

## **Music and Medicine – Future Directions for Music Therapy?**

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### **Abstract:**

In the last ten years, there has been a resurgence of interest in holistic approaches to health care, and in medical applications of music. Research findings suggest that music can have a valuable role in stress management and biofeedback, in the management of medical and dental pain, in psychoneuroimmunology, and in performing arts medicine. It is important for music therapists to be aware of these developments which offer exciting new prospects for music therapy practice and research.

Music and medicine have been closely associated in many cultures throughout history. However, recent Western history has been dominated by Cartesian dualism in which mind and body are seen to be separate entities. Music involves the mind and emotions and so has been seen to have little relevance to physical health. Although music therapists have practised in various rehabilitation settings for many years, their work has received scant recognition. In a recent press report a leading Australian medical practitioner claimed that music therapy had no credibility as a treatment technique (Couper-Smartt, 1991).

In an overview of music therapy practices in Australia in 1983, Erdonmez described behaviour modification, developmental and humanistic/creative approaches, indicating a closer association with psychology than with medicine. However, during the last ten years there has been a resurgence of interest in music and medicine. This has come with increasing recognition for the interaction between biological, social and psychological influences on health, and the rise of holistic approaches to the treatment and prevention of disease.

In 1989, Lippin, a medical practitioner and founding president of the International Arts-Medicine Association, addressed the annual conference of the National Association for Music Therapy in the USA on the interdisciplinary field of Arts-Medicine, defined as the holistic study of links between the arts and human health. He emphasized the protection of the health of performing artists, the power of the arts to heal individuals, institutions and society, and the role of the arts in rehumanising health education and health care institutions. Two-thirds of the members of the world-wide International Society for Music in Medicine are medical doctors, and most of the published research in music and medicine has been conducted by physicians, nurses and psychologists (Taylor, 1988).

The growth of the New Age movement and alternative health practices has also led to an abundance of new ideas and publications on music and sound for healing e.g. Halpern and Savary (1985), Keyes (1987) and Lingerman (1983), as well as a huge market for recorded music for relaxation.

As Taylor (1988) states, the future of the music therapy profession may be at stake if we fail to address these areas. "It appears that the bandwagon destined to reunite music and medicine is well on its way, and too few music therapists are aware of its progress. Missing it entirely could be embarrassing at least, but playing a major part

could greatly elevate the credibility of all areas of music therapy applications both inside and outside the medical field" (p. 92).

### **Research**

Standley (1986) provides a comprehensive overview and meta-analysis of 30 empirical studies using music in actual medical and dental treatments. In 54 out of 55 variables analyzed, music conditions enhanced medical objectives, whether measured by physiological, psychological/self-report or behavioural means.

The estimated effect sizes (i.e. the proportion of standard deviation showing the difference between experimental and control groups) ranged from .17 to 3.28 with an average effect size of .98. While these results seem impressive, statistical significance is not discussed. The greatest effect sizes were achieved with dental, cardiac and surgical patients, and the smallest effect sizes were achieved with neonates, obstetric and cancer patients.

The most common and also most effective use of music was as an audio-analgesic or to reduce anxiety. The dependent variables most affected by music were pulse rate, amount of analgesic medication used, pain perception or observation, and stress hormone levels. Many studies used taped music for listening purposes and did not involve a music therapist. However, it is interesting to note that a minority of studies did use participatory music therapy activities and these studies showed a slightly higher effect size.

### **Music and Stress Reduction**

Many people use music to reduce stress in their everyday lives, to bring pleasure and relaxation to time spent in the car, at work and at home. It would therefore seem reasonable to assume that music could have a clear-cut role in stress management, and in the prevention and treatment of stress-related medical conditions. However, the influence of music on stress is a complex and challenging area for researchers.

Hanser (1985) discusses some of the methodological problems involved. Stress research in general is complicated by the lack of an agreed standardized definition. In attempting to measure stress, researchers use many different variables which may or may not correlate with each other. These variables may include physiological measures (heart rate, blood pressure, GSR, skin temperature, EMG and EEG), anxiety inventories and psychological tests, behavioural observations and interviews.

Although early research suggested various significant physiological effects of music listening, more recent highly controlled experiments have failed to demonstrate consistent effects (Hanser 1985). This may be because music stimulates an orienting response and physiological arousal. It may not be valid to pre-categorize music as stimulative or sedative (Taylor, 1973).

