



Faculty of Cognitive Sciences and Human Development

**SOUND THERAPY TO RELIEVE STRESS UNIVERSITY
FINAL YEAR STUDENT:
BEETHOVEN'S**

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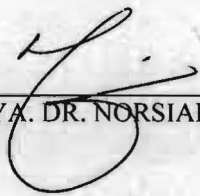
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ABSTRAK

Kajian ini adalah bertujuan untuk mengkaji keberkesanan terapi bunyi terhadap tahap ketenangan dan stress para pelajar tahun akhir. Data dikutip dengan menggunakan alat Kuantitatif Electroencephalogram (QEEG) dengan Neurofeedback Training (NFT) dan data dianalisa menggunakan Microsoft Excell. Responden yang terlibat dalam kajian ini adalah seramai lima orang yang dipilih berdasarkan stress inventori mereka. Responden ini adalah dikalangan pelajar tahun akhir, Universiti Malaysia Sarawak. Responden dikehendaki mengisi stress inventori untuk mengenal pasti tahap stress dan dipilih berdasarkan jumlah markah yang dikumpul. Kemudian, para pelajar akan melalui dua sesi QEEG iaitu sebelum dan selepas sesi Neurofeedback. Berdasarkan sesi QEEG yang pertama, protokol yang sesuai akan dipilih untuk sesi Neurofeedback. Hasil daripada analisis yang dibuat berdasarkan data yang telah dikumpul menunjukkan gelombang otak yang paling dominan untuk meningkatkan tahap ketenangan (Alpha) ialah protokol Delta. Kajian menunjukkan protokol delta mampu menstabilkan gelombang Alpha kedua-dua hemisfera.

ABSTRACT

This study aims to assess the effectiveness of the sound therapy due to calmness and level of stress of final year students. Data was collected using a quantitative electroencephalogram (QEEG) with Neurofeedback Training (NFT) as the therapy medium and the data analyzed using Microsoft Excel. Respondents involved in this study were five people and chosen based on their score of stress inventory. The respondents were among final year students of Universiti Malaysia Sarawak. Respondent was required to complete an inventory to identify the stress levels and were selected based on total points accumulated. Then, the students will go through two sessions which pre and post QEEG and also Neurofeedback session. The suitable protocol for Neurofeedback training would be chosen based on the first QEEG session. Based on the results of collected data, it shows that the most dominant brainwaves to improve calmness (Alpha) was Delta protocol. Studies show that, Delta protocol were able to stabilize Alpha brainwaves of both hemispheres.

CHAPTER 1: INTRODUCTION

University student can never escape from stress situation. Some of the student cannot handle the situation since they had a low self - esteem. In their intention to solves this problem they tried to boost their self-confidence by looking for relaxation activity and some of them made their own solution by resorting to negative social activities. Sound therapy is not just about music but also about the use of any other auditory frequencies that implicates on the brain waves or regulate the brain to relax. Sound is the most accessible medium of art in healing of human psychology apart of an entertainment. Depends to which medium of sound are preferred, it bring a good outcome to relax human tendons and at the same time relief human pressure.

Beethoven's music is one of the medium since its containing a lot of meaning. Sometimes people does not necessary to understand the lyrics but the softening sound will tend to give a relief which can be hear by others too. This study was about sound therapy to relieve stress university final year student. Along this study, the brainwave pattern of stress among universities student also been described by using Quantitative Electroencephalogram (QEEG). The participants involved are final year students. The result obtained from the pre QEEG would be follow up through Neurofeedback training session as the platform of sound therapy. The therapeutic medium was the Beethoven's music which focused on relaxation.

BACKGROUND OF STUDY

1 SOUND THERAPY

Sound therapy has been applied in medication world since many years before. Apart healing psychologically, even human health also can be cured since the drugs taken were decreasing which would give side effect if taken regularly. Stress occurs because of pressure that cannot be control or handle and may give mentally effects. Beethoven music had been long applied for relaxation, meditation and release anxiety for treatment. Classical music was more with old memory which may bring relaxation. Beethoven music was composed by Germany composer namely Beethoven. His music was good for psychological cure or in other word called sound therapy. Previous research mentioned that while hearing to Beethoven's Ninth Symphony, there was something biological happened where it can decreased the blood pressure (Clynes, 1987).

