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Music and Stress

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Abstract Myths about the power of music to regulate and change emotional states are found in each culture. Googling the words "music and stress" produces promises for different types of music specially designed to assist managing stress. Music therapists are familiar with using different techniques to reduce stress with different populations. This paper examines both the application of music to stress management and the neurological and physiological mechanisms of stress that can be modulated by music.

Keywords Music · Stress · Emotions · Music therapy · Psychology of music · Biological effects of music

Introduction

In William Styron' book Darkness Visible (1990), an expression taken from Paradise Lost by John Milton, the author shares with the reader memories of his depression. In a very touching way, he recounts his decision to commit suicide. Although his depression was not connected to any life conditions or any tragic event (a "clear case" of depression), he was losing hope for restoring a worthwhile life. In a cold night, he was watching a movie on television, where at one point the heroes, who were marching along a corridor of a music conservatory, overheard the voice of a woman singing in a melody in contralto from Brahms' Alt Raphsody.

> *The sound, which like all music–indeed, like all pleasures–I had been numbly unresponsive to for months, pierced my heart like a dagger, and in a swift recollection I thought of all the joys the house has known: the children*··· pp. 66

Her voice made him reappraise his previous decision, at which point he decided to seek help. To suggest that Brahms' Alt Raphsody is the proper medication for stressful conditions such as depression is at best a romantic attitude, but this authentic self-report illustrates the sublime role music can play in one's life. Brahms caused Styron to free himself from the strong emotions that flooded him, to use his reason and to appraise his situation and reach constructive ways of coping with his depression.

Mankind and Music

Since early times, music has played an essential part in human life. It was appreciated by ancient, primitive and advanced civilizations that realized its power. Music is universal as language, but it "speaks" louder than words. Since sounds never lie, music has a truthful authority. Music has intrigued philosophers and writers who tried to understand its effect on the human body and on human emotions.

The roots of music can be traced to early infancy. Trevarten (2002) states "I believe we see in infants innate psychological foundations of both musical behaviour and musical awareness that are unique to human beings" (pp. 21). In his view, music has strong roots in human nature. Mankind has a predisposition to engage in 'musicking'

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(Small 1998), and it seems to be a biological adaptation that was built through evolution. Stern (1985) uses musical concepts to describe the very first communication of the baby with his mother and thinks that the intonation we use when we speak expresses our authentic emotions. The musical happening is a manifestation of emotional communication (Gilboa et al. 2006).

Rowell (1984) posits three therapeutic functions attributed to music by the Greeks and expressed in their myths: (1) restoring both the soul and or the body to a state of equilibrium, arousing or soothing as needed, to temper excess or deficient emotion; (2) creating the sensation of pleasure through movement; (3) inducing catharsis that purges the soul of emotional conflict. The Greeks thought that music penetrates the body, the mind and the soul. Its healing effect was well recognized throughout the many productions of human behaviour. A prominent example of the power exerted by music is the story told of King George I (King of England), who suffered memory loss and stress management. Upon reading the biblical story about King Saul, he felt that Saul had suffered from the same type of problems that he was experiencing. King George realized that Saul overcame his problems using special music. With this story in mind, the King asked George Frederick Handel to compose a special piece that would help him in the same way that music helped Saul. Indeed Handel wrote "Water Music" for this purpose, a piece beloved by King George.