The problem of lack of correlation between physiological and psychological measures is common in stress reduction research, and suggests that physiological measures may lack validity (Hanser, 1985). Music appears to have a more consistent effect on verbal reports and anxiety inventories than on physiological measures.

#### *What types of music reduce stress?*

It seems that the definition of relaxing music is unique to the individual, and the stress response likewise may be complex and unique to the stressor (Hanser, 1988). Stratton and Zalanowski (1984) found that musical preference was the most significant factor

in determining self-reported relaxation to five types of music. Familiarity with the music and the extent to which subjects are given control over musical choice and volume could also influence results, as could sound quality and the conditions of presentation (live or recorded, through headphones or speakers, in an individual or group setting). Individual associations or imagery to music could also influence responses.

Hanser (1988) points to changing technology to assist in isolating important variables. Electronic music allows for the systematic manipulation of musical elements such as tempo, volume, rhythm, timbre and pitch. Medical measurement technology will enable greater measurement of physiological responses and help define the stress response.

#### *Guided Imagery and Music (GIM)*

GIM is a process in which relaxation techniques and classical music are used to evoke imagery leading to self-understanding and personal growth. Classical music selections are chosen to stimulate emotional involvement and introspection, encouraging catharsis, insight and problem-solving (Bonny 1989). The initial relaxation induction creates a receptive state of mind so that the client can use the music listening to resolve tensions. This process is supported by the therapist who then assists the client in integrating the session. This approach has been reported effective in reducing stress in healthy individuals, as well as those with medical conditions such as AIDS (Bruscia, 1989), brain damage (Goldberg, 1988) and cancer (Hamilton, 1985).

#### *New Age Music*

'New Age' refers to a broad category of music recordings marketed specifically for relaxation purposes. Using environmental, acoustic and electronic sounds, soft dynamics and slow tempi, and no conventional pulse, melody or harmonic progression, these recordings minimize musical tension. Some find this musical style uplifting, non-intrusive, evocative of pleasant imagery and associations, and helpful for creating an atmosphere for meditation or relaxation.

Halpern (1989) claims that such music harmonizes and relaxes the body and supports natural healing. A study by Logan and Roberts (1984) compared the effects of silence, superlearning (slow classical) music, and Halpern's music on a progressive muscle relaxation procedure. They found no significant overall difference between the three conditions, although Halpern's music produced significantly higher subjective tension ratings on 2 out of 9 data points.

#### *Vibro-Acoustic Therapy*

Vibro-acoustic therapy was devised by Olav Skille in Norway in 1968. The client relaxes in a specially designed chair or bed with built-in speakers which transmit sound waves directly onto the body. Special tapes are recorded using New Age or other 'relaxing' music mixed with pure low frequency tones so that the overall music will be both felt and heard.

Vibro-acoustic therapy is claimed to reduce activity of the sympathetic nervous system and improve blood circulation, and to be helpful in reducing stress, muscle pain, stiffness and spasticity. It has been used in many European countries as a palliative treatment for a wide range of medical conditions including cerebral palsy, autism, asthma and Rett Syndrome (Skille, 1989).

#### *Biofeedback*

Biofeedback is one area of stress reduction using physiological measures and music with greater validity and success. Electromyographic biofeedback (EMG) uses electrodes

to monitor tension in specific muscles, and feeds back information to enable the subject to gain greater control over tension levels.

Reynolds (1984) found that EMG biofeedback on the frontalis (forehead) muscle, combined with harp music and positive suggestions, led to a significantly greater reduction in muscle tension than EMG or relaxation training alone (n = 20).

Scartelli (1982) used EMG biofeedback with six cerebral palsied adults in an effort to reduce arm tension. EMG and music led to a 65% decrease in tension and EMG alone led to a 32% decrease.

In another study, Scartelli (1984) found that subjects with EMG biofeedback and music reduced their frontalis muscle tension by 31%. Those with music only, reduced their tension by 26% and those with EMG only reduced their tension by 16% (n = 30).

Scartelli suggests that music may block the critical, analytical thought processes of the left hemisphere, and enhance the right hemisphere's role in awareness and control of somatic functions.

### *Music for Stress Reduction in Hospitals*

Spintge, a German medical practitioner, specializes in research into music listening to reduce anxiety during hospital treatment. Anxiety is common among hospital patients due to social isolation, feelings of helplessness, fears of anaesthesia, surgery, and treatment effects, as well as other concerns. Spintge (1989) found that 97% of hospital patients welcomed the opportunity to listen to music, and 50% of these required less sedative and analgesic medication as a result.

