

MUSIC AND HEALTH : AN OVERVIEW OF MUSIC THERAPY & MUSIC MEDICINE

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Abstract

This review attempts to provide a brief overview of the role of music in health and disease. The review starts with a brief introduction to complementary/alternative medicine & mind-body medicine. The differences between music therapy & music medicine are highlighted next. An overview of the effects & clinical applications of music therapy is provided. Numerous randomized controlled trials & systematic reviews have elucidated the clinical benefits of music. Some of the salient published findings are presented in this review. Music therapy is postulated to have beneficial effects on health by reducing negative emotions & stress, inducing mental well-being, & harnessing the power of brain-body information transfer systems (neuroendocrine system, autonomic nervous system and the neuroimmune pathway). Neuroscience research on the brain's processing areas for music has revealed interesting facts. Some of these are described in this review. Experts have emphasized that musical preferences of the patient / client need to be taken into account while planning music therapy. The review ends with a note on the significance of musical characteristics & genre in the context of music therapy and music medicine.

Complementary/alternative medicine & mind-body medicine

The term "mind" refers to the totality of mental functions related to consciousness, thought, mood, and behavior, derived from activities within the brain.¹ Mental health is a key determinant of overall health.² The influence of the mind on the body and the effect of psychological factors in health and disease are well known.²

Complementary and alternative medicine (CAM) refers to the various disease-treating or disease-preventing practices whose methods and efficacy differ from conventional biomedical treatment.³ Some of these CAM approaches can

be used in conjunction with allopathic medicine.³ Mind-body medicine is a domain within CAM that focuses on the interactions between mind and body, and the ways in which emotional and behavioral factors can directly affect health.⁴ Mind-body practices use the mind to affect physical functioning and promote health.⁴ Music therapy is classified as a mind-body intervention, along with yoga, meditation, biofeedback etc.³ The PubMed MeSH database⁵ classifies music therapy under "Sensory Art Therapies" (therapies using arts or directed at the senses), within the broad category of complementary therapies.

Music therapy & music medicine

Music therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program.⁶ It is an established health service similar to occupational therapy and physical therapy and consists of using music therapeutically to address physical, psychological, cognitive and/or social functioning for patients of all ages.⁶ Music therapy requires no prior musical knowledge/skill on the part of the patient.⁷

Interventions are categorized as 'music medicine' when passive listening to pre-recorded music is offered as an ancillary therapy, by medical personnel who are not necessarily specialized in the field of music therapy.^{7,8} In contrast, music therapy requires the implementation of a music intervention by a trained/qualified music therapist.^{7,8} In active music therapy, the patient makes music either alone, with a therapist or within a group.⁷ Typical intervention techniques include singing, playing with rhythm, improvisation, and the composition of music or songs.⁷ In receptive music therapy, therapeutic goals are pursued by listening to recorded or live music.⁷

An overview of the effects & applications of music therapy

A substantial body of literature exists to

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support the effectiveness of music therapy.⁶ Healthy individuals can use music for stress reduction via active music making, as well as passive listening for relaxation.⁶ Music is often a vital support for physical exercise.⁶ Music therapy may be used to facilitate labor and delivery.⁶ Effects of music for stress reduction have been documented in physiological (e.g. heart rate, blood pressure, hormonal levels), neurological (e.g. EEG readings) and psychological (e.g. self-report, the Spielberger State-Trait Anxiety Inventory) domains.⁸

Music is used in hospitals to alleviate pain in conjunction with anesthesia or pain medication: elevate patients' mood and counteract depression; promote movement for physical rehabilitation; calm or sedate, often to induce sleep; counteract apprehension or fear; and lessen muscle tension for the purpose of relaxation.⁶ Anxiety and stress reduction is one of the primary outcomes investigated in music medicine and music therapy research with medical patients.⁸ The effects of both music and music therapy interventions have been documented in a range of medical patients, for example, pre-surgical, oncology, pediatric, and pre-procedural patients.⁸

Published research on music therapy

RCTs have documented the effect of music therapy on postoperative pain,^{9,10} preoperative anxiety,^{9,11} and the stress response to cardiac surgery.¹² RCTs have been conducted to study the impact of music on anesthesia,¹³⁻¹⁵ and the role of music in the management of cerebrovascular disease,¹⁶ and obstructive sleep apnea syndrome.¹⁷ In addition, RCTs have explored the effects of music on preterm infants¹⁸ and ventilator-dependent patients.¹⁹

A systematic review of 42 randomized controlled trials showed that music intervention reduced **perioperative anxiety and pain**, in approximately half of the reviewed studies.²⁰ A Cochrane review of 51 studies on the effect of music on pain concluded that listening to music reduces pain intensity levels and opioid requirements.²¹ A Cochrane review of 23 randomised controlled trials concluded that music listening may have a beneficial effect on blood pressure, heart rate, respiratory rate, anxiety,

and pain in persons with coronary heart disease.⁸ A meta-analysis of 8 randomized controlled trials concluded that music improves patients' overall experience with colonoscopy.²² A Cochrane review stated that 4 of the 5 studies reviewed reported greater reduction in symptoms of depression among those randomised to music therapy than to those in standard care conditions.²³ A Cochrane review of 4 randomised controlled trials of music therapy for schizophrenia concluded that music therapy as an addition to standard care may improve symptoms.²⁴ A review of 13 studies observed that music therapy reduced agitation in patients with dementia, in a majority of the studies.²⁵