Music is an abstract symbolic language with no specific references or associations. Nevertheless, its intrinsic pattern and structure convey meaning to our brain (Miell et al. 2005). It can act as a powerful sensory stimulus, engaging the brain in retraining neural and behavioural functions that can be applied to non-musical context in everyday life, such as therapeutic needs. Musical meaning was a source of debate between two main attitudes: the "absolutes" and the "referentialists". Meyer (1956) proposes that these two opposing attitudes actually coexist. Every piece of music has abstract intellectual meanings ("absolutes" position), but at the same time it communicates extramusical meanings ("referentialists") e.g. emotional states, personal memories, social situations. Langer (1957) claims that music is the language of emotions. Music has always served different functions in private and social life: in feasts, weddings, funerals, hunting, war, entertainment and various religious and political ceremonies. Early civilizations regarded it as a scientific subject; Plato thought that music must be part of education since aesthetic sensitivity paves the way for ethical sensitivity. Thompson (2009) in his book on the psychology of music dedicates an entire chapter (Chap. 10) to survey the extensive research dealing with questions of music and other abilities. The last decade has witnessed a growing number of researchers from various backgrounds who tried to translate intuitions about music into research questions and employing techniques of modern scientific inquiry. Thompson relates short-term effects of exposure to music to long-term effects of music training and its effects on non-musical domains. Music played in shopping establishments affects customer behaviour (Brunner 1990, cited in Thompson 2009), improves spatial abilities (Rauscher et al. 1993), increases mood and arousal levels (Hussain et al. 2002, cited in: Thompson 2009), engenders a compliant attitude towards any message that is mediated by music, Thompson and Russo (2004, cited in Thompson 2009), influences pacing and timing of movement (Milliman 1982, cited in Thompson 2009) and above all conveys emotional meaning. Thompson et al. (2004, cited in Thompson 2009) found that emotional meaning conveyed by speech prosody (one of the dimensions of emotional intelligence) is enhanced by studying piano. Emotional intelligence (e.i.), a relatively new concept, has been given great importance and appears to be essential in its ability to predict stable life and success. Difficulties in dealing with emotional issues may lead to conflicts and failure in utilizing one's cognitive and intellectual potential to the fullest (Maree and Eiselen 2004).

The fact that sound has no limits might offer an explanation of its great impact on mankind. Music reaches and touches us weather we like it or not. It actually invades our physical, emotional and cultural territory. Lecourt (1990) states that one of the main problems of sonority is the absence of boundary in space and time. Sounds surround us and reach us from everywhere, sonorous perception is active day and night, and stops only with total deafness or death. She also specifies characteristics of the sonorous experience: it has the quality of caring and holding (Winnicott 1971), it can be like a veritable womb, but at the same time it can be aggressive, intrusive and traumatic. MP3 users in London interviewed by Simun (2009) describe their experience in a way that can be understood as both emancipatory and pacifying. The city of London is an overstimulating city and is a stressful surrounding. The experience of its 'sonorous envelope' (a concept proposed by Anzieu, cited in Lecourt 1990) can be aggressive, intrusive and traumatic. Listening to 'my music' in a public space invaded by public sounds/noise/music helps to regain control over the auditory space and evade the stress.

Stress

As an emotional state caused by various emotional or circumstantial factors, stress can cause a multitude of physical manifestations. The concept has a long history (Lazarus 1999). Stress is part of everyday life (at home, in work, in personal relations), as well as a psychological condition

that is part of a crisis (trauma, wartime, illness, etc.). Outside the laboratory, stress is accepted as an unavoidable by-product of living and is an especially complex phenomenon in the modern technological society. While many profess to thrive in a stressful environment, there is little doubt that an individual's success or failure in controlling stressful situations (real or perceived) can have a profound effect on the ability to function. The ability to manage stress has figured prominently in anxiety and psychosomatic research and in discussions of health psychology or behavioural medicine. Reports of a statistical link between coronary heart disease and individuals with a particular personality profile that is characterized by a behavioural pattern manifesting a life style of impatience, a sense of time urgency, hard-driving competitiveness and a preoccupation with vocational and related deadlines ("Type A personality") have been reported numerous times. Similar correlations with other behaviour profiles have suggested potential links to cancer, diabetes and other chronic medical conditions.

Lazarus (1966, cited in Lazarus 1999) distinguishes between three different sources of stress: harm/loss, threat and challenge. In psychology and biology, the term "stress" is applied to describe a response or reaction to an external event or interference that disturbs and jeopardizes the functioning of an organism. Organisms, both animals and humans, respond to physical and psychological stress with behavioural and physiological defences. If the stress is too powerful, too prolonged, or is perceived as too threatening, or if the defences are inadequate, then a somatic or psychological dysfunction may be expressed: chronic pain and illness, GI (*gastrointestinal*) distress, sleep disturbances, fatigue, high blood pressure, headaches, etc., or stress emotions, such as anger, anxiety and panic, fright, guilt, shame, sadness, depression Lazaruss (1999) points out that positive emotions such as happiness, pride, love, gratitude are also frequently associated with stress. He distinguishes between social stress, physiological stress and psychological stress and integrates both stress and emotion into one theoretical framework, with appraisal and coping as its basis. Emotions have practical importance in our physiological and psychological well-being and in social functioning. It is of relevance here to consider Lazaruss' attitude since music is a language that expresses, evokes and effects our positive and negative emotions.

