



Research on the Mental Health Applications of Music Therapy

Xiaoxiao Yu^(✉)

Department of Psychology, Coventry University, Coventry CV1 5FB, UK
yux24@coventry.ac.uk

Abstract. As a mature and complete borderline discipline, music therapy has developed clinical treatment methods to treat physical and mental disorders of certain diseases. This literature review explores the biological aspects of the effectiveness of music therapy, illustrates the effects of music therapy on the diseased brain and other organs, and examines the use and limitations of music therapy in dementia and schizophrenia. In dementia, music therapy can improve the prognosis of patients with dementia and reduce the abnormal behavior of patients, but the effect of regret is not lasting; In schizophrenia, music therapy often plays a role in treating negative symptoms, but the performance of music therapy in treating positive symptoms remains to be studied. To sum up, music therapy is a promising clinical therapy. However, the current research on it is still relatively single, and more experiments and information are needed to understand the neural mechanism of music therapy in order to achieve better treatment methods.

Keywords: Music therapy · dementia · schizophrenia

1 Introduction

In ordinary life and therapeutic settings, music is utilised to control mood and arousal and as a tool. The World Federation for Music Therapy defines music therapy as the professional use of music and its elements with individuals, groups, families and communities in medical, educational and everyday settings, seeking to maximise their quality of life and enhance their physical, communicative, social, intellectual, emotional and spiritual health and well-being. Music therapy is a very ambitious therapy and through its in-depth study and exploration, it can be found to work on physical, psychological, emotional, cognitive and social needs with the aim of eliminating psychological disorders or disturbances and restoring or improving mental and physical health. In today's world, when mental illness is prevalent, music therapy has been demonstrated to be an effective intervention for those with chronic mental illness, resulting in improvements in social functioning, overall state, and mental state [1]. Multivariate analysis showed that after a certain period of treatment, comparing additional music therapy plus standard care with standard care alone. There was a trend towards improved symptom scores in patients randomized to music therapy compared to those who did not experience treatment, indicating that those randomized to music therapy had improved psychological

disorders [2]. With regard to the history of music therapy, music therapy emerged as a professional discipline in the United States in the 1940s, first in veterans' hospitals and later in other fields. As we move into the 21st century, music therapy has expanded and is now practiced in over 50 countries (including Australia and New Zealand) and is used in all areas of medicine, not only in mental health, but also in neonatal wards for pain management, cancer care, palliative care and surgical patients.

2 Is Music Therapy Effective?

The notion of music as medicine dates back to pre-industrial tribal healing practises and provides a non-invasive alternative to hormone or cytokine therapy and pharmaceuticals. Approaches to music therapy can be divided into active and receptive approaches, with the level of structure and therapeutic focus. Active music therapy includes various forms of musical interaction such as free improvisation and song reproduction, and receptive therapy involves listening to music played by the therapist for the patient [3]. While some conditions rely exclusively on one mode of musical interaction, most models are a mixture of both.

The amygdala is a bilateral structure inside the temporal lobe of the limbic system that is involved in the processing of emotions, particularly discomfort. Emotional and scared facial expressions have a crucial function in cognition. When listening to painful music, the amygdala is engaged but deactivated when listening to good music [4]. Chanda and Levitin contend that music therapy can influence the release of dopamine, a neurotransmitter involved in the brain's reward circuit [5]. In addition, music can influence various hormone levels via the hypothalamic-pituitary axis. For instance, listening to relaxing music might boost Serum oxytocin. Gangrade reported that participants exposed to unpleasant music had lower platelet serotonin levels than those who listened to pleasant music and that hyposerotonin was associated with depressive companions and anxiety disorders [6]. Furthermore, there is evidence that music therapy interventions reduce blood cortisol levels, and a reduction in cortisol levels also indicates a reduction in stress. Nonetheless, the absence of a standardised selection of musical stimuli is a common shortcoming of music therapy. To classify music, researchers typically rely on its arousal properties (relaxation/calmness versus stimulation), emotional quality (happy, sad, peaceful), and structural characteristics (e.g. rhythm, tone, range, timbre, rhythmic structure). Due to the fact that the experimenter is frequently unable to identify whether the experimenter's subjective evaluation of these musical stimuli is compatible with the subject's evaluation, there will be some inaccuracies. Consequently, the vast majority of studies on music therapy lack precise control over musical settings, and it is extremely probable that any reported impact is not specific to music but is mediated by a variety of inputs. These stimuli collected give stimulation along these axes. Even though there is evidence that music therapy is excellent for happiness, arousal, stress reduction, immunity, and social interactions, it is still not widely used. However, based on the current experiments, it is hoped that these deficiencies and doubts will be resolved in the future. However, because many studies conducted to date have many ambiguities and limitations, for instance, in some experiments, music activities are frequently mixed with the background of social groups, it is unlikely that these shortcomings and questions will

be resolved in the near future. Therefore, the current state of music therapy research is quite limited [5].