2 STRESS INVENTORY

Stress inventory is an inventory to measure the level of stress of an individual. This inventory was the appropriated one since it had been modified from the last 15 years, about the adult to the college student. The given scales were consistent within the range of stress of college students. The given measurement are mild stress (<150), moderate stress (150 - 300) and severe stress (>300) (Holmes & Rahe, 1967). There were 32 of potential stress procedure which might change an individual lifestyle. Through stress inventory, students can measured which level they were in. Then, they can find an alternative to reduce the pressure and at the same practiced a healthy lifestyle.

3 QUANTITATIVE ELECTROENCEPHALOGRAPH (QEEG)

QEEG is a device which records the electrical activity within the brain channel. The electrodes which placed all over the skull function to measure the electrical power in the brain. Other than that, it can detect which brain region engaged and at the same time processed efficiently. As the result, an electrical pattern would be produced from the electrical activities which also known as brainwave pattern. Brainwave divided into four categorize, which are, Alpha, Theta, Delta and Beta. But in this study, the main focus is only the Alpha wave.

4 NEUROFEEDBACK TRAINING

Neurofeedback training is a feedback from the QEEG to show the current electrical patterns occurs in the brain. It is a type of biofeedback which measuring brain waves to produce signal that can be used on brain activity to teach self - regulation. It is also representing an alternative treatment that may have the potential to help on along term basis with little risk of harm (Coben, Linden, & Myers, 2009). By detecting the abnormality of brain, researcher can choose which frequency of treatment is suitable with the patient. Commonly, this training will be provided with video or sound to in order to get the positive feedback for the desired brain activity.

In this study, neurofeedback training would be the alternative to decrease the stress pressure by Beethoven music. This statement can be proved by Moss and Kirk, 2004; Gilbert and Moss, 2003 by stated that a mind - body therapy can be done using electronic instruments in order to help an individual to gain awareness and control psychophysiological process. Delta and Beta were as the NFT platform for trained the inactive brain function.

PROBLEM STATEMENT

'Sound' is the best therapy to relief stress and at the same time become the alternatives medical way to treat patient that having psychology problem. Sound can be music, sound that produced by human or any medium that produces sound which can bring calm situation. In this study, the used one sound medium was Beethoven's music.

Although, Beethoven's music can cure psychology pain but there still inconsistent result. Burns et al. (1999; 2002) and Labbé et al. (2004) reported that there was a mixed result since they allowed the participant listened to music in a long period which was within 20 minutes instead of 10 minutes. They actually too much focused with the stressful test prior by listened to the music.

Therefore to support more point that Beethoven music as the stress relieve, more study need to be conducted in order to get a valid information.

Anderson et al. (2003) also studied the effect of relaxing music but more on aggressiveness level and did not measured physiological effect. They compared the result of violent and nonviolent songs to see the aggressive level of a person. They made an hypothesis by saying that the result of violent compared to nonviolent songs led more on to aggressive thought and feelings of hostility even when were not provoked.

Labbé, Schmidt, Babin & Pharr (2007), doing a research by listening to classical music and self - selected relaxing music result a significant reductions of stressed. However, the research only based on retrospective which only through physical appearances and does not peeps into the brain which, was to investigated what occur in the brain. They does not monitored their participant brain progress via QEEG method.

In this study, a sound therapy was conducted among final year cognitive sciences students in

order to gain their brain waves progress instead of psychological progress. QEEG was used to get the brain waves, while neurofeedback was the brain training via Beethoven music. Beethoven music will be platform of sound therapy.

RESEARCH OBJECTIVES

1 GENERAL OBJECTIVES

- This research was carried out to describe the brainwave pattern of stress among cognitive sciences final year students by using Quantitative Electroencephalogram (QEEG).

