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The Study of Music Therapy for Depression under the Background of Brain Science

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Abstract: Depression is a mental disorder characterized by low mood. Music therapy is a new interdisciplinary subject which combines music, medicine and psychology. Brain science research effectively integrates psychiatry, neurology and basic neuroscience, which can be described more objectively and vividly the morbidity mechanism and treatment effect of mental disorders. This paper reviews the neurobiological mechanism of depression and music cognition in brain science research, which are combined with actual case analysis study, finding music therapy has positive effect on Depression.

Keywords: Music Therapy, Depression, Brain Science

1. Introduction

The diagnosis of mental disorders such as depression depends on clinical symptoms and are lacks of objective biomarkers. Brain research has established an organic link between mental and neurological diseases. The pathological manifestations of mental diseases are often the early manifestations of neurological diseases. Neurobiological basis is involved in the morbidity, diagnosis and treatment of mental disorders. There is also a trend of transition from music psychology to brain science. Studying the brain mechanism of musical hearing helps to find out some advanced psychological functions of the brain. Studies have shown that music for the treatment of depression has a positive effect on regulating depression.

2. Depression and Brain Science

Depression as a major challenge in psychiatry has always been the focus and difficulty of brain science research. Screening for Mental Illness and Substance Abuse Disorder, No.1 is for depression. Its recognition rate and system treatment rate are low. (Kupfer, Frank, & Phillips, 2012) This makes it particularly important to explore the pathogenesis and treatment of depression.

In the diagnosis of depression, Roiser's findings have shown that depressive patients have affective processing disorder. When processing external information, it is easy to appear negative cognitive processing bias. This abnormal processing of sensory information involves perception, attention, memory, etc. (Roiser, Elliott, & Sahakian, 2012) Groenewold's studies have found that different brain regions have different roles in emotional processing. Brain area of emotion recognition is located in subcortical structures, such as the ventral striatum and prefrontal cortex. The insular lobe and anterior cingulate cortex are involved in the integration of psychosomatic responses. The dorsolateral and ventrolateral prefrontal lobes are involved in the detection of emotion. The study finds that depressed patients' anterior cingulate gyrus, parahippocampal gyrus of amygdala and striatum are hyperactivated, meanwhile the activities in the dorsolateral prefrontal cortex are decreased, in which the amygdala and striatum are over-activated in primary sensory processing, leading to cognitive bias. The prefrontal cortex has abnormal emotional monitoring, which can not correct the excessive activation of brain areas, resulting in depression. (Groenewold, Opmeer, De Jonge, Aleman, & Costafreda, 2013) Murray's finding based on fMRI is that excessive amygdala activation enhanced processing of negative information, and that ventral striatum process less positive information. Dysfunction in the brain area responsible for emotional detection is reduced, and so is inhibition of the amygdala overactivation.(Murray, Wise, & Drevets, 2011) Almeida's MRI studies based on DTI have also found that the abnormal connection among Prefrontal cortex and subcortical white matter and the medial prefrontal cortex and the amygdala is involved in the emotion regulation of depressed patients.(Almeida, Versace, Mechelli, Hassel, Quevedo, & Kupfer, et al., 2009) The functional and structural changes in these emotion regulation networks, possibly as

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biomarkers for the diagnosis of depression, can also provide neurobiological basis for the development of antidepressant drugs.

In the treatment of depression, the research conducted by Siegle has discovered that the increased amygdala activity and the increased activity in the medial prefrontal cortex can predict the antidepressant effect of cognitive behavioral therapy. (Siegle, Carter, & Thase, 2006) Findings are from clinical trials based on imaging by Maller. The Cauda equina volume and the relief of depressive symptoms have shown a significant positive correlation, which is expected to become a biological index for evaluating the effect of antidepressant treatment (Maller, Broadhouse, Rush, Gordon, Koslow, & Grieve, 2017). Studies by Gujral have found that it can be done by movement to modulate the prefrontal cortex, cingulate cortex, and cauda equina to ameliorate depressive symptoms. In addition, the above brain areas can also be used as the imaging index for evaluating the effect of exercise therapy on depression. (Swathi, Gujral, Howard, Aizenstein, Charles, & F, et al., 2017).

3. Music Therapy and Brain Science

Music can express the emotional impact of people, and has been used extensively to improve physical fitness, reduce stress, and distract patients from the symptoms of illness. Despite differences in individual preferences, there is no doubt that music has direct physiological effect on the autonomic nervous system. It can effectively reduce the anxiety and improve the mood of patients, and also alleviate the pain of patients with surgery or other chronic diseases. (Kemper, & Danhauer, 2005)