Physiology of Stress

The physiological response to stress includes an increase in heart rate and blood pressure, an endocrinological response that includes activation and release of 'stress hormones' (mainly ACTH and cortisol) which activate the sympathetic nervous system ("fight or flight") and an immunological system reaction to stress with a release of 'stress markers' such as IgA and IL-1, IL-6 and IL-10.

Music, Emotions and Stress

Many researchers have tried to understand the sources of emotions we experience in response to music. Thompson (2009) points out to the different possible sources of emotional responses to music that can either reflect direct sources such as psychophysical cues or expectancy mechanisms or indirect sources such as personal memories or cultural significance. Psychophysical cues (such as a sudden loud or soft sound) are grasped as "emotional" since they may signal a forthcoming event that may have a biological significance; it may put us on alert and challenge us. Expectancy mechanisms involve emotions, since being able to predict forthcoming events is a biological advantage. These direct sources are powerful, immediate and personal. When both sources are activated, the experience can be rich and intense (Thompson 2009). The author suggests that these two mechanisms are interesting from a theoretical point of view since they reflect direct links between the components of music and the emotional systems. Expectancy mechanisms also exist among music listeners in a different sense: people expect music to be a change agent in the sense that it will alter their psychological state and relax them when they are anxious or stressed (Sloboda 1996).

Juslin and Sloboda (2001) have reviewed many studies that deal with music and emotions, but the overall picture is sometimes quite confusing, and research findings can be contradictory. Understanding the psychological mechanism that underlies the listener's emotional response to music might help us in understanding this issue. A relevant question that is commonly asked is whether music can induce genuine emotions (the emotive position) or if listeners just perceive emotions expressed by music (the cognitivist position) and how it can give rise to the listener's responses. Lundqvist (2009) investigated whether music is able to induce genuine emotions in listeners. The combination of subjective experience as reported by the listener, together with facial expression and reactions of the autonomic nervous system, would suggest that music is indeed a potent elicitor of authentic emotions. When responses from all three reactions are investigated and when several measures of each component (e.g. heart rate, skin conductance and finger temperature) are taken into consideration, the validity of the emotive position will be more convincing. Such a study was reported by Lundqvist (2009), and the results support the emotive position. Special music that expressed sadness and happiness was

composed for this study, and it was shown to evoke similar emotions. The authors list several mechanisms that have been suggested (by Juslin and Vastfjall, in press cited by Lundqvist 2009) to explain how music affects the responses that were observed in their research: brain stem responses, evaluate conditioning, emotional contagion, mental imagery, episodic memory and musical expectancy. Using neuroimaging, researchers were able to reveal brain activity while responding emotionally to music. Several areas of the brain are activated while performing or listening to music, and the researchers examined possible neurological and physiological mechanisms of stress and how music can mediate the calming of stressful situations.

There are many reports that music can reduce stress and anxiety levels, but there is no comprehensive explanation or model that explains the mode of action of music in altering emotional states. While there are few papers directly relating music and stress, a notable exception is the report by Nilsson (2008) that reviewed 42 randomized control studies on the stress and anxiety and their reduction by the music intervention in a preoperative setting. In more than half of the reviewed studies, a beneficial effect of music was found. The type of music presented was soothing (i.e. 60–80 beats per minute), and in the majority of the studies ($n = 29$), self-selected music was used. This included the patient's own favourite music or music chosen from a selected list of musical genres (e. g, classical, new age, jazz). In the other 15 studies, one specific genre of music was provided by the researchers. This included new age, classical, slow instrumental, piano and pan flute. An opposing view claims there is no operational definition of soothing music that can relax (Hanser 1985, 1988). The possibility of using external stimuli to drive the brain towards relaxed activity has been studied (Will and Berg 2007), and the following will discuss effects of music on the nervous system and other biological mechanisms.

