher scores indicating stronger working memory.

Table 7. Results of the Attention Network Test (Alerting Network Efficiency)

Group	Reaction time(ms)	Accuracy rate(%)
Guqin group	412±38	88.2±5.1
Bach group	398±42	91.5±4.3
Pipa group	425±36	86.7±5.8
Mozart group	385±31	93.8±3.7

Table 8. Analysis of EEG Indicators

Frequency band	Changes in Guqin group	Changes in Bach group	Changes in Mozart group
θwave(4-7Hz)	+18.2%	+12.7%	+9.5%
αwave(8-13Hz)	+25.6%	+31.2%	+34.8%
βwave(14-30Hz)	-7.3%	-5.2%	-3.9%

*Note: The percentage represents the power change relative to the baseline.

4.2. Analysis of Experimental Results

Western Classical Music Group: This group demonstrated a significant improvement in spatial orientation ability ($p < 0.01$). Mozart's music significantly enhanced the alerting network, yielding the fastest reaction time (385 ms) and the highest accuracy rate (93.8%). This aligns with the high-frequency harmonic characteristics of Mozart's compositions, which are known to enhance brain wave oscillations in the 30–100 Hz range. The Bach group ranked second in performance. The polyphonic complexity of Bach's compositions may have slightly increased cognitive load, as reflected in a 13 ms longer reaction time compared to Mozart's group.

Traditional Chinese Music Group: Participants in this group showed more stable performance in sustained attention tasks, with accuracy rate fluctuations under 3%. Notably, the Guqin group exhibited the lowest variability in sustained performance, with a standard deviation of 5.1 in accuracy rate, suggesting its potential suitability for tasks requiring long-term concentration.

5. Results of Meditation State Assessment (MBSR Scale)

5.1. Meditation Depth Rating

Table 9. Changes in Meditation Depth Rating for Each Group

Group	Pre-test scores	Post-test PA	Change value
Guqin group	12.5±3.2	18.7±2.8	+6.2
Bach group	12.8±3.0	16.2±3.1	+3.4
Pipa group	12.3±3.5	17.9±2.9	+5.6
Mozart group	12.6±3.1	15.8±3.3	+3.2

*Rating range 5-25, higher scores indicate deeper meditation state.

5.2. Analysis of Meditation Quality Dimensions

5.2.1. Body Awareness

Guqin music demonstrated the most significant improvement in body awareness (+42%).

The improvement was significantly higher than that observed in the Western classical music group ($p < 0.01$).

5.2.2. Psychological Calmness

Bach and Guqin music yielded comparable effects, increasing psychological calmness by 35% and 38%, respectively.

Both were significantly more effective than the other two groups ($p < 0.05$).

5.2.3. Change in Time Perception

All groups showed statistically significant improvement in time perception ($p < 0.01$).

However, no significant differences were found between the groups ($p > 0.1$).

6. Discussion and Conclusion

In terms of emotional regulation, music intervention produced significant effects. Western classical music, especially Mozart's compositions, was the most effective in enhancing positive emotions. By contrast, traditional Chinese music, particularly Guqin, demonstrated a unique emotional regulation pattern—characterized by a delayed emotional elevation effect and greater emotional stability, as indicated by smaller fluctuations in negative affect (NA). Regarding attention, the experiment supports Bigand's (2013) theory that Baroque music around 60 BPM can significantly enhance executive functioning. Mozart's music produced the strongest attention-enhancing effect, further reinforcing the well-known "Mozart effect" hypothesis. With respect to the meditative state, the distinctive "loose and heavy" tonal quality of Guqin music appeared especially effective in inducing a meditative state. This finding aligns with the "melancholy-to-calm" transformation mechanism observed in previous research by the Tokyo University of the Arts. In terms of cultural differences, the results suggest that Western classical music is effective for rapid and pronounced enhancement of emotional-cognitive processing, while traditional Chinese music facilitates a gradual and sustained regulation of consciousness states.

This study represents the first systematic comparison of traditional Chinese and Western classical music in the context of multi-dimensional consciousness state regulation, offering a foundational empirical contribution to the field of cultural neuromusicology. Future research could further explore the long-term effects of music training, examine individual differences in regulatory responses, and investigate clinical applications of music-based interventions in emotional and cognitive therapies.

Author Contributions:

Conceptualization, Y. S.; methodology, Y. S.; software, Y. S.; validation, Y. S.; formal analysis, Y. S.; investigation, Y. S.; resources, Y. S.; data curation, Y. S.; writing—original draft preparation, Y. S.; writing—review and editing, Y. S.; visualization, Y. S.; supervision, Y. S.; project administration, Y. S.; funding acquisition, Y. S. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest:

The authors declare no conflict of interest.

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