2 SPECIFIC OBJECTIVES

- To describes the brain waves before and after QEEG session.
- To analyse which protocols were dominant to increase calmness (Alpha).
- To analyse the effects of sound therapy on the final year students in order to increasing the calmness and reducing the stress.

RESEARCH QUESTIONS

- What was the brainwaves stated in QEEG before the therapy conducted?
- What was the brainwaves stated in QEEG after the therapy conducted?
- Were the any changes of participant brain normality after the neurofeedback training?

DEFINITION OF TERM

1 SOUND THERAPY

- **Conceptual:**

A range of therapies in which sound was used to treat physical and mental conditions (Encyclopedia of Alternative Medicine).

- **Operational:**

Defined as therapy or healing session through any sound medium. This therapy purposes was to healing human psychology.

2 QEEG

- **Conceptual:**

A measurement , using digital technology, of electrical pattern at the surface of the scalp which primarily reflect cortical electrical activity or " brainwaves" (Behavioral Medicine Associates, 2006).

- **Operational:**

A machines that can detect human brain activities within the brain channel. The activities can be seen through computer screen by connect the electrodes on human scalp.

3 NEUROFEEDBACK TRAINING

- **Conceptual:**

An emerging neuroscience - based clinical application based on the general principles of biofeedback or cybernetics (Gunkelman & Johnstone, 2005).

- **Operational:**

A training conducted based on feedback from QEEG to show the current electrical patterns occur in the brain. This training is conducting to recover the not normal of brain part.

4 BRAIN WAVES

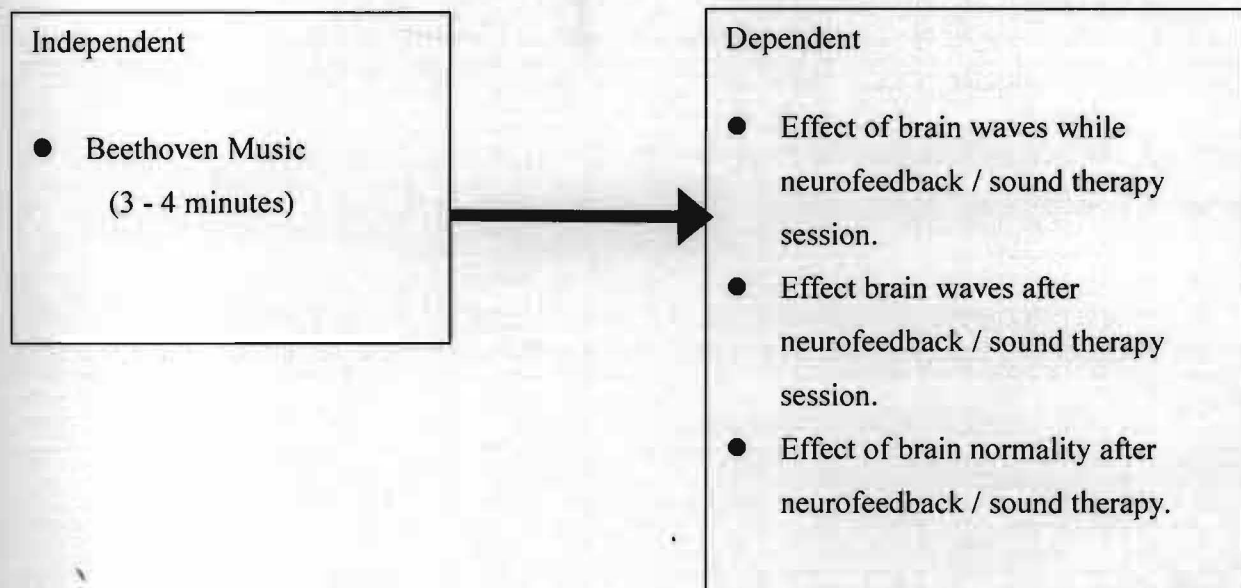
- **Conceptual:**

An electrical potential or impulses given off by brain tissue (The Dictionary).

