HAIGAZIAN UNIVERSITY

THE EFFECT OF MUSIC TYPES ON MOOD AND VIGILANCE

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DEDICATION

To my wife Jeannette, whose voice is the best music to my ears.

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Finally my gratitude to the best counselor ever, Jesus Christ.

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ABSTRACT

A study was conducted to test five hypotheses which investigated the effect of music types on mood induction and vigilance in young Lebanese students. This study aimed also to validate a specific type of music 'the designer' as a tool for mood and vigilance enhancement. A mood assessment scale was administered to a sample of 60 students (31 males and 26 females), with ages ranging between 13 and 18, enrolled at the Beirut Baptist School in Beirut. The mood shift was measured by comparing the posttests and the pretests T scores of the mood assessment scales. The vigilance was assessed by using the 'star-tracing' activity. Two tailed paired *t* tests and one way analysis of variance tests of between-groups effects (the dependant variable being the mood and vigilance and the independent variable being the type of music), were performed. The results showed significant shifts in mood for all types of music, except for the designer music on the relaxation scale. As for the vigilance, there was a reliable difference between the influence of Designer music and the Grunge Rock. The results indicate that music and in specific the 'Designer' can be used as a tool for facilitating reduction of stress and hostility and fostering attention and focus.

CHAPTER 1

INTRODUCTION

"After that, whenever the bad depression from God tormented Saul, David got out his *harp and played.* That would calm Saul down, and he would feel better as the *moodiness* lifted"

1 Samuel 16:23 from the Old Testament

Music is "The Perfect Expression of the Soul."

Composer Robert Schumann

Statement of the Problem

In May 2008, I had the opportunity to lead fellowship sessions with grade 12 students at the Beirut Baptist School. During the sessions, I put some music from a DVD entitled "Yanni live in concert", and to my surprise the students were so absorbed by the music that they stayed for more than 30 minutes completely silent and some of them expressed how pleasant they were feeling. Having listened to same kind of music, grade 10 students' behavior changed from agitated to calm in a remarkable way. Was it only the effect of music that changed the behavior or was it due to other factors or inputs? Is there any power in the music that affects the mood and behavior of students?

Music is woven into the fabric of our lives from home to stores. Music has performed an important role in every known civilization, past and present. Most societies mark the important stages of a person's life with specific types or pieces of music. There are birth songs, birthday songs, coming-of-age songs, graduation songs, anniversary songs, holiday songs, retirement songs, and even death songs. Music's influence is so prevalent that, to this day, most of us remember songs that were played at important moments in our lives

(Millbower, 2000). Music is interpretative enough to be communally understood, yet personal and intimate enough to share our deepest thoughts.

In his book "Training with a beat" Lenn Millbower (2000) explained how Music crawls into every fiber of our being, becoming one with us and affecting our lives in many ways : Music affects shopping habits: The use of slow music increases sales. The use of slow (adagio) Baroque music can increase sales by as much as 38 percent.

Music affects mood: Music can calm, relax, excite, motivate to action, and suggest appropriate emotions to people.

Music affects productivity: Assembly line efficiency improves when background music is linked to repeated motion at appropriate speed.

Music affects Health: Music can alter the human body's physiology, making people happier, healthier, and smarter; helping the body fight off viruses, reducing stress hormone levels; and affecting heart beat, pulse rate, and blood pressure.

In a school setting, music in the classroom may have different effects depending on the strengths and weaknesses of the pupils in the classroom. It may also depend on the existing level of noise pollution at the school and surrounding area. Noise pollution is a growing problem, and schools are not exempted. Researcher Arline Bronzaft as mentioned in Lawrence (2001) found that children on the train-track side of a New York public school were lagging a year behind their classmates on the other side of the building in learning to read.

In a study conducted by Frontzak (2004) to investigate the effect of playing background music on students as they come into class, it has been found that the time to settle down decreases with the classical music playing in the background.

Over a 20 year period, the National Academy for Child Development in the United States experimented with many ways of creating a sound filter including white noise,

environmental sounds, nature sounds, and many forms of music. When "Advanced Brain Technologies" was founded, one of its objectives was to offer recordings that would provide a consistent, high-quality therapeutic auditory environment. Ostrander and Schroeder as mentioned in Lawrence (2000) stated that tests conducted at Iowa State University, showed that slow Baroque music alone speeded up learning by 24 percent and increased memory retention by 26 percent.