There are three kinds of music therapy methods respectively, which are receptive music therapy, recreative music therapy, improvisational music therapy. (Hou & Gao, 2013, 2007) Listening to music is a comprehensive process of cognitive processing and emotional processing, influencing the mechanism which belongs to different brain areas. Griffiths has found that through research the cognitive processing of music is involved in Largebilateral frontal lobe, frontal lobe, parietal lobe and occipital lobe, which are connected with each other. The emotional processing of music mainly depends on the anterior cingulate amygdala and the structures of the limbic system such as basal ganglia. Pleasant music can stimulate the potential function of many brain areas and contribute to the improvement of intellectual and behavioral abilities. (2003, 2001) Many researchers believe that the amygdala in the limbic system is actually a brain structure necessary for processing emotional information in music, especially a feeling of sadness or terror. The study by Koelsch finds that a pleasant piece of music activates the forehead, Rolandic operculum, while sad music activates the amygdala.(Stefan, Koelsch, Thomas, Fritz, & Yves, et al., 2006) Xiang Aizhai finds out that in the presence of a scale stimulus and a light musical stimulus the amygdala is only activated in response to music terror.(Xiang, Zhang, & Zhang, et al., 2006) The study from Eldar finds that the music, which is rich in emotion but lacks a sense of reality, is combined with the film, which is rich in details and poor in emotion. It activates the amygdala, the parahippocampal gyrus and the lateral prefrontal cortex. When the music is combined with the real world, it increased amygdala responsiveness to emotional stimuli. The findings lay a foundation for the study of the effect of information integration on the concrete real world in the process of emotion processing.(Eran, Ori, Roee, Avraham, & Talma, 2007)

The Book *Unlock your higher dimensional wisdom* by Liu Feng says that the Earth itself is shaking and the fundamental resonance frequency (Schumann resonance) is 8.5 Hz -16.5 Hz. The frequency of the earth affects the functioning of people's brain waves. The frequency of 7.83 Hz is the state of release and shutdown. By contrast, the frequency of 8.5 Hz - 16.5 Hz is for the gradual awakening of self-awareness. The vibrations of the Earth's interior will affect your body. (Liu, 2017) As your frequency resonates with the Earth, you will have your own unique self-awakening. Changes in the Earth's frequency are associated with the changes in the vibrational DNA evolution of our cells. People change with the music that is often played in the frequencies close to those of the earth. As the Earth's magnetic field weakens and the base frequency speeds up, the emotional and psychological patterns of the past are loosened and we can more easily access higher States of consciousness to find the life force from the bottom of life, boosting the body's dopamine production and reduced depression and recovery from depression.

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4. A Case Study of Music Therapy for Depression

4.1 Subject of treatment

A college student, suffer from depression, disable to stand due to chronic anorexia

4.2 Treatment Protocol

The patient received music therapy in addition to antidepressant treatment (Take escitalopram oxalate tablets), 5 times per week, 30 to 40 minutes per treatment. Music therapy includes song discussion, music recall, music synchronization and music imagination ect. Music discussion is done once a week. Patients choose and provide their favorite music to discuss, put forward the feeling and understanding of the music. We can understand the psychological state of the music provider, help them and explain the causes. Music synchronization is conducted 2-3 times per week. We Play happy and relaxing music for the patients, while teaching the patients to learn to sing, which will help patients change their depressed mood and adjust their mood. Musical imagination is to play quiet and concentrated music every two weeks to allow patients to imagine freely after entering a relaxed state. Use the method of free association to dig out the painful experience of the patient's heart, so that the depressed mood can be vented. Analyze and explain the content of the conversation provided by the patient, so that the patient can understand and change the original behavior pattern. Recreative music therapy is put into effect once every two weeks. Patients can use musical instruments to play, so that patients can be infected in musical activities so as to achieve physical and mental harmony and alleviate depression. In improvisational music therapy, patients do not need to learn, perform on their own, so that patients know their own emotions, learn the right way to express emotions, improve depression.

4.3 Therapeutic effect

Patients were rated in the first visit, at the end of the 8^{th} and 12^{th} week by taking the Hamilton depression scale HAMD and Beck depression rating scale BD1-13. Treatment engagements were assessed in the first visit and at the end of the 12th week. Treatment participation mainly included the patient's medication compliance, physiology, self-care initiative, initiative to socialize with others, participation in group activities. This study showed that antidepressant treatment might have some effect on symptoms. The efficacy increased with the prolongation of treatment time. At the end of the 8^{th} week of the treatment, HAMD and BD1-13 scores were significantly different, which continued until the end of the 12^{th} week. Patient's Treatment Engagement Performance suggests the change of patients' interest in various collective life and behaviors. It can be a good supplement to suggest the change of patients'quality of life. It shows that systematic music therapy can effectively improve the enthusiasm of patients. It can awaken the patient's desire for survival and enthusiasm for life, and effectively improve depression.

5. Conclusion

The traditional treatment of depression is mainly based on drugs. Although there is a certain effect, the condition is prone to relapse. Compared with traditional therapy, music therapy can effectively change cognition and some personality traits of individuals. This study shows that during treatment, patients with depression choose drugs combined with music therapy. It can effectively improve depressive mood, improve cognitive and social skills, and alleviate physical and mental pain. Music has a positive effect on the treatment of depression. Music therapy may have cultural differences. The dynamic stability of the curative effect also needs to be compared and analyzed between the experimental group and the control group, which needs further study.

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