According to Spintge, 'anxiolytic' music must not have any extremes in rhythm, melody or dynamics, must be instrumental rather than vocal, must be of a high recording quality, and must be chosen by the patient. He reports several favourable physiological effects of anxiolytic music. Spintge and Droh (1987) edited a substantial text in German and English on music in medicine, and were co-founders of the International Society for Music and Medicine.

In other studies concerning hospital stress, Levine-Gross and Swartz (1982) found that six hospitalized children participating in music therapy activities showed significantly less state anxiety after one session, and less trait anxiety after eight weeks, than a control group. Goloff (1981) found that music therapy encouraged general medical patients to view their hospitalization more positively, to report reduced physical discomfort, and to experience significant improvement in four out of six mood parameters.

Chetta (1981) compared the effects of verbal instruction with music therapy activities designed to teach 75 young hospitalized children about surgery. The group receiving music therapy was consistently rated as indicating less anxiety before and during induction of pre-operative medication.

Bonny (1983) found that music listening in two intensive coronary care units reduced patient heart rates, increased pain tolerance and decreased anxiety and depression according to a nurses' rating scale. Nurses also reported less staff stress during the study, and continued to use music after the study was completed.

Provision of music therapy services and the availability of a range of quality music recordings (via headphones) would contribute to a more humane and less stressful hospital environment. The employment of a fulltime music therapist has recently been well received by patients and staff at the Royal Children's Hospital in Melbourne.

## **Music and Pain Relief**

### *Acute Pain*

In the 1960s and '70s, laboratory studies suggested that music could increase subjects' tolerance to experimentally induced pain (Standley, 1986). Presumably for ethical reasons this line of research did not continue, but several early studies supported the analgesic effects of music played through headphones during actual dental treatments.

Gardner and Licklider (1960) claimed that nine dentists in the Boston area had performed over 4,000 dental operations, including tooth extractions, using sound stimulation as the only analgesic agent necessary. They explain this in terms of the relaxing effect of music, the use of white noise to drown the sound of the drill, the patient's control over volume, the effects of positive suggestion, and the possibility that overstimulating the auditory nerve directly inhibits pain-evoked neural activity.

In other surgical operations, music listening has been found to be beneficial in reducing pre-operative anxiety and post-operative pain. Shapiro and Cohen (1987) found that headphone music reduced tension and pain levels for women undergoing pregnancy terminations. Locsin (1981) found that patients listening to music in the 48 hours after abdominal surgery showed less overt pain responses and needed less pain-relieving medication.

Music has been used in several studies to manage pain and enhance the euphoria of childbirth. Hanser, Larson and O'Connell (1983) adjusted the music to match the breathing rate of each of seven women in labour. They found that subjects demonstrated less physical and verbal pain responses while music was playing, than during alternating periods without music.

### *Chronic Pain*

Beyond the problems of acute pain, music therapists have addressed the more complex issues of chronic pain i.e. pain which persists beyond the expected recovery time for a disease or injury, or pain associated with chronic or progressive medical conditions.

Wolfe (1978) used music and exercise activities in an attempt to increase activity levels and positive comments from chronic pain sufferers. If pain behaviour is learned and reinforced by rest, attention and medication, then ignoring negative comments might assist in replacing complaints and inactivity with achievements and mobility. This study raises philosophical issues for music therapists working with clients with chronic pain. To what extent is it useful for clients to ventilate their suffering, and to what extent should music therapy attempt to replace so-called negative behaviours with enjoyable active participation?

In recent years there has been increasing recognition of the emotional, physical and interpersonal aspects of chronic pain. Godley (1987) describes the application of music therapy as one of many holistic approaches offered in a pain clinic. Music is offered as a pleasant conditioned stimulus for use during stressful times to induce relaxation and imagery. Patients often used their music tapes as a substitute for medication, and 70% were able to reduce their pain medication as a result.

Rider (1985) evaluated the effects of different types of music on imagery, EMG muscle tension and pain reduction with 23 spinal pain patients. Subjects were instructed in relaxation procedures and in imagining their pain being subdued by their endorphin system. Entrainment music was more effective than minimalist, impressionistic, classical, jazz music or no music. The entrainment music was improvised specifically to reflect and guide the imagery, beginning with a 7/8 accelerating section, reaching a climax

and then shifting to a more pleasant 4/4 melodic section. It is interesting to note that this music was least preferred but most effective.

