Music Aesthetics: The Formation Mechanism of Emotional Perception

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Abstract

Music constitutes a form of aesthetic education, with music emotion perception forming the foundation of aesthetic sensibility and music appreciation. Music emotion perception refers to an individual's awareness and judgment of emotions implied within musical works. This article dissects music emotion perception and its theoretical mechanisms, synthesizing research on factors influencing music emotion perception across eight dimensions: brain mechanisms, age, gender, music preference, personality traits, music learning experience, culture, and musical materials. Concurrently, it conducts an in-depth analysis of the limitations in existing research, proposing that future investigations could further elucidate the impact and functional outcomes of music emotion perception.

Full Text

Musical Aesthetics: The Formation Mechanism of Emotional Perception

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Abstract

Music serves as an important approach to aesthetic education, and music emotion perception forms the foundation of aesthetic appreciation. Music emotion perception refers to an individual' s ability to detect and judge the emotions implied in musical works. This article analyzes the theoretical mechanisms underlying music emotion perception and systematically reviews research on eight major influencing factors: brain mechanisms, age, gender, music preferences

and personality traits, music learning experience, culture, and musical materials. Additionally, we critically examine the limitations of existing research and propose directions for future studies to further clarify the effects and mechanisms of music emotion perception.

Keywords: music emotion; music emotion perception; influencing factors; theoretical model

Beauty constitutes a vital source of moral purity and spiritual enrichment. Aesthetic education, conducted through artistic means, aims to enhance students' aesthetic appreciation and humanistic qualities while cultivating imagination and fostering innovative consciousness. In October 2020, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued "Opinions on Comprehensively Strengthening and Improving School Aesthetic Education in the New Era," emphasizing that aesthetic education guided by Xi Jinping Thought on Socialism with Chinese Characteristics represents a crucial component of school education. As a significant pathway for aesthetic education, music plays an essential role in the development of aesthetic appreciation, with emotion perception serving as a fundamental capacity for music appreciation and aesthetic development.

Music functions as a carrier of social culture, and the perception of emotions in musical works reflects individuals' social cognitive abilities [8, 9, 63]. Recent research on music emotion perception has undergone a transformation from macroscopic to microscopic approaches. The ability to perceive emotions in music represents a foundational skill for music appreciation and aesthetic development, constituting an indispensable capacity in individual development. Contemporary research on factors influencing music emotion perception spans multiple disciplines including psychology and physiology, though some studies exhibit notable discrepancies. For instance, debates persist regarding the cultural adaptability versus universality of music emotion perception, limitations exist in the categorical approaches to demographic variables such as gender and age, and relatively few studies have examined musical features (e.g., presence of lyrics) and contextual factors. Moreover, a systematic and comprehensive review of existing research is lacking, which has constrained theoretical and applied research in this domain. Based on this analysis, the present study systematically synthesizes and examines the connotations, theories, and influencing factors of music emotion perception to facilitate better understanding of the current state of research, identify gaps and limitations in previous studies, and provide a scientific foundation for future investigations.

2. Music Emotion Perception

Emotion perception refers to the capacity formed in early development to interpret emotional expressions and understand relationships between emotions and other behaviors, psychological activities, and contexts, also known as emotion understanding (cognition, processing, discrimination, recognition, judg-

ment, perception) [26]. Chinese scholars Yang Lizhu and colleagues similarly conceptualize emotion perception as individuals' judgment and inference about their own emotional states [3]. Regarding the definition of music emotion perception, scholars have proposed various conceptualizations. Some define it as individuals' detection and judgment of emotions implied in musical works [34], while others emphasize the specific cognitive understanding of emotions expressed through music [31, 38]. Research on the psychological and physiological aspects of both general emotion perception and music emotion perception reveals distinct emphases. Physiological mechanism studies demonstrate that music emotion perception as an auditory modality is unique in its capacity to capture attention without direct contact, unlike visual emotion perception [27]. Furthermore, cognitive theories of musical emotion and aesthetics posit that engaging in musical experiences may evoke emotions associated with personal experiences [47, 59]. Previous research has confirmed the importance of individual characteristics in music perception, showing high consistency among listeners in perceiving basic emotions and related dimensions, though significant variations emerge when judging complex emotions and other psychological states [22]. Moreover, personality traits do not operate in isolation but interact with music preferences. Whether music can attract individuals and resonate with them is influenced by music preferences [24]. Music emotion perception is also affected by other factors including internal variables such as gender, age, and music learning experience, as well as external factors like musical features and culture.