Music Drives Brain Waves

To the extent that that electrical activity reflects the mental state, two types of brain wave signal relaxation. The alpha wave (6–12 Hz) appears during relaxation and theta wave (4–7 Hz) during deep relaxation. Studies have found that brain waves (EEG) can be altered by music (Knosche et al. 2005; Levitin and Tirovalas 2009). Alpha and theta brain waves increase either by relaxation type music or by other relaxation techniques (Jacobs and Friedman 2004). It has been observed that people who focus their attention on a particular rhythmic stimulus long enough can experience a new level of awareness. It appears that brain waves move with the rhythm and the longer one attends to it the more synchronized they become with the rhythm.

It has been demonstrated that music by Mozart (K448), Brahms (Hungarian Dances) and Hayden (Symphony 94) evoke different electrical activity in the brain (Jausovec and Habe 2005). While the calming effect of music has been demonstrated, the question is whether this effect of music is mediated by changes in the frequency of the brain wave. Studies on the effect of music on falling asleep resulted in conflicting findings, with some reporting beneficial effects (Ziv et al. 2008; Harmat et al. 2008; Iwaki et al. 2003), and others not reporting such outcomes (Lazic and Ogilvie 2007). The issue of sleep is important since sleep stages are characterized by distinctive brain wave frequencies, as does music that induces mood changes (Chen et al. 2008; Lu et al. 2005).

Music and the Nervous System

One example, of many, that demonstrates how music can influence neurological functions is given in a report that the amplitude of a startle eye blink reflex was larger and its latency shorter during unpleasant music compared with pleasant music, suggesting that the defensive emotional system is modulated by music (Roy et al. 2009). More profound effects are given in reports that demonstrates that musical training enhances activation and development of certain neuronal structures including cortex, amygdala, hippocampus and hypothalamus and improves plasticity and neurogenesis (Boso et al. 2006; Fukui and Toyoshima 2008; Hyde et al. 2009a, b). Some pathways also mediate emotional responses when processing both pleasant and unpleasant music (Koelsch 2005), with specific activation of the nucleus accumbens and the ventral tegmental area that are responsible for regulating autonomic and physiological responses to rewarding and emotional stimuli. In this regard, two brain regions deserve special attention; the hypothalamus with its control of the hormonal response to stress and the hippocampus that is part of the limbic system and its control of emotion (Baumgartner et al. 2006; Koelsch et al. 2006).

Music and Brain Biochemistry

The main neurotransmitter in the reward system is dopamine. Pleasant music releases dopamine in the nucleus accumbens (Sutoo and Akiyama 2004; Menon and Levitin 2005). On the other hand, listening to slow music decreased the level of norepinephrine (a neurotransmitter that regulates arousal) (Yamamoto et al. 2003). Another neurotransmitter that responds to music is serotonin. Pleasant music increases the release of serotonin (which is responsible for good mood) in the brain, while unpleasant

music reduced the level of serotonin (Evers and Suhr 2000; Kumar et al. 1999).

Another molecule that activates the reward system is endorphin. Endorphin induces a well-being feeling and relaxation. Pleasant music elevates endorphin level, and subjects who were treated with endorphin receptor blocker agent reported getting considerably less pleasure when they listened to normally moving musical stimuli (Goldstein 1980; Balter 2004). 'Techno-music' decreased endorphin level, while classical music elevated endorphin level (Gerra et al. 1998).

Music, Stress and Cortisol

While stress on one hand and music on the other hand can induce many endocrinological changes, the most important hormone is cortisol. Cortisol is the main stress hormone, which is elevated in stress condition, prepares and helps the body to overcome the stress situation by 'fight or flight' responses.

Psychological stressor provokes strong emotional response and an increase in cortisol level, but exposure to music reduced the elevated cortisol level (Khalfa et al. 2003).