In a further study, Rider (1987) discusses the use of spontaneously improvised entrainment music in music therapy groups for chronic pain sufferers. He recommends individualized improvisations to maximize empathy, immediacy and effectiveness in guiding imagery towards healing and pain relief.

In a music therapy stress management workshop led by the present author, participants reported relief from tension headaches, back ache and menstrual pain, when entrainment music was improvised for them by the group. Clearly the influence of social support and suggestion enhance any effects of the music and imagery in these situations.

### *Conclusion*

There is a need for rigorous research into the many applications of music for pain relief. Existing studies suggest that music may have value as a pleasurable stimulus to distract from pain and to mask background noise, to promote catharsis, tension release and healing imagery, to cue deep breathing and relaxation, to enhance the placebo effect, and to increase a sense of control. Further research is necessary to isolate the influence of variables such as musical style, method of delivery, and subject personality and preference and to assess whether benefits are sustained over time.

Goldstein (1980) suggests that the thrill response to music produces endorphins which produce a natural high. Any physiological basis for audio-analgesia, such as endorphin production or suppression of pain messages, warrants further investigation.

### **Music and Immunity**

The expanding field of psychoneuroimmunology is concerned with the influences of psychological, behavioural and environmental stress factors on immunity and disease. Maranto (1988) discusses the possible influences of personality traits and emotional stress on immune-related diseases, and explores issues for music therapists working with AIDS patients. Hall (1989) attempts a molecular explanation for links between emotional and physical health.

Rider and Weldin (1985) studied the effects of music, progressive muscle relaxation and guided imagery on adrenal corticosteroids (stress hormones) and circadian rhythms of nurses doing shift work. In another study, Rider (1990) proposed a mechanism by which cell-specific imagery could affect particular immune functions. The experimental group receiving instruction in cell-specific imagery and live improvised entrainment music produced significantly higher levels of salivary immunoglobulin A than did groups receiving only music or silence.

While these results are promising, there is as yet insufficient evidence to claim specific effects of music therapy on immune functioning. While Rider's work demonstrates dramatic effects of music and imagery, the treatment effects of imagery alone, relaxation, expectancy and social factors are not controlled for. Nevertheless, if further evidence supports the efficacy of live entrainment music to elicit immune responses, there would be wide implications for music therapy practice. Rider concludes that if biologically-specific components of the immune system can be individually modulated than specific scripts, each evoked by specific entrainment music, need to be developed for patients with cancer, AIDS, autoimmune diseases and allergies.

Maranto (1989d) suggests that music therapists may have a unique contribution to make in the field of psychoneuroimmunology, by addressing both the biomedical and psychosocial aspects of the person. She adds that as a positive emotional experience, music

may enhance immune system functioning generally, and future research should examine the specific neurochemical basis for thrill responses to music (Goldstein, 1980) and their relevance to the immune system.

### **Music and Coma Arousal**

There is a great need for research in the field of music and coma arousal, with anecdotal evidence suggesting a valuable role for music therapy. Honour (1988) described the use of music in the Adelaide Children's Hospital where music provided feelings of comfort and control to families visiting their badly injured children. Many semi- or unconscious children responded to their favourite music, in one case before responding to painful stimuli.

Aldridge, Gustorff and Hannich (1990) described music therapy for five intensive care patients with severe coma after accidents. The music therapists improvised wordless singing based on the tempo of the individual patient's pulse and on their breathing patterns. Reactions ranged from slower and deeper breathing, hand and head movements, eyes opening and regaining consciousness. Changes in EEG and heart rate indicated arousal and perceptual activity, and faded out after the 10 minute music therapy contact.

Boyle and Greer (1983) used taped excerpts of patient's preferred music to reinforce compliance with requests for specific movements from three coma patients. The multiple baseline design demonstrated a significant effect of music only for one patient who had been in a coma for the least time.

It seems that people with very limited sensory awareness may still respond to auditory stimulation, especially to the emotionally stimulating properties of music. Aldridge et al (1990) suggested that the fundamentals of human communication may be musical in form, and so singing may be more effective than speech for providing human contact and promoting perceptual responses. Further research is necessary to determine the value of music therapy in coma arousal.