Currently, the definition of music emotion perception predominantly derives from concepts proposed by foreign scholars and has been widely adopted in research. Although multiple classification systems exist, the underlying connotations demonstrate considerable consistency. As a hot topic in emotion perception research, the formation mechanisms and theories of music emotion perception have attracted considerable attention, warranting detailed elaboration and analysis.

3.1 Process Theories of Music Emotion Perception

(1) Expectancy Model

Building on Angell' s concept of emotional expectancy, Meyer [46] proposed the musical expectancy model, which was the first to explain the process of music emotion perception from a cognitive perspective. The model posits that melodic representation dominates musical activities and governs individuals' musical cognitive capacity, enabling autonomous anticipation and expectancy of musical events. Expectancy states are benchmarked against the congruence between musical events and expectations [46]. Conversely, when musical progression conflicts with expectations, unfulfilled expectancy leads to negative emotions. Mandler analyzed the evolutionary basis of expectancy formation [25], arguing that adaptation function constitutes the foundation of expectancy formation. By using event probability as an estimation standard for development, expectancy

provides humans and animals with control over future events, enhancing their sense of control over survival and life [25]. Extending this research, Huron proposed a comprehensive model using expectancy theory to explain music emotion perception processes, identifying five expectancy-related response stages: imaginative response, tension response, predictive response, reflexive response, and evaluative response [29]. Huron argued that musical emotions primarily arise from specific reactions at different stages, predominantly expressed as mixed emotional responses, thereby rendering music emotions more complex and conflicted [29, 60].

(2) Multiple Mechanisms Model

In 2008, Juslin and colleagues proposed the multiple mechanisms model of music-evoked emotions, which has gained widespread recognition and utilization among researchers. This theoretical model hypothesizes six psychological mechanisms underlying music-evoked emotions: brain stem reflexes, evaluative conditioning, emotional contagion, visual imagery, episodic memory, and musical expectancy [31].

Brain stem reflexes involve the brain stem receiving basic sensory sounds from music to signal important events. Under equivalent conditions, musical features such as rapid tempo produce discomfort, increasing central nervous system activity. Evaluative conditioning represents a process of music-evoked emotion akin to affective learning, operating on classical conditioning principles where a neutral conditioned stimulus repeatedly paired with an emotionally-laden unconditioned stimulus acquires the capacity to evoke similar affective states. Emotional contagion refers to individuals' capacity to perceive specific emotions conveyed by music, "mimic" these emotional expressions, and through feedback mechanisms experience the same emotions. Research has confirmed that music under specific emotional conditions can produce identical emotions across different listeners [36, 35]. The experienced emotion centers on the music itself and can occur through external feedback or direct internal emotional feedback, reflecting empathic responses and mirror neuron activity. Visual imagery involves the process where individuals simultaneously see images while listening to music, thereby generating emotions. The presence of imagery demonstrates that stimuli include both music and visual components. Visual imagery resembles perceptual experience but occurs without relevant sensory stimulation, with mental images serving as emotional "triggers" [52]. Individuals appear to conceptualize musical structure through different imagery [42, 14]. Currently, visual imagery research has been applied in music therapy [62]. Overall, image processing constitutes a crucial component of musical emotional experience [46].

Episodic memory refers to music' s capacity to evoke specific memories of life events, thereby generating emotions. Numerous studies have demonstrated music's ability to evoke memories [56, 56, 33, 22]. Although previously dismissed by music theorists as minimally relevant to music, recent research indicates episodic memory may be one of the most frequent and important sources of musical emotion [32]. While both episodic memory and evaluative conditioning are memory

forms, they differ in process characteristics and neural substrates. Episodic memory involves active recall of previous events, retains more contextual information, and exhibits higher organizational structure [16]. Musical expectancy refers to the anticipatory process of musical continuation. When musical features violate or confirm listeners' expectations, emotions emerge. For instance, sudden interruption of musical expectancy triggers emotional responses [58]. However, since different musical features generate different expectancies with individual variations, the challenge lies in understanding individuals' reactions in specific contexts. Recent research has also found that musical expectancy does not necessarily trigger emotions [58].