Teachers working for the Washington State Department of Immigration played the music during English classes for recent arrivals from Cambodia, Laos, and other Asian countries. Teachers reported it eased the trauma these older adults experienced at having to pick up a new language and use it in a very foreign culture. The music also accelerated their learning". In 1991 Northwestern Indiana Science Fair, a sixth grader Jamee Cathcart designed a study with Baroque music. Eleven out of twelve students showed remarkable improvement in test scores after listening to Baroque music (Lawrence, 2001).

These claims for the effectiveness of music seem fantastic and make us wonder if this effectiveness is cross-cultural. Can a certain type of music have the same effect regardless of the culture? Could we find similar results if similar experiments were conducted locally with participants from Lebanon? We have a country that is interested in different types of music. Take for example the young generation's taste of music; a brief observation of their style of music will give you an idea about the broad spectrum: from the Arabic oldies of Oum Kolsoum to the Pop, Techno and Grunge of the 21st century. It is so diverse that it varies from one area to another, sometimes within the same age group. Thus in midst of this diversity, what type of music can be applied for a certain age group (e.g. 14-18years old) to enhance its mood and behavior? Is there any specific type that can enhance the mood and affect the clarity and attention regardless of the music taste or familiarity ?

Purpose of the Study

The purpose of the following study is to examine the effect of music on mood and behavior of young people in the Lebanese culture and in particular in a school setting. The behavior will be examined by assessing the vigilance using an activity called Star-Tracing (appendix C).

Hypotheses

Based on the purpose of the study mentioned above and on the findings that will be reported in this study, the following hypotheses were made:

Hypothesis 1: Classical music (Joyful type : key major with moderate tempo) will increase pleasantness and relaxation and decrease hostility among participants.

Hypothesis 2: Designer music will increase pleasantness and relaxation and decrease hostility among participants.

Hypothesis 3: Grunge Rock music will increase hostility and decrease pleasantness and relaxation among participants.

Hypothesis 4: Participants will need less time to complete vigilance task when listening to Classical (joyful type) and Designer music, than when listening to Grunge Rock music.

Hypothesis 5: Participants will make less errors on vigilance task when listening to classical (joyful type) and designer music, than when listening to Grunge Rock music.

The Significance of the Study

Lebanon is a fertile soil for stress, and we often ignore the fact that young students can fall into depression and suffer from traumas, so we just go by and teach as usual. Ignorance is not a blessing in this case.

Hanshumaker (1980) noted that music is capable of facilitating language acquisition, reading readiness, and general intellectual development; It can foster positive attitudes and to lower truancy in middle and high school; it can enhance creativity, and to promote social

development, personality adjustment, and self-worth. Therefore, it would be beneficial to adopt music as a tool to help students reach better performances on the emotional and behavioral level.

The Nature of the Study

The present study is quantitative in nature. It relied on self-report measures and also on a vigilance task (appendix C) requiring attention and focus which were assessed by recording the time needed for completion and the number of errors made.

A sample of 60 students from the Beirut Baptist School participated in the experiment by filling a questionnaire including twenty nine subscales (appendix A) measuring the five mood scales of Fatigue, Hostility, Pleasantness, Relaxation and Sadness (appendix B). The effect of music on these scales and on the vigilance were examined by Means comparison in a paired samples *t* test and one way analysis of variance ANOVA.

Definition of Terms

Affect

The word affect comes from the Latin word affectus, which means "mental state" or "mood" (Adler & Adler, 2001).

Baroque music

Describes an era and a set of styles of European classical music, that was known as having the characteristics of a style of artistic expression prevalent especially in the 17th century. This music marked generally by use of complex forms, bold ornamentation, and the juxtaposition of contrasting elements often conveying a sense of drama, movement, and tension. It is also characterized by grotesqueness, extravagance, complexity, or flamboyance (Baroque, 2008).

Designer Music

The term "Designer Music" was introduced by the music industry to describe a new genre of music designed to affect the listener in specific ways. The term has been used in the scientific literature to specify this type of music (Atkinson, Barrios, Choplin,, McCraty, Tomasino, 1998).

Grunge Rock

A Rock music incorporating elements of punk rock and heavy metal, that originated in the 1990s, is characterized by loud guitar and drum playing and nihilistic lyrics (Grunge, 2008).