### **Performing Arts Medicine**

#### *Music-Medicine*

Music-Medicine is a multidisciplinary field which has developed in the last fifteen years to provide treatment for performance-related problems of musicians. The most common health problems of musicians are musculo-skeletal in nature, and are due to stress, lengthy playing times and improper muscle use. These include overuse problems, back problems, carpal tunnel syndrome and thoracic outlet syndrome. Other physical problems include vocal, visual, hearing and skin problems. (Maranto 1989b). The most common psychological problem for musicians is performance anxiety.

In a summary of 39 descriptive and experimental research studies, Maranto (1989b) found that performance anxiety is related to audience size, occurs more frequently and at higher levels in women than in men, and is most common in the 35-45 age-group and among brass players and violinists. 27% of American orchestral musicians use beta-blockers to manage their anxiety. Non-medical treatments apart from stopping performing include systematic desensitization, attentional training and cognitive restructuring, behaviour rehearsal, counselling, relaxation, hypnosis, EMG biofeedback and aerobic exercise.

Rider (1987) combined improvisational music therapy, counselling, biofeedback and systematic desensitization in treating a cellist with performance anxiety, shoulder muscle fatigue and breathing problems. Rider recommends using music therapy to trace and

resolve repressed emotional issues concerning the musician's relationship with his/her music, and a multi-faceted treatment approach.

Rovics (1984) provided personal growth workshops for musicians to help them confront issues affecting their performance. He combined improvisation, Gestalt, psychodrama and Senoi Dreamwork to help participants deal with performance anxiety, chronic tension, over-competitiveness, fear of loss and lack of emotional support. Rovics reports that physical and emotional release and insight led to improvements in performance quality.

Maranto (1989c) recommends music therapy as an accessible, safe, non-invasive treatment for musicians. Musicians may respond more intensely and meaningfully to music due to their involvement, and music therapy can complement their existing lifestyle and foster self-reliance. The multidisciplinary style of music therapy is appropriate to music-medicine. Music therapists have training in music and therapy, as well as experience as musicians to assist them is understanding performance problems.

Although there is as yet no empirical evidence for music therapy in the treatment of musicians, this area offers a fascinating challenge to music therapists. Additional training in areas such as medicine, biofeedback, cognitive behaviourism and counselling may be required. As Maranto points out, music therapists should at least be informed of developments in the field of music-medicine so as to avoid exacerbating medical problems in their clients.

### **Conclusion**

This literature review presents a range of innovative medical applications of music in stress management, biofeedback, psychoneuroimmunology, pain relief and performing arts medicine. More established music therapy practices in such medical areas as physical, psychiatric and geriatric rehabilitation, and palliative care have not been discussed.

Research in music and medicine, as well as in music therapy generally, is characterized by diversity and breadth of subject matter, rather than by thorough investigation of any one area. In order to gain credibility, more in-depth rigorous research is required to demonstrate efficacy. More information is required on how client variables affect outcome. Further use of double-blind experimental designs is required to avoid the effects of expectancy on the part of experimenters and subjects. Larger sample sizes, random sampling and random assignment to experimental conditions are important although they can be difficult to achieve in medical settings. Measuring instruments need to be checked for reliability and validity.

Greater understanding of the neurological basis of musical experiences is required as well as the biochemical basis of emotions and their effect on physical health. The interactive effects of music and imagery warrant investigation as do the influences of musical style. Live, individualized entrainment music presents challenges as it cannot be replicated for research purposes. Is music effective alone or only in combination with other treatment methods? What training is necessary to apply music effectively?

The research questions are numerous and are currently being addressed from both inside and outside the field of music therapy. While music may seem to be a simple, readily available remedy, the research shows that responses to music are complex and wide-ranging. Music therapists are best qualified to address these issues.

Medical applications of music therapy are expanding employment opportunities in hospitals, community and health centres, pain clinics and private practice. Music therapists

need particularly to educate health administrators and the medical profession (Crowe 1985). Standley (1986) provides an excellent guide to medical applications of music therapy, including detailed objectives, target populations, procedures and assessment approaches.

As Broucek (1987) comments, music therapy has much to offer in reviving, sustaining and nurturing the life spirit of all people at all levels of functioning. With growing community interest in holistic approaches to health, the opportunity exists to deinstitutionalize music therapy and to extend the field beyond the disability arena. Many music therapists are responding to new challenges with characteristic creativity and enthusiasm. The future survival and growth of the profession may depend upon developing more active roles in medical treatment and in fostering health and wellbeing in the general population.

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