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Original Research Article

Therapeutic use of music: Recent trends in medical science

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Abstract

Music therapy is an established health profession in which music is used within a therapeutic relationship to address physical, emotional, cognitive and social needs of individuals. There are many different approaches to music therapy including creating music, listening to music and talking about music. Although music therapy is often used to promote mental and emotional health, it may also help to improve quality of life for people coping with physical health condition. In recent days more hospitals are healing with the help of music therapy. In a sprinkling of hospitals, music is increasingly being used as therapy. Music also helps newborn thrive in neonatal intensive care unit. Music softens the environment and soothes it from loud and noising. It is true that the music therapists are not so concerned with the direct medical illness but they are working to change mood, creating a feeling support for the patient. Listening to music releases the mood enhancing chemicals in the brain. The dopamine increases with listening music in response to other stimuli. It is need of the time to create awareness among people about stress that men and women face in today's world. Music as a sound is a means for creating the sensation of hearing, a transmission of controlled energy i.e perceived by the ear, processed by the brain to resonate in the energy centers of the body and restore it**.**

Key Words: Music, cognition, perception, psychological, physiological, sensation, personality.

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INTRODUCTION

Music is one of a small set of human cultural universals[1], evoking a wide range of emotions, from exhilaration to relaxation, joy to sadness, fear to comfort, and even combinations of these[2-4]. Many people use music to regulate mood and arousal, much as they use caffeine or alcohol[5-7]. Neurosurgeons use it to enhance concentration[8], armies to coordinate movements and increase cooperation[9], workers to improve attention and vigilance[10] and athletes to increase stamina and motivation[11]. The notion that 'music is medicine' has roots that extend deep into human history through healing rituals practiced in pre-industrial, tribal-based societies[12].

In contemporary society, music continues to be used to promote health and well-being in clinical settings, such as for pain management, relaxation, psychotherapy, and personal growth. Although much of this clinical use of music is based on provisional or unproven methods, an emerging body of literature addresses evidence-based music interventions through peer-reviewed scientific experiments. In this communication it has been tried to examine the scientific evidence supporting claims that music influences health through neurochemical changes in the following four domains:

1. Reward, motivation and pleasure;
2. Stress and arousal;
3. Immunity; and
4. Social affiliation.
5. These domains are analogous to the known following neuro-chemical systems respectively
6. Dopamine and opioids;
7. Cortisol, corticotrophin-releasing hormone (CRH), adreno cortico tropic hormone (ACTH);
8. Serotonin and the peptide derivatives of proopio melano cortin (POMC), including alpha-melanocyte stimulating hormone and beta-endorphin; and
9. Oxytocin.

Reward, motivation, and pleasure: All organisms engage in motivated behaviors geared towards survival[13]. This can be for individual survival, such as seeking out and ingesting food, or survival of the species, such as sexual activity. Reward is a complex construct involving motivational states (e.g., craving or wanting), prediction, goal-directed behavior, reinforcement learning, and hedonic states. Music does not have the clear survival benefit associated with food or sex, nor does it display the addictive properties associated with drugs of abuse. Nonetheless, the average person spends a considerable amount of time listening to music, regarding it as one of life's most enjoyable activities[14]. Many believe that music has special, mystical properties and that its effects are not readily reducible to a neurochemical state[15,16]. Advances in cognitive neuroscience have challenged this view, with evidence that music affects the same neurochemical systems of reward as other reinforcing stimuli. Music listening reportedly lowers requirements for opiate drugs in post operative pain[17], which suggests that music may stimulate the release of endogenous opioid peptides within the brain. A frequently cited older study found that self-reported thrills and chills during music listening could be blocked by the opioid antagonist naloxone, which provided tentative evidence of a causal link between musical reward and the central release of endogenous opioids.