The adjunctive role of music therapy has been studied in several clinical conditions such as coronary heart disease, chronic obstructive pulmonary disease, breast cancer, skin diseases, dementia, traumatic brain injury, and perioperative scenarios. In the realm of obstetric & gynecologic practice, the supportive role of music therapy has been studied in normal & high-risk pregnancy, labor, cesarean section delivery, and postpartum women.

Additionally, research data is available on the role of music in clinical procedures such as bronchoscopy, gastroscopy, colonoscopy and dental procedures. The effect of music on patients undergoing procedures such as radiation therapy, chemotherapy, burn dressing changes, and bone marrow biopsy has been documented.

How does music influence health?

Factors that contribute to the effects of music therapy include attention modulation, emotion modulation, cognition modulation, behavior modulation and communication modulation.²⁶ These processes can have beneficial effects on psychological & physiological health.²⁶ Music can evoke strong emotions & reliably affect mood.²⁷ Music-evoked emotions can modulate activity in all limbic & paralimbic brain structures.²⁷ Functional magnetic resonance imaging shows that listening to music modulates activity in a network of mesolimbic structures of the brain, including the nucleus accumbens, ventral tegmental area, hypothalamus & insula, which regulate autonomic & physiological

responses to rewarding & emotional stimuli.²⁸ It is well known that the hypothalamus exerts control over several vital bodily functions through the brain-body information transfer systems such as the hypothalamic-pituitary-adrenal axis & the autonomic nervous system. Therefore, hypothalamic activation induced by music is of special interest. Positron emission tomography has been used to demonstrate that pleasant emotional responses to music are associated with changes in cerebral blood flow in brain regions thought to be involved in reward/motivation, emotion, and arousal, including ventral striatum, midbrain, amygdala, orbitofrontal cortex, and ventral medial prefrontal cortex.²⁹

The brain’s major computational centers for music³⁰

Region	Significance / task
Auditory cortex	The first stages of listening to sounds; the perception and analysis of tones
Visual cortex	Reading music; looking at a performer’s movements (including one’s own)
Cerebellum	Movements such as foot tapping, dancing and playing an instrument; also involved in emotional reactions to music
Prefrontal cortex	Creation of expectations; violation and satisfaction of expectations
Motor cortex	Movement; foot tapping; dancing; playing an instrument
Sensory cortex	Tactile feedback from playing an instrument and dancing
Hippocampus	Memory for music, musical experiences and contexts
Amygdala	Emotional reactions to music
Nucleus accumbens	Emotional reactions to music

Musical preferences of the patient / client

An individual’s musical preference is highly

subjective.³¹ Music that feels soothing to one may feel unpleasant to others.³¹ Some factors that influence musical preference & taste include age & gender, familiarity with the music, culture, community & peer influences, intelligence & education, socioeconomic status, musical training, mood & personality and current situation & circumstances.³¹ An important prerequisite for effective music therapy is that the patient enjoys what he or she is hearing.⁷ The individual’s preferences, circumstances and need for treatment, and the client or patient’s goals help to determine the types of music a therapist may use.³² Further research is required to clarify the differential effects of therapist/researcher-selected music versus patient-selected music.⁸

Therapeutic significance of musical characteristics & genre

There is no particular style of music that is more therapeutic than the rest.³² An eclectic and unbiased approach is recommended while selecting music for therapy. Regardless of subjective factors, there are some sound characteristics which move us in certain emotional, physical or psychological directions.³¹ Certain sound patterns motivate us, while others tend to evoke peace or relaxation.³¹

Musical elements that affect a listener include rhythm, volume, complexity, variation in pitch, repetition within the tune, & the type of music.³¹ Musical mode (major/minor mode) may play a role in the type of emotion triggered by music. It has been noted that major mode music conveys/ induces happiness.^{33,34} Although researchers have extensively investigated the effects of specific musical characteristics such as tempo, melody, harmony and timbre, on emotional responses in non-medical populations, such research is still needed with medical patients.⁸ More controlled trials are needed with medical patients to further examine which specific musical characteristics enhance the psychological and physiological benefits of music.⁸ There exists a popular view that certain special “ragas” of Indian classical music have specific therapeutic indications and possess unique therapeutic efficacy in the context of specific disorders/diseases/symptoms. However, there is insufficient evidence in the published research

literature to support this concept of “therapeutic specificity of selective ragas”. The scientific validity of this widely held notion needs to be formally tested and documented through rigorous, well-designed randomized controlled trials.

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