Stressful situations induce elevation in cortisol level. Suda et al. (2007) show that major music (Mozart's Allegro con spirito, K448, which induces happiness) reduced stress and cortisol level more than minor music (Beethoven's fur Elise, which induce sadness). On the other hand, "techno-music' increases many stress hormones including cortisol, while classical music (Beethoven Symphony 6) reduces cortisol level (Gerra et al. 1998).

Music, Stress and the Immune System

Stress induces major changes in the immune system (Koelsch 2005). Studies showed that certain types of music can modify the level of certain immunological components such as immunoglobulin A (IgA) and natural killer cells (Hirokawa and Ohira 2003; Enk et al. 2008). Other molecules, which are also changed by music, are markers of stress (Brennan and Charnetski 2000). Results indicate that there is a positive relationship between relaxing music and immunological stress markers.

Recreational music modulates the natural killer–cell activity and the level of cytokine IL-10, which are stress markers, and improves mood (Wachi et al. 2007). Recently, (Nelson et al. 2008) it has been shown that music in stress situation is able to elevate the IL-6 level. The IL-6 and IL-10 are the immunological 'stress markers'.

Music, Stress and Heart Activity

Stress increases both heart rate and blood pressure. Studies show that music (Mozart, Symphony # 40; or Ligeti, String Quartet # 2) can increase or decrease heart rate and blood pressure (Lemmer 2008). Similar results were found by Iwanaga et al. (2005). It seems that music promotes relaxation via physiological and/or psychological entrainment. Entrainment is a physics principle, in which two objects vibrating at similar frequencies tend to cause mutual sympathetic resonance and vibrate at the same frequency. Entrainment is achieved using music to directly elicit relaxation. Musical stimuli and physiological processes (heartbeat, respiratory rate, blood pressure, temperature, adrenal hormones) are composed of vibrations that occur in a regular, periodic manner and consist of oscillations. Musical stimuli, specifically rhythm and tempo, can be used as a synchronizer to influence changes in physiological responses (i.e. heartbeat, respiration, blood pressure) through entrainment (Thaut 2003). When using music to induce relaxation through entrainment, it should have a tempo at or below a resting heart rate (<80 beats per minute), predictable dynamics, fluid melodic movement, pleasing harmonies, regular rhythm without sudden changes and tonal qualities that include strings, flute, piano or specially synthesized tones. These musical properties are used to induce relaxation by causing body rhythms to slow down or entrain to the slower beat of the music (Merker et al. 2008).

Interrelated with music-induced relaxation is the reduction in anxiety. Music with slow, steady and repetitive rhythm is thought to exert a hypnotic effect contributing to relaxation and anxiety reduction through cognitive quieting and altered states of consciousness. Because physiological relaxation is incompatible with anxiety, music can alter perceived levels of anxiety while facilitating more relaxed physiological responses. Music can decrease anxiety by occupying attention channels in the brain with meaningful, distractive, soothing auditory stimuli rather than stressful environmental stimuli (Editorial 1993).

Daily Stress and Music

Approaches for alleviating workplace stress include altering actual demands, increasing individuals' abilities to cope by altering cognitive appraisals, behavioural responses and physiological responses and supporting existing abilities to cope. The use of music to reduce stress is considered a palliative coping approach in that individuals' internal psychological strategies are enhanced in order to

manage tension and minimize distress (Sutton and De Baker 2009).

Music techniques employed frequently for stress management include music listening, guided imagery and music, and progressive muscle relaxation to music; three treatment modalities, including guided music listening with counselling, instrumental group improvisation and preferred music listening with progressive muscle relaxation, were employed with psychiatric prisoner patients. Treatment results from all three conditions revealed that patients experienced significant improvement in state of relaxation, mood and thoughts about self (Lesiuk 2008).

A survey of information offered to parents about benefits of music in parenting magazines showed that the role of music in reducing stress or changing mood was the most frequently mentioned. The authors remark that although the recommendations were based mostly on intuition, there is a growing body of research that supports these intuitions. The authors list a long list of researchers and authors in education, psychology and therapy who published their studies on music as a stress reducer for children between 1999 and 2005 (Sims and Udtaisuk 2008, pp. 24).