Stress and arousal: All organisms seek to maintain homeostasis. Stress can be defined as a neurochemical response to the loss of homeostatic equilibrium, motivating the organism to engage in activities that will restore it. Lifestyle choices that reduce stress are thought to be highly protective against diseases[18] and music may be among these [19-21].

The effects *of* music on stress and arousal: The potential therapeutic effects of music listening have been largely attributed to its ability to reduce stress and modulate arousal levels. Listening to 'relaxing music' (generally considered to have slow tempo, low pitch, and no lyrics) has been shown to reduce stress and anxiety in healthy subjects[19,22], patients undergoing invasive medical procedures (e.g., surgery, colonoscopy, dental procedures[20,23,24,25], pediatric patients undergoing medical procedures[19], and patients with coronary heart disease[22]. Music listening following painful medical procedures (e.g., surgery) has also been found to reduce sedation, as well as pain and analgesic requirements[20,23], although the effect sizes are small[23]. These effects are conventionally considered to be owing to the ability of music to distract or modulate mood.

Underlying mechanisms of action: One proposed mechanism for the ability of music to regulate stress, arousal, and emotions is that it initiates reflexive brainstem responses[24]. Music modulates brainstem mediated measures, including heart rate, pulse, blood pressure, body temperature, skin conductance, and muscle tension[25]. Stimulating music produces increases in cardiovascular measures, whereas relaxing music produces decreases[26], patterns observed even in infants[27]. These effects are largely mediated by tempo: slow music and musical pauses are associated with a decrease in heart rate, respiration and blood pressure, and faster music with increases in these parameters. This follows given that brainstem neurons tend to fire synchronously with tempo[28]. Several studies have investigated the effects of music on salivary immunoglobulin A (s-IgA), a principal immunoglobulin secreted externally in body fluids, including saliva and mucus of the bronchial, genitourinary and digestive tracts[29]. Salivary IgA is a first line of defense against bacterial and viral infections[29], and a reliable marker of the functional status of the entire mucosal immune system[30]. Blood plasma levels of IgA (as opposed to s-lgA) were measured in surgery patients who listened to experimenter-selected 'calming music'. There was no significant difference in blood plasma IgA levels among patients in the music condition compared to the control condition, even though the stress marker cortisol was significantly decreased with music. An important consideration in the study on the surgery patients - is that the effects of local anesthetic infiltration may interfere with the effects of musical intervention on biological measures[31].

Summary and future directions: A small number of studies found that music boosts the innate or non-specific immune system, indicated by in creased NK cell activity and mucosal immunity. Music has anti-inflammatory properties, indicated by positive changes in cytokine profile. These results, though promising, are still preliminary and warrant more careful follow up studies that control for effects of extraneous variables. Experiments involving group drumming and group singing have ecological validity, in that they represent an organic process that has existed since prehistoric times and may have advantages over solitary musical activity. It will be important for future studies to include non musical control activities that are well matched for social context. For example, a control condition for a private singing lesson could be a lesson in vocal technique for public speaking; listening to audio books could serve as a control for passive music listening. Using the participants' depression and anxiety scores at covariates to determine whether these factors contribute to the effects of musical manipulations on subjective relaxation and levels of oxytocin and physiological stress markers will also be valuable. Finally, it will be crucial to investigate directly the hypotheses that (i) musical activity particularly when

performed in groups - increases trust, social bonding and positive affect and (ii) these beneficial social effects are mediated by oxytocin. The evidence for the beneficial effects of music on reward, motivation, pleasure, stress, arousal, immunity, and social affiliation is mounting. We consider the evidence to be promising, yet preliminary, due to numerous confounds and limitations of many studies performed to date. We note that - in most studies - the methods used did not qualify as "Music Therapy", in that music intervention was not administered to participants by a licensed therapist. Instead, music intervention was administered to the participants by the experimenter or another type of health care professional (e.g., nurse). It remains to be investigated whether music administered in the context of a music therapy session is more effective than music interventions administered by other types of health care practitioners or by the patients themselves.

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