- **Operational:**

An electrical pattern that occur in human brain which can be seen through QEEG.

CONCEPTUAL FRAMEWORK



SIGNIFICANCE OF THE STUDY

As the other classical music such as Mozart, Bach and other classical music, Beethoven have its own specialty in cure an individual psychology pain. By proposed this study, its may bring more good especially in term of knowledge. Beethoven music can be a new alternative in medical way to reduce stress and life pressure. So, a lot of research were welcome to do since it can gives people knowledge and at the same time cured their psychological pain. People can search for help via websites, books or an articles so that they can solve it in more natural way.

Apart from that, Beethoven music also can be applied and played in the hospital. The previous research by Program Oncobiology Federal University of Rio de Janeiro on 2010, reported that Beethoven's the fifth symphony can destroyed cancer cells. It claimed that one of five the cells were died, which enthusiastically involved. So, instead of using radiotherapy, classical music also can cure even in a small contributions.

People can handle stress by their own even in their home. Besides relaxing, they can do meditation or yoga to relief their stretching muscle caused by stress. With help of classical music, the sense of calming can be feel faster than do it in silence. Beethoven music such as Beethoven's Piano Emperor No. 5 can be played during the relaxing, meditation or yoga state. People can feel the calmness in a very natural way since human body can compromised with music easily.

SCOPE OF THE STUDY

The focus of the study was to analyse brainwave pattern of the stress final year Unimas Cognitive Sciences student while listening to Beethoven. After the assessment and analysis of the wave, this research also aimed to generated alpha brain waves. This is to help students to stay

in calming position even though they in busy situation. Generally, this research was under cognitive neuroscience fields since its related with the brain pattern of the brain. Music is a part of an art and since music had its own specialty in term of tune, rhythm and pitch which can contributes to human psychology healing.

LIMITATION OF THE STUDY

One of the limitations of this study was some of the participant does not give full cooperation while conducting this experiment and not willing to participate until the end of the research. The reason why they were refusing since they claimed that busy with assignment and classes. In QEEG process, some of the participant does not comfortable when wore the cap on their head with electrodes attach from the scalp and also the gel. They claimed that they felt itchy.

Plus, this research also need time constraint and most of them does not willing to finished their session. During the NFT session, it would required a half an hours to finish up one session. Sometimes, they felt its was too long. Besides, the study on 5 participant cannot represented of all Unimas students. Since classical music may sound old to particular people, so some might not interested with classical music. Some student were more self - selected which choosing a music based on their interest.

CHAPTER 2: LITERATURE REVIEW

1 SOUND THERAPY

Sound therapy is a kind of cure that include the brainwave technology, sound wave equipment, music, natural sound, human voices and any other sound that can treat a host of physical and mental conditions. People preferred to heard a harmonies sound or music that can give them a relief or reducing the feeling of anxiety and stress. As long as the harmonics sound or music element are combined in a very good mixture, it would responsive the brain in positive way. It all depend on how this sound or music infrastructure being used such as on how the melodies, rhythms and harmonies were put together. By doing the sound therapy, the related patient would felt very relaxing and comfortable as that they were entered the another world. Nilson (2008), claimed that music fill up the patient's mind by soothing and familiarizing thing which allowed them to be in their own world. Sound therapy also known as masking devices (Hobson, Chisholm, El Rifaie, 2010).

Sound therapy does work in handling stress people since it has a very profound effect toward human body. Different tones would affect different body organs which by during the orchestra, people can heard different notes and different ways of singing. Planum temporal which at the left hemisphere, had the ability to detected the absolute pitch which know exactly which type of song was played. That why people can hear a mixer of tune or pitch in a music. Music was seems to compromised the whole psychological reality. When human was hearing of sound, it would project into the body by voices, songs, singing bowl and many more. Since human body contain 70% of water, it is a good medium to travel the sound vibration through the human body. Sounds actually works in many level since it is multi - faceted. It has many of layer or harmonics and some of its might not been heard by human ear.