(3) Component Theory

Based on extensive research on neural mechanisms of music, Stefan Koelsch [40] proposed the component theory of musical emotion, identifying five organismic components in music emotion generation. First, the cognitive appraisal component refers to music' s capacity to evoke emotional arousal and evaluation. Second, the behavioral motivation component involves music triggering strong emotional behaviors. Third, the physiological component indicates music' s role in arousing or relaxing associated physiological activation. Fourth, the expressive component refers to music' s influence on individuals' external emotional expression capacity. Fifth, the subjective experience component involves music' s capacity to arouse or reduce emotional processing. Koelsch emphasized that music can activate all brain structures related to emotion, providing important guidance for further research on neural activities underlying musical emotion [40].

Both the expectancy model and multiple mechanisms model elucidate psychological mechanisms of music emotion understanding. The expectancy model, as a comprehensive framework for explaining music emotion generation, was the first to adopt a cognitive perspective, analyzing the value of melodic representation and the basis of expectancy formation [25], while proposing five expectancy-related response stages [29]. Building upon the expectancy model, Juslin and colleagues added five factors beyond musical expectancy: brain stem reflexes, evaluative conditioning, emotional contagion, visual imagery, and episodic memory. The multiple mechanisms model, with its relatively rich theoretical and practical research, comprises individuals' different experiences across each factor constituting the emotion generation process, offering a complete and detailed theoretical framework. With increasing research attention to music emotion perception in recent years, the multiple mechanisms model has gained favor among numerous scholars. Meyer [46] predicted it might become the most cited mechanism in musical emotion. In 2018, the component theory was proposed as a complementary framework to the multiple mechanisms model, identifying five organismic components of emotion generation based on neural mechanisms.

Additionally, Konecni' s mediation hypothesis has attracted many researchers due to its general theoretical applicability. This hypothesis suggests that while music can directly evoke emotions, mediation also exists between music and

emotion [31]. Music exerts direct or mediated influences on expression, action behavior, mood, and physiological responses, potentially triggering genuine emotions through memory and association [41].

3.2 Cue Theories of Music Emotion Perception

(1) Music Cue Consistency Model
From a cognitive psychology perspective, music comprises countless acoustic symbols whose processing involves extracting relevant features from different musical cues and gradually integrating them. Under cognitive influence, acoustic cues in music can be isolated to examine associations between individual cues and emotions, pioneering empirical research on musical emotion [60, 31]. Based on cognitive psychology, Juslin and colleagues constructed the music cue consistency model, positing that consistency between activated information representations during encoding and decoding enables correct and effective communication between senders and receivers. Therefore, creators' musical symbol representations must align with listeners' internal symbols to achieve effective musical communication [30].

(2) Music Emotion Perception Model
The music emotion perception model, proposed by Balkwill, Thompson, and Thompson, includes two representative sub-models: the cue redundancy model and the fractionated emotion system model. The core proposition of both models is that individuals can identify emotions expressed in music through certain cue characteristics. When listeners encounter familiar music, they utilize cues for deeper understanding. This theory correlates with music preferences, as listeners automatically respond to unfamiliar music and employ psychophysical cues to analyze and understand it, since such cues are sufficient for judging the general emotional tone of music [61].

The music cue consistency model elaborates on music cue processing under the influence of cognitive information theory. Its advantage lies in using information representation consistency as a starting point, applying symbol representation characteristics to music to enable listeners to achieve representational consistency and thereby understand musical emotions. If creators' and listeners' internal symbol representations align, listeners' capacity for music emotion understanding can be enhanced. Currently, research in this area remains limited, with only the cue redundancy model and fractionated emotion system model available, necessitating deeper investigation.