Music may act as an anxiolytic treatment, so that experiences of anxiety are prevented or reduced (Chikahisa et al. 2006). The study explored the effect of experimenter-determined sedative music on participants' subjective and physiological stress levels following a cognitive stressor involving 12 min of preparation of an oral presentation. A control condition, that of sitting in silence during preparation for the oral presentation, revealed increases in subjective anxiety, systolic blood pressure and heart rate. The treatment condition, that of presence of the music, revealed a significant decrease in subjective anxiety, systolic blood pressure and heart rate. The findings of the study are promising when one considers stressors in the air traffic control occupation, whether the stressors are perceived as mildly or strongly adversary.

"Test anxiety" is another example to daily stress. Music is known to affect the individual by sympathetic resonance. The time spent during the examination could be made more relaxing by playing soothing music. Music has gained support in today's literature as an intervention that decreases anxiety levels in a variety of clinical situations. The effects of music on the anxiety response mechanism have been studied by only a few nursing researchers. Based on a psychophysiological theory synthesized from the literature, certain types of music induce relaxation and pleasure responses which reduce activity in the neuroendocrine and sympathetic nervous systems, resulting in decreased anxiety, heart rate, respiratory rate and increased temperature. Music, which has been used across the ages to soothe and relax, has been proposed as a means of decreasing test anxiety among college students (Lai et al. 2008; Stanton 1975).

Finally, it is an oversimplified view to assume that people respond similarly to sedative music. Responses to music are based on factors such as familiarity, preference, current mood and music training. Recently, neuropsychological research is contributing evidence of neuroanatomical parallels between processing of daily emotions and processing of emotional responses to music Such parallels will lead to a more thorough understanding of the influence of music on brain-emotion structure) (Knight and Rickard 2001).

Music Can Both Relax and Cause Stress

Subjects from different cultures are able to identify the type of emotion described by the music regardless of their cultural background (Fritz et al. 2009), yet music can induce emotional states in the listener or change the mood (Mc Craty et al. 1998). It has been claimed that music is widely used to enhance well-being, reduce stress and distract patients from unpleasant symptoms. Music seems to effectively reduce anxiety and improve mood for medical and surgical patients, especially for patients in intensive care units and patients undergoing aversive procedures. Music improves the quality of life for patients receiving palliative care, enhancing a sense of comfort and relaxation.

While music can help one to cope with stress, it may also evoke stress, anxiety and intolerance. Frith (2004) asks: Why does music make people so cross. He lists several examples where music was used as a weapon: playing classical music through a tannoy to drive bored teenagers off railway station (this tactic is used in Britannia, Australia and the USA against vandalism). US military interrogators use a combination of high amplitude rock and happy-smiley children's songs that are reported to break the will of the hardest terrorist. Frith quotes Berger (from The Guardian, May, 20 2003) who cites a US "operative" telling Newsweek magazine: *"These people have not heard heavy metal before. If you play it for 24 h, your brain and body functions start to slide, your train of thought slows down and your will is broken. That's when we come in and talk to them"* (Frith 2004 pp. 64). Elvis Presly and the Beatles led their young audience to frantic behaviour, and the pianist and composer Franz List inspired manic excitation or deep melancholy in his listeners (Rose and Bartsch 2009). The film industry has discovered that music is a powerful stimulus that can evoke fear and stress to a greater extent than visual images. Sound is experienced both outside and inside. Music can move us along the 'stress continum', it can both relax us and at the same time can stress us.

Culture can be a reason for different reactions to different musical styles. The boundaries of cultural experience

can be very rigid; music is not only an aesthetic experience, but it may also serve as a resource for developing one's identity. While one may attribute enormous power to "their" music, at the same time they may reject or become intolerant to the "other's" music. People credit music that they love, but music can also produce fear, anger and stress. Cohen (2001) states that we are enslaved to our old musical schemes. Familiarity with the music is an integral reason for the shiver reactions that accompany deep emotions and the close relations between familiar music and deep emotions (Grewe et al. 2007). This raises the issue of different musical styles and their effect on emotions, and it is especially important with young people who use music to build their identity (Labbé et al. 2007).