Mood

Baker defines mood as follows: "A pervasive emotion of sustained duration in which the internal quality of feeling affects the person's perception of himself or herself and the surroundings. Although it is not necessarily pathological in and of itself, a mood may persist over a length of time and require professional help. The feelings may be unpleasant (such as depression, anger, or anxiety) or pleasant (such as elation or an exaggerated sense of well-being" (Baker, 1999, p. 761).

Although there is no universally accepted statement on the defining characteristics of mood especially in distinguishing the term mood from related terms such as affect, emotion, or feeling, most researchers agree in defining mood as affective states that are nonspecific, pervasive, and capable of widely influencing cognition and behavior. There has been less agreement regarding other elements of moods, such as their lower intensity or longer duration, especially in comparison to emotions (Swinkels &, Giuliano, 1995). Labeling one's mood is the focus on categorizing and naming feelings.

Music Therapy

Music therapy is the systematic application of music in the treatment of the physiological and psychosocial aspects of an illness or disability. It focuses on the acquisition of nonmusical skills and behaviors, as determined by a board certified music therapist through systematic assessment and treatment planning (Music Therapy, 2004)

Pitch

Is a purely psychological construct, related both to the actual frequency of a particular tone and to its relative position in the musical scale (Levitin, 2006).

Reverberant environment

Refers to the perception of how distant the source is from us in combination with how large a room or hall the music is in (Levitin, 2006).

Tempo

Refers to the rate of speed of a musical piece or passage indicated by one of a series of directions (as largo, presto, or allegro) and often by an exact metronome marking (Tempo, 2008)

Timbre

Distinguishes one instrument from another, when both are playing the same written note (Levitin, 2006).

Vigilance

Is the quality or state of being vigilant, watchful and alert. It is the state of paying close and continuous attention. Sustained attention, or vigilance, as it is more often called, refers to the state in which attention must be maintained over time. Often this is to be found in some form of "watch keeping" activity when an observer, or listener, must continuously monitor a situation in which significant, but usually infrequent and unpredictable, events may occur (Attention, 2008)

Limitations

The sample which was selected randomly from intermediate and secondary classes was limited to N =15 per each type of music, thus it is not representative of the population of young students of the school intermediate and secondary levels.

The experiment was conducted in a school in Beirut. Thus the results cannot be generalized to the schools in Lebanon.

Though the crowd effect was minimized by keeping the participants' group of maximum five, this cannot eliminate the possibility of distraction when somebody asked a question or made a funny comment.

No detailed survey was made concerning the music taste which can be of importance to the analysis of the results.

CHAPTER 2

LITERATURE REVIEW

What is music? To many, 'music' can only mean the great masters, Beethoven, Debussey, and Mozart. To others, 'music' is only the Jazz and Blues and anything made before 1940 or after 1960 isn't really music at all (Levitin, 2006). For others especially the teenagers, anything which is not to the rhythm of Pop is considered dead.
What do the music of Bach, Bob Dylan, Prince have in common? What separates music from noise?

Do the sounds of nature provide useful starting point for defining music? Birds are said to "sing", but what they really do is repeat patterns. The relationship between these sounds has little variation, and hence little musical value. Birds do not control their songs. They repeat patterns seared into bird memory. Nature in fact does not really make "music". They are too random and cannot be controlled. Starvinsky as per Millbower (2000) differentiated noise from music with his observation that tonal elements become music only by virtue of their being organized, and that such organization presupposes a conscious human act. The American Heritage Collegiate dictionary definition of music supports Stravinsky's position by stating that 'Music' is the art of arranging sounds in time so as to produce a continuous unified and evocative composition, as through melody, and rhythm. The composer Edgard Varse defined it as "music is organized sound" (Levitin, 2006, p. 14)

General Overview on the Power of Music

Music is virtually everywhere from packed sports arenas to commercials that peddle everything from tennis shoes to alcohol from the sound tracks of movies and television series to the pulsing rhythms that reverberate in our health spas. Everything today seems to march to its rhythm.

Young people wake up to music, drive to it, play to it, study to it, and go to sleep to it. Studies in the United States, showed that between the 7th and 12th grades, the average teenager (13-18years old) will listen to and watch 11,000 hours of rock music and rock videos - more than twice the time they will spend in class (Holmberg, 1990). A similar study in Lebanon concerning the type of music to listen to would give us information on the most pervasive type for the young Lebanese population.

Dr. Alan Bloom noted in his best-selling book The Closing of the American Mind, "Nothing is more singular about this generation than its addiction to music" (Bloom, 1987, p. 68).