3.3 Coordination Theory of Musical Emotion

In recent years, based on empathy theory, some researchers have used the concept of empathy to explain the principles underlying music emotion generation, arguing that music and language are products of long-term human development. Their symbolic representational forms render them essentially consistent, and the interactive process with creators mirrors individuals' processing of language

and music. Therefore, the process where listeners resonate and empathize with creators reflects the occurrence of musical emotion, similar to how language cognitive empathy processes reflect emotional occurrence [43]. Early scholars proposed the Shared Affective Motion Experience (SAME) model, suggesting that interactions between the human mirror neuron system (MNS) and limbic system may enable the brain to "understand" complex musical signal patterns. This model posits that music is a stimulus that coordinately activates all neural systems, with imitation, synchronization, and shared experience representing key aspects of human musical behavior that provide a neural substrate for subsequent emotional responses [30]. Later scholars adopted the term "coordination" to explain core mechanisms of musical empathy. Coordination refers to individuals' automatic tendency to activate alignment with external environments in terms of movement frequency and direction, making synchronous feedback and adjustments in response to objects' changes [50]. Based on empathy theory, this framework utilizes the interaction between music and empathy to derive "coordination," though its limitation lies in the current inability to explain deeper-level cognitive coordination and cognitive empathy based thereon.

In summary, this article elaborates on the psychological mechanisms of music emotion perception from three dimensions—process, cue, and empathy—presenting process theories (expectancy model, multiple mechanisms model, component theory), cue theories (cue consistency model, music emotion perception model), and coordination theory. Process theories, based on Meyer' s expectancy model, primarily introduce the processes and components of music emotion perception. Cue theories, influenced by cognitive information theory, address the impact of musical cues on perception. Coordination theory clarifies the similarity between music and language empathy while highlighting the importance of internal symbol consistency in music processing for emotion perception capability. These theoretical developments provide important theoretical foundations and research directions for future studies in this field, inspiring new perspectives. Moreover, factors influencing music emotion perception are multidimensional and interactive. The following sections provide detailed classification and synthesis.

4.1 Brain Mechanism Research

Over the past two decades, scientific research on the neural basis of music has advanced rapidly. Studies indicate that different aspects of music processing engage nearly all brain regions, including the prefrontal cortex, premotor cortex, motor cortex, somatosensory cortex, temporal lobe, parietal cortex, cerebellum, occipital cortex, and limbic system including the amygdala and thalamus, more than any other stimulus or cognitive process [39, 66, 67, 17].

The neural mechanism of music emotion perception is well demonstrated by differential processing in the left and right cerebral hemispheres. The prefrontal cortex represents a crucial region for music emotion information processing, with different sub-regions serving distinct functions in emotional processing [3]. Xi-

ang Aizhai and colleagues' research shows that music effectively activates brain regions related to emotional processing, with different neural areas processing different emotions [6]. Tsang et al. [65] found that left frontal brain regions primarily activate in response to pleasant musical excerpts, while right frontal regions activate for fearful musical excerpts, demonstrating not only the importance of frontal areas in understanding musical emotions but also differential roles for left and right frontal lobes. Beyond the frontal lobes, Altenmüller et al. [9] used cortical DC-EEG to reveal widespread activation in bilateral frontotemporal regions during music listening, confirming Tsang et al.' s findings regarding lateralization effects in emotional responses to music. Consequently, researchers have continued investigating temporal lobe damage, finding that patients with right temporal lobe damage have difficulty distinguishing and identifying sad musical emotions, while those with left temporal lobe damage almost cannot identify happy musical emotions [37], results that align with lateralization advantage research.

Positive and negative musical emotions exert different effects on individuals. Positive emotion processing enhances pleasant mood [6]. Research has also found that increased theta waves in the frontal mid-region primarily accompany pleasant emotions, facilitating relaxation [55]. Meanwhile, neuroscience research on negative emotions indicates that negative emotions triggered by musical stimuli increase activity of NE, 5-HT, Ach, and Glu in the brain, disrupting neural stability, significantly reducing T lymphocyte activity, and decreasing resistance [4]. Additionally, Dai Jinghua's [2] experimental results confirm music's capacity to induce calmness and relaxation.