During the normal waking state, human brainwave frequency is still in Beta. When human exposed with harmonics sound, their brainwave would change. Sound tools actually trained the brain to goes more deeper to Alpha and Theta brainwave frequencies. These are the frequencies that induce deep meditative and peaceful states.

2 QUANTUM PHYSIC

Quantum physic is dealing with physical phenomena at nanoscopic scales where the action on the order of the plank constant. On the other word, quantum physic is study of the behaviour of matter and energy at a smaller microscopic scales. Music brings waves. Unfortunately, brain cannot recognize directly the external frequencies as physical sounds and noises. It have to be transformed into transformation signals which the brain received it as the information signals. Cochlea which is the inner part of human ear function to convert mechanical vibration of air into information energy so that human brain can perceived the sound. Manzelli (2008), reported that sound only can be interpreted if "Information Energy " was derived by " entangling activity" which transformed the vibration waves into information signals.

The vibration has to be transformed in quantum-signals, so that the information activities can interact with the neurons. This responsibility had done by the final section of cochlea which called as streneocilia of hair cells. Once streneocilia transform the waves into information signal, then it would be transmitted into brain by acoustic nerve. By interacting with neurons, then, the pitch, loudness and timber, human voices or any sound medium can be understood or perceived by human.

Same model applied when human exposed with sound waves such as Beethoven music. When the Beethoven music played, people cannot recognize what type of piece or rhythm was

played. Sonata piece of a piano bring relaxation sound but then, it only can be interpret by human brain by break the piece waves in nano scales and send it as an information signal. Then, human brain neuron can interact with the waves in the form of information signals by distinguish what types of piece were using. Sonata piece produced relaxing sound. So, when human brain perceived the sound which had been transformed into information signal, the brain waves will change into alpha since the sound can bring harmonic feeling.

3 QEEG

Quantitative Electroencephalogram is a mathematical processing of recorded EEG (electroencephalogram) in order to highlight specific wave form component by transformed the EEG into a format that elucidate relevant information (Nuwer, 1997). Or in other word, QEEG actually transforming the brain waves into numerical results with EEG data for subsequent review or comparison. Brain waves was a framework of human brain activity. According to Davidson (1988), the specific of brain waves types indicated the type of brain activity that was occurred.

There are four types of waves usually forms in brain which are Alpha, Theta, Beta and Delta. Human feeling or action can be determined by observed the brain waves. Below are the brain waves eventually occurred in human brain:

3.1 ALPHA WAVES

Alpha waves is also known as neural oscillations and mainly related with relaxation. It is appears in calm situation and usually in relaxing state even though there is a little bit of distraption. Commonly, the alpha frequency is between 8 hertz and 12 hertz. The waves would

be increases if a human was in wakeful relaxation position with eyes that still closing. Höller et al. (2012), supported that the state of alpha wave activity was inversely related with cognitive activity, so any relaxing medium such as music can increased the alpha wave activity. In this position, the alpha wave always be ready to get respond once its needed. In contrast, the waves would be decreased if the eyes is opened or drowsiness on sleep.

Therefore, the formed of alpha activities in the occipital region was associated with a relaxed mental state. So, the greater the amplitude of alpha wave, the more it indicates relaxation and less arousal.

3.2 THETA WAVES

Next is Theta, which a normal brainwave in the encephalogram of a human who was awake but in relaxed and drowsy condition. It always being relates with creativity and intuition which only need low frequency and amplitude to get active. Theta waves will appears during the day dreamy or fantasizing. Theta frequency is between 4 herzt and 7 herzt.

3.3 DELTA WAVES

The third one is Delta, defined as a slow brain wave and having a frequency that lower than 6 cycles per second. Delta only would be appears during the deepest stages of sleep time in frequency between 1hertz and 4herzt.

3.4 BETA WAVES

While, Beta is the about the state of mental, intellectual activity or outwardly focused concentration (Hammond, 2006). Its the second most common waveform occurred in EEG of the

adult brain, since the brainwave can be identify once human in age of 3. The frequency are between 12 herzt and 30 herzt per second. Instead of associated with an alert waking state, it also can occurs as a sign of anxiety or apprehension. If the is brain engaged with metalling or thinking processing, the Beta waves would be detected during the presence.