3 Music Therapy Dementia

Dementia is a chronic or progressive illness characterised by a more fast and more severe deterioration in cognitive function (i.e., the capacity to process thoughts) than is typical of ageing. It impairs memory, cognition, orientation, understanding, computation, learning, language, and judgement, but consciousness is normally unaffected. Typically, cognitive impairment is accompanied by or preceded by deteriorations in emotional regulation, social conduct, and motivation. As a result, many dementia patients lose their language and communication abilities. Cognitive function degrades as the disease develops; nonetheless, it is believed that musical receptivity persists until the final stages of dementia [7]. In general, dementia is treated with a combination of pharmacological and non-drug interventions. Drug intervention, such as acetylcholinesterase inhibitors, is primarily for the treatment of cognitive symptoms, although these therapies have a limited effect in alleviating behavioural and psychological symptoms of dementia, whereas music therapy has a significant effect. These non-pharmacological treatments can improve outcomes for people with dementia, reduce their abnormal behaviour and maintain or improve their quality of life. Learning and performing music can enhance cognitive areas like language, learning, and attention. And neuronal memory processes. In addition, music stimulates subcortical circuits, the limbic system, and the emotional reward system, evoking emotions of happiness and joy [8]. Receptive music therapy (i.e. listening to music) appears to be more beneficial than interactive music therapy for reducing agitation, behavioural issues, and anxiety in Alzheimer's patients [9].

Moreno reviewed eight trials involving 816 individuals and noted that listening to music is the music therapy that has the most beneficial effect on cognitive function [8]. This can be explained by the fact that listening to music incorporates the perception of sound, rhythm, and lyrics, as well as the response to sound, activating several regions of the brain. In addition, musical training is a potent stimulant of neuroplasticity. It is believed that music is beneficial for persons with dementia because music includes a variety of "design elements" that interact to differing degrees with different components of the self, therefore boosting general health. Thus, Baird's music therapy framework may be effective in diagnosing and treating self-impairment in people with dementia and highlights that music therapy can simultaneously mobilise all capacities for self-action and further lead to an improved sense of total self [10]. Lin hypothesises that the connection between autobiographical memory and familiar music may be mediated by the rostral medial prefrontal cortex, one of the final brain regions affected by Alzheimer's disease [11]. Thus, music can prevent neuronal degeneration by increasing brain plasticity and stimulating the formation of new neural connections. Nonetheless, this impact is not long-lasting. It suggests that music therapy improves the quality of life of patients with dementia with few aftereffects [8].

Moreover, the methods employed in investigations of the effects of music therapy on dementia may not be able to accurately measure the cognitive, behavioural, and psychological states of individuals with impairments. Given that dementia is a gradual neurodegenerative disorder that impairs cognitive and communicative abilities, the study's

assessments should ideally be brief and simple to complete for those with impairments. Complex or verbose assessments of persons with impairments may lack reliability and validity, making experiments more difficult and prone to mistakes. The effect of cultural expectations and norms on receptivity and desire to participate in music therapy interventions, which may alter the receptivity of individuals to music therapy involvement, is another possible limitation. Even if this is an external factor outside the scientific process, it might nonetheless have a constraining influence on the results.