In summary, with the development of cognitive neuroscience, brain mechanism research on music emotion perception has become a focal and hot topic in contemporary research. Existing studies demonstrate significant brain mechanism effects in music emotion perception, primarily involving the functions and roles of different brain regions in processing musical emotions. For instance, positive emotional music activates left frontal regions, while negative emotional music activates right frontal regions. Research has also examined processing characteristics of positive and negative musical emotions and cerebral lateralization advantages in music emotion processing.

4.2 Research on Individual Influencing Factors

(1) Age Differences

Recent research indicates that music emotion perception exhibits both age and gender differences. Previous studies on music emotion perception have primarily focused on preschool children. International research reveals that age four represents an optimal period for children' s music emotion perception development, with children generally able to identify happy and sad emotions around this age. After age four, children gradually develop the ability to recognize similar emotions such as fear and anger, with music emotion perception showing an upward trend and gradually approaching adult levels [49, 18, 57, 64]. Domestic

research shows similar trends, indicating that ages 3-5 constitute an important developmental stage for Chinese children' s music emotion perception, with age four being the most critical period. After age four, children' s music emotion perception develops rapidly, approaching adult levels after age five. Domestic studies also find that preschool children' s perception of basic emotions shows significant differences, with happy and positive emotions being perceived more easily than others [19]. Although both domestic and international research focuses on the preschool period, studies on older populations have found that elderly listeners have richer emotional experiences and prefer positive emotional excerpts [28]. From a brain mechanism perspective, Marijtje' s research on music trainees found that P300 amplitude decreases with age, though no differences emerged among same-age participants, indicating that age influences music emotion perception through multiple pathways [12].

Overall, despite different research timelines and procedures, domestic and international findings converge and demonstrate consistency. During the preschool period, age four represents the most critical period for children' s music emotion perception development, with rapid development after age four gradually approaching adult levels. While researchers have examined preschool stages, they have also attended to older populations, though current research on age-related factors in music emotion perception remains limited. Therefore, research on age characteristics, particularly physiological influencing factors, remains relatively weak with limited scope and requires further in-depth investigation [53].

(2) Gender Differences

Gender, as a fundamental demographic variable across fields, has been studied in relation to music emotion since the 20th century, with findings indicating that women experience musical emotions more intensely than men [35]. Domestic physiological research also reveals gender differences in the timing and intensity of music emotion responses and brain mechanisms. When processing musical emotions, women show right hemisphere and mid-region advantages, while men demonstrate anterior and left hemisphere advantages. Emotional processing strategy research shows that women' s music emotion reaction speed exceeds men' s, primarily for pleasant and sad emotions, while women' s emotional experience intensity surpasses men' s for sad and fearful emotions, particularly showing more significant activation when processing sad emotions [4]. However, some studies find that men and women show almost identical perception of positive musical emotions, with men sometimes responding even more intensely than women [5].

Thus, international research on gender differences in music emotion perception remains relatively singular and one-sided, merely proposing that women perceive musical emotions more intensely than men. Domestic research, however, has examined not only physiological aspects but also cerebral lateralization and processing strategy advantages, revealing gender differences. Therefore, in-depth research on gender differences is essential based on domestic and international findings.

(3) Music Preferences and Personality Traits

Music preferences and personality traits represent important influencing factors in music emotion perception. Only music that listeners enjoy can satisfy their physiological and psychological needs [26]. Meanwhile, individual differences and the degree of resonance with musical emotions constitute primary reasons for music emotion responses, with personality traits influenced by music preferences [24]. Music preference research indicates that factors such as musical style, familiarity, and liking exert specific influences on music emotion perception, showing positive correlations. Music that is familiar and liked typically evokes more intense emotional perception [5, 15]. Additionally, research finds that individuals prefer works whose emotional content matches their own feelings, meaning they favor music that can evoke strong emotions [20, 21]. Personality trait research reveals that warm, optimistic individuals experience more positive emotions when listening to music, whereas hostile, impulsive individuals experience more negative emotions. Open individuals show stronger emotional perception when listening to music, consistent with previous findings [19, 1]. Therefore, music preferences and personality traits are two crucial factors influencing music emotion perception.