3. 5 TYPES OF BRAIN WAVES

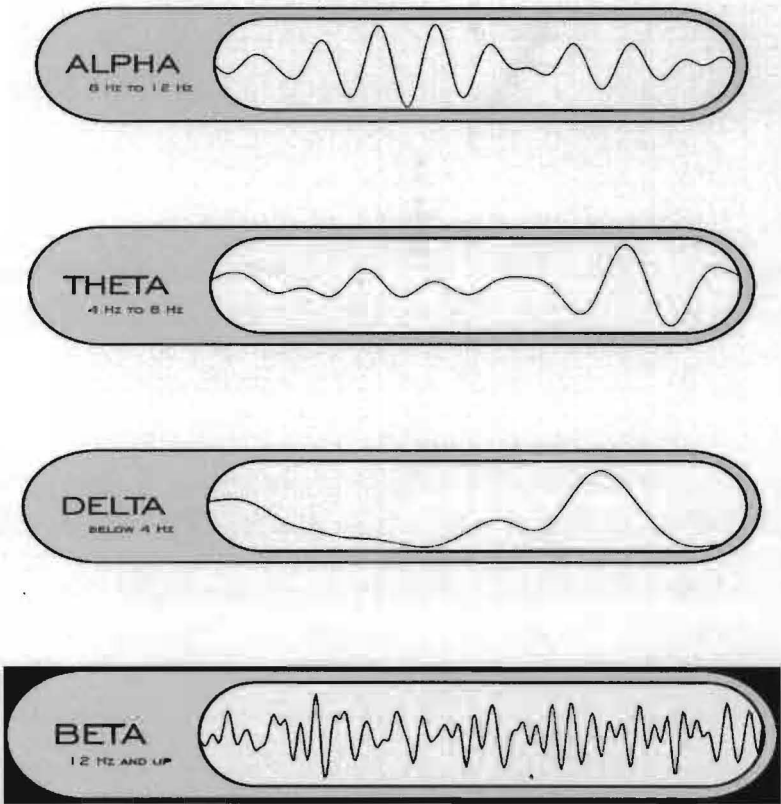


Figure 1: Types of Brain Waves

4 NEUROFEEDBACK TRAINING (NFT)

Neurofeedback training (NFT) is a form of behavioral training that aimed at developing skills for self - regulation of brain activity. NFT emerged with neuroscience fields which involved clinical application based on the general principles of biofeedback or cybernetics. The training was based on physiology not the human behaviour. The measurement of psychological indicators should be in logically and be more related to a proper medication choices or treatment, since it needs being treated. According to Fein, Galin, Yingling, Johnstone and Nelson (1984), reported that recording and analysis of QEEG has been shown yield reliable results.

Human brain can developed or expanded the pathways that are used and 'pruning' the connections that were still being utilized. In order to performed the brain normality back, NFT need to be done in 25 - 50 sessions of 40 - 60 minutes duration. Although, QEEG can show the brain waves through the computers screen while NFT was conducted, but then the artefacts need to be removes. Artefacts was known as arousal that disturbed the actual brain waves reading which might affect the test reliability. Artefacts were caused by the eye or head movements as well as the muscle activity (Kotchoubey, Schleicher, Lutzenberger, & Birbaumer, 1997).

Neurofeedback training had been applied most in the medical treatment such as depression, autism and many more. Lubar & Shouse (1976), reported that neurofeedback (NF) activities had been implied in the field of child and adolescent psychiatry since the past 30 years ago. A part of that, NF activities also had applied in depression (Rosenfeld, 1997). Most of treatment were succeeded in experiment and the success rated from 60 - 90 % (Wright & Gunkelman, 1998). Some of the patient might show up the effect even in the early of the session for example at 5 - 10 session, though some also had strong changes even after their initial session.