4 Music Therapy in Schizophrenia

Additionally, music therapy helps treat schizophrenia is a collection of chronic illnesses of unclear aetiology that primarily affects young people with a gradual or subacute start and is clinically exhibited as a syndrome with numerous symptoms, including perception, thought, emotion, and behaviour abnormalities. Schizophrenia is a mental disorder characterised by positive symptoms such as hallucinations, delusions and thought disorders, and negative symptoms such as sadness, self-neglect and ineffectiveness [12]. Kane mentioned that antipsychotic medication is a relatively effective way to reduce positive symptoms such as hallucinations and delusions [13]. Long-term use of antipsychotic drugs, which inhibit repolarising potassium currents *in vitro*, is associated with an increased risk of sudden cardiac death. This is an important pathogenic mechanism of ventricular tachycardia, which frequently results in sudden cardiac death and may also result in adverse effects such as retarded movement disorders, cardiovascular disease, and metabolic abnormalities. Anti-Adherence to psychiatric drugs is relatively [14], but they are ineffective in lowering negative symptoms and cognitive impairment [15], whereas psychotherapy is successful. In contrast, music therapy can alleviate the unpleasant symptoms of schizophrenia, and compared to antipsychotics; it is both cost-effective and harmless. There was a randomized study of 37 psychopaths in schizophrenia, and both groups were medicated and treated for their respective disorders. The experimental group received additional music therapy for groups, but the control group did not. The concluding performance was shown that music therapy had a substantial impact on depressive symptoms, self-evaluation, and interpersonal skills [16]. Negative symptoms are associated with irritability, poor social interaction, and a general lack of interest. Since music responds directly to emotional centres, activates emotion-related brain regions, and evokes strong feelings of pleasure in these regions [17], this may explain why music therapy improves depressive symptoms in people with schizophrenia.

Moreover, music therapy can influence the physiological reactions and activities of the neurological, endocrine, and cardiovascular systems, resulting in psychological and physical stability, enhanced mood, cognitive function, and good behaviour [18]. Specifically, music therapy can influence EEG brain wave activity, which is strongly associated with brain function [19]. The experiment revealed that after 13 sessions of group music therapy, the alpha waves measured from 8 different parts of all participants were consistently higher in the experimental group than in the control group, suggesting that people who participated in music therapy may have lower levels of stress hormones. Throughout the therapy, happier emotions were reported. The experimental group's

cognitive function and positive behaviours (social ability, social interest, and personal neatness) also increased, although their negative behaviours were much less than those of the control group. Although the experimental group allocations were not random, the results should be applicable to a wide range of situations. Music therapy has been demonstrated to be a successful strategy for promoting emotional relaxation, cognitive processing, and positive behavioural improvements in persons with chronic schizophrenia, despite the disease's difficulty in varying degrees of severity. Moreover, Kamioka did a meta-analysis of 19 research on the effectiveness of music therapy in the treatment of schizophrenia [20]. The results demonstrate that music is beneficial in suppressing and countering psychotic symptoms and that non-classical music is more successful than classical music in lowering psychotic symptoms, indicating the therapeutic potential of popular music for treating individuals with psychotic symptoms. Schmuttermayer studied music therapy approaches based on listening to music, singing music, dancing to music and playing instruments, which may be combined to provide 'group-centred graded music therapy' and as well as its technique, teaching structure, and effects on a group of schizophrenia patients [21]. Each therapy modifies the variables "anxiety" and "activity" in a unique manner. It appears conceivable in group-centred treatment to impact these characteristics and direct the group toward more realistic patterns of communication and behaviour. On the other hand, the significance of music therapy in the treatment of positive symptoms in patients with schizophrenia is unclear owing to a lack of data, and future studies should also focus on the variables that drive positive symptoms and how music therapy might be utilised to improve them.

5 Conclusion

While the neurobiological research is becoming more prevalent in health care and has demonstrated promising results in the treatment of mental disorders, such as dementia, schizophrenia, and depression, more research is required to understand the neural mechanisms of music therapy, particularly in the context of mental health treatment. More research into these scientific concerns may have been gradual, due in part to research goals and in part to the difficulty of identifying the anatomical and functional changes that music therapy induces. In addition, music therapy is now predicated mostly on long-term adjuvant therapy, but the study advancement regarding acute adult psychosis is little. Adapting to the challenges of the environment of acute adult psychotic patients necessitates in-depth study and development of adaptive therapy so as to focus on immediate and short-term aims. Future research should be undertaken through clinical trials, employing a combination of clinical and neurological outcome measures, should adhere to a randomised, controlled, and single-blind design, and should be sufficiently in-depth to determine the long-term effects of specific music therapies. Such research will help us figure out how the brain works when we listen to music, how mental illnesses develop and how they affect each other, as well as how to come up with and use new ways to treat people with music.

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