In conclusion, while personality traits are relatively stable, they change with life experiences, and individuals with the same personality may differ due to external conditions. Existing research demonstrates that music preferences and personality traits are complementary and interactive, with their mechanisms of action on music emotion perception being inseparable. For research on music preferences and emotion perception, individuals' likes and sensitivities play crucial roles, directly influencing emotion perception. For personality traits and music emotion perception, different personality traits yield different perceptions, and individual characteristics are not static but change with personal environments and other factors.

(4) Music Learning Experience

Music learning experience represents another non-negligible influencing factor in music emotion perception. Although scholars have paid considerable attention to this factor, previous research remains relatively scarce. Some studies find that musically trained children often demonstrate higher levels of attention and emotion comprehension ability [54, 17], suggesting that musical experience and training can cause changes in human music emotion perception, musical cognitive ability, and even differences in cortical structure [5]. Koelsch et al. [38] also found that musical training promotes individuals' perception of musical emotions in music perception tasks without age differences. However, other research questions this, proposing that music emotion perception is an ability acquired through long-term evolutionary processes that exists independently. Studies have demonstrated that although musical training can enhance individuals' music perception ability, no significant differences emerge in music emotion perception processes [13]. Language domain research also finds that individuals' inherent auditory abilities are more influential than long-term musical training [45], substantially questioning whether musical training enhances emotion

perception and processing.

In summary, regarding the role of musical training in music emotion perception processes, although some studies indicate that musical experience and training indeed influence human music emotion perception and that musically trained children show higher attention levels than untrained children, music emotion perception is an ability gradually acquired through long-term development that exists independently of musical training. Later research has also found that musical training is not the only way to promote emotion perception, with individuals' inherent auditory abilities being more influential. Therefore, this research area requires further verification and exploration.

4.3 Research on External Influencing Factors

(1) Musical Features

Musical features have attracted extensive research attention as important influencing factors in music emotion perception. One study on lyrics' impact found that regardless of lyric presence, listeners can process emotional information conveyed by music itself. However, other research indicates that lyrics influence the temporal course of brain processing of musical emotions, with processing of lyric-free musical emotions being stronger than that of music with lyrics, providing some basis for exploring music-language relationships [7].

As these studies demonstrate, behavioral research on lyric presence shows that processing of musical emotions with lyrics lags behind that of lyric-free music, providing some basis for investigating music-language relationships. However, research on lyrics and music emotion perception remains scarce both internationally and domestically, offering opportunities for extensive in-depth research incorporating linguistic and cultural differences.

(2) Cultural Universality and Adaptability

Musical cultural experience transmits to individuals' music emotion perception, enabling mostly accurate interpretation of emotions expressed in music. Although research shows that individuals lacking musical cultural experience can still correctly interpret musical emotions, those with such experience can perceive more common features [1]. A cross-cultural investigation found that listeners from Japan, Sweden, India, and other countries demonstrated high accuracy in identifying over ten different emotion categories expressed across various cultural music styles, though emotional understanding might show ambiguity for some complex emotions. Thus, identifying emotions directly expressed by music is relatively easy, while more difficult for indirectly expressed emotions [1]. Some scholars have proposed a cultural adaptation theory of emotion perception, arguing that cultural customs primarily determine individuals' specific understanding of musical meaning and profound perception of musical emotions. This theory acknowledges some universal features in music perception while maintaining that specific tonal systems in cultural contexts influence understanding of musical emotion meaning [14]. However, other scholars have questioned this,

indicating that cultural specificity appears in early childhood but disappears during development, with young children demonstrating musical cultural universality [18, 57]. Regarding cultural universality, domestic scholars examined Chinese participants aged 3, 4, 5, and university students to investigate developmental characteristics of emotion perception in culturally contextualized music expression, with results supporting cultural universality—that is, no overall cultural differences exist between Chinese and Western music emotion perception at any age [20].