The Importance of Music Preference

"…no music has power in itself. Music has no consequences for social action unless it can be related to a coherent set of ideas and bodily feelings" (Blacking 1974, p. 35).

Cross-cultural studies concerning the connections between music and emotion provide compelling evidence that at least some of the connections are universal (Thompson 2009). In a study conducted by Lingham and Theorell (2009), effects of listening to two self-selected pieces of favourite stimulative and sedative music on both aroused (sad/joyful, listless/energetic, worried/elated) and relaxed (tense/relaxed, anxious/calm) emotions were assessed by means of both visual analogue scales and physiological outcome measures (heart rate, respiration rate and expiratory carbon dioxide). The arousal effects of the favourite stimulatory music were significant, whereas the effects of favourite sedative music were less predictable. Clark et al. (2006) reports that listening to self-selected music while being in curative radiation therapy lowers anxiety and treatment-related distress. However, physical symptoms were not affected by the use of music. Higher doses of music produced greater declines in distress.

Affective response to music depends more on cultural tradition than on inherent qualities of the music (Gregory and Varney 1996). Good et al. (2000) recommend that nurses should become aware of cultural differences in music preference and provide culturally specific selections among other music expected to have a therapeutic effect. Preferred music, as opposed to prescribed music, is a critical factor in music's effectiveness to relieve stress. Early music therapy studies established the importance of preferred music listening for relaxation. For example, participants reported favouring a "no-music" condition over a prescribed music relaxation condition. Significant correlations were found between the degree of relaxation and liking the music. Their study (Salamon et al. 2003) revealed following a comparison of five different types of music to a no-music condition that one of the types of music (i.e. atonal music), was significantly less relaxing. They concluded that preferred music was an important factor in determining music that is considered relaxing (Fukui and Yamashita 2003). A recent (Pelletier 2004) meta-analysis of the effectiveness of music use for stress reduction revealed that selections of music based on research and, as well, preferred music decreased arousal due to stress. In a study (Bernardi et al. 2006) measuring physiological and psychological responses to preferred and relaxing music, varied types of music chosen by the participants significantly reduced anxiety. The researchers concluded that preference, familiarity or past experiences with the music may have an overriding effect on positive behaviour change than the type of music.

Holland (1995) concentrates on the role of short-term music therapy as preventive medicine with both physical and mental stress–related illnesses. She states that at times stress is essential. Music can be both relaxing, but it can also serve as a safe place through which one can acquire self-knowledge through sound, observe his own life, work at deeper levels and release stress patterns that have built up through the years. Holland uses both music and words: she provides means of diffusing stress and tension in the sessions themselves and enables clients to acquire ways to manage and control their own stress. The author claims that one can learn to change from which to view stress and live with it. It bypasses language and reaches emotions directly. She claims it can be effective both for physical and mental stress–related illnesses. As Lazarus (1999) suggests appraising effects our emotions and is critical for efficient coping.

Conclusion

Going through the index of Lazarus' book, I did not see any reference to music. I was both surprised and disappointed. It may imply that the research done in this area is not sufficient.

Human life span has considerably increased, and medical services are preoccupied with health issues. Modern life is a very stressful situation, and stress emotions can cause a multitude of physical manifestations. Due to overuse of antibiotics, our ability to control infections has decreased. Music, which is expected it to be a positive experience, has a great potential in alleviating stress emotions, and Lazarus (1999) states that working with one's emotions is one of the foci in treating stress. Health psychology is studying new ways that look for environmental, psychosocial or sociocultural factors that may

contribute to disease or its prevention. Music in medicine relies on the effects of the music per se and does not involve a therapeutic relationship, and thus as Abhijeet et al. (2009) claim, it is emerging as a significant non-pharmacological alternative for psychiatric clients.

I believe we need a more focused research that can study the effect of music on various stress emotions, in everyday life and in crisis, in different age groups, with different kinds of music and with different instruments. Music therapists and researchers in the area of psychology of music can bridge between the clinical, therapeutical and basic research in music and its effects on stress and stress emotions.

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