In summary, musical emotions can be understood regardless of cultural experience, though individuals with musical cultural experience base have richer perceptual experiences. The cultural adaptation theory of music emotion perception addresses consistency across different cultural contexts, acknowledging commonalities while arguing that specific tonal systems in cultural backgrounds influence understanding of musical emotion meaning. Later research results support cultural universality. Therefore, controversies persist between cultural universality and adaptability in music emotion perception, requiring strengthened theoretical research on both perspectives in future studies.

5. Future Research Directions

Music emotion perception research has become a hot topic with rapid development in recent years. International research began relatively early and has progressed quickly. Summarizing and analyzing previous research limitations, we explore future directions from two aspects: psychological mechanisms and influencing factors of music emotion perception.

5.1 Empirical Research on Psychological Mechanisms of Music Emotion Perception

Regarding current theoretical research on music emotion perception domestically and internationally, content coverage remains insufficient and applicable models are limited. Only some theoretical models proposed by foreign scholars have reference value, such as the multiple mechanisms theory of music-evoked emotion. Some researchers have suggested expanding the original six factors to seven by adding rhythmic entrainment—referring to internal motor mechanisms awakened and spontaneously synchronized with music' s rhythmic patterns [2]. While this added factor shares commonalities with previous theories in that music emotion perception can be triggered by any single factor, Juslin and colleagues did not originally propose rhythmic entrainment, necessitating further research to determine its value and the optimal number of factors. Additionally, the multiple mechanisms model possesses certain value and practicality. For instance, Chen Yiping and colleagues in Taiwan proposed aesthetic evaluation from multiple perspectives to elaborate individuals' psychophysical processes of music-evoked emotion [1], though its value and practicality require further empirical research.

Furthermore, the two music emotion perception models centered on music emotion perception—the cue redundancy model and fractionated emotion system model—particularly emphasize music emotion feeling. Although they possess certain theoretical and practical value, both require improved empirical research on their mechanisms.

5.2 Research on Internal and External Influencing Factors of Music Emotion Perception

Music emotion perception is influenced by multiple factors. Previous research has roughly involved two major categories and eight influencing factors, with the two categories representing physiological and psychological dimensions. Physiological research has primarily focused on cerebral lateralization and processing strategies in relation to gender, musical training' s promotion of activation in prefrontal opercular regions and anterior superior temporal gyrus, brain mechanisms' effects on positive and negative musical emotions, and music therapy [5]. Brain mechanism research, as a current focus for scholars, holds strong theoretical and practical value when combined with music emotion perception. Psychologically, research has relatively limited content, mainly concentrating on cultural experience, music learning experience, and language effects. Compared with international research, domestic research on music learning experience and cultural experience is relatively scarce and requires further detailed analysis. Controversies persist between cultural adaptability and universality in music emotion perception. Additionally, whether music learning experience truly promotes music emotion perception development requires further exploration [45]. Moreover, the relationship between music and language warrants further investigation. Music and language share similar characteristics, and music theorists widely believe that most musical styles can be described using grammar [1]. Research on music, language, and grammar remains scarce, and studies on lyrics and music emotion perception are particularly rare, with only one valuable domestic finding [7].

Furthermore, based on psychological mechanism research on music emotion perception, future studies should organically integrate aesthetic education with music emotion perception research, leveraging theoretical insights to enhance applied value in guiding aesthetic education. This integration would enable theoretical research on music emotion perception to truly 融入 aesthetic education application research. In aesthetic education, research on psychological mechanisms of music emotion perception can effectively help teachers master aesthetic education principles, improve methodological effectiveness, select appropriate musical materials based on local conditions, and implement reasonable instruction. This approach emphasizes both foundational aesthetic principles and teaching techniques while strengthening instructional training to ensure practical effectiveness. Consequently, students' aesthetic and social cognitive abilities can be continuously enhanced, emphasizing the unity of artistry and scientificity. Such research can improve students' music appreciation levels, pro-

mote auditory and memory development, enhance imagination and creativity, and foster comprehensive and harmonious physical and mental development.

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Note: Figure translations are in progress. See original paper for figures.