Throughout the ages, wise men have noted music's profound impact on its listeners. For example, over 2,000 years before the birth of Christ, the musical systems of China were both highly developed and central to its society. It was toward this that the philosophers directed much of their attention. Understanding its intrinsic power, they carefully checked their music to make sure that it conveyed eternal truths and could thus influence man's character for the better. Tradition states that one emperor, by the name of Shun, would monitor the health of each of the provinces of his vast kingdom by simply examining the music they produced; Coarse and sensual sounds indicated a sick society, one in need of his intervention and assistance. Greek philosopher Plato echoed the sentiments of Emperor Shun when he said, "When modes of music change, the

fundamental laws of the state change with them". Plato's contemporary Aristotle stated that music has "the power to form character" (Holmberg, 1990).

The social scientist, James Q. Wilson observed in his book "Thinking About Crime" that disorder and crime are usually inextricably linked and human behavior is profoundly affected by its environment. Broken windows, graffiti, drunkenness, and open displays of unfettered sexuality are an invitation for crime; a declaration that the environment is uncontrolled and uncontrollable, and that anyone can invade it to do whatever damage and mischief the mind suggests (Wilson, 1985).

A striking example of this "broken window effect" as it relates to music can be seen in a small park in Edmonton, Alberta. Several years ago drug dealers began doing business there and, as a result, the crime rate in general began to increase. In an effort to restore a sense of order and preserve their community, local merchants paid for a sound system and began to broadcast the symphonies of Bach, Beethoven and Mozart throughout the park. Neil Dubord, the local Chief of Police, reported that the results were immediate and dramatic with the number of crimes falling by approximately 800 percent. While there's no way to fully quantify all the factors that led to this decline, the gut consensus was that the intelligence, beauty, grandeur and order projected by the classical music was so antithetical to the discord and degeneracy associated with the drug trade, that many of the dealers just stayed away (Holmberg, 1990).

Repeated experiments have shown that plants respond positively to classical forms of music, actually growing and flowering faster than if there was no music at all. Conversely, more dissident forms of music, like heavy metal, can actually retard growth and even kill the plant. Dr. Adam Knieste, a musicologist who studies the effects of music upon people noted that music is really a powerful drug. Music can poison you, lift your spirits, or make you sick without knowing why (Holmberg, 1990).

A number of studies have shown that music affects emotions and mood states. Other studies have demonstrated the effect of music on physiological measures such as muscle tension, immune system function, pulse rate, and blood pressure (Atkinson et al., 1998).

In the realm of the mind, there is mounting evidence that certain kinds of rock have a negative effect on one's ability to think and learn. Studies at two separate universities, for example, have found that rats have a much more difficult time learning to pass through a maze if they are subjected to hard-rock music (Insight Magazine, 1987, p. 57).

On the emotional level, few would deny music's power. Its ability to influence and enhance moods is, in fact, one of its greatest attractions. As Eddie Manson, Oscar-winning composer and one-time president of the American Society of Music Arrangers has said, "We manipulate people like crazy.... Every film composer mixes his experiences with a talent for musical manipulation, and then projects that Machiavellian power gut to gut" (Family Weekly, 1983, p. 15)

Regarding the brain, music is also a powerful "encoder", a term in psychology for something that helps determine the way we perceive and think about the world. In other words, music has an inside track to the subconscious levels of our minds. This truth is even physically suggested by the fact that the auditory nerves are the most predominant of all the human senses. Musicologist David Tame wrote in his book “The Secret Power of Music”, that "Music is the language of languages. It can be said that of all the arts, there is none that more powerfully moves and changes the consciousness" (Tame, 1984, p. 15).

The Music and the Brain

How does Brain process Music?

Levitin (2006) explained that for scientists, the word mind refers to that part of each of us that embodies our thoughts, hopes, desires, memories, beliefs, and experiences. The brain, on the other hand, is an organ of the body, a collection of cells and water, chemicals and blood vessels, that resides in the skull. Activity in the brain gives rise to the contents of the mind. He makes the analogy that the brain is like a computer's CPU, or hardware, while the mind is like the programs or software running on the CPU. Different programs can run on what is essentially the same hardware, different minds can arise from very similar brains. He stated also that more than a century of such neuropsychological investigation has allowed scientists to make maps of the brain's areas of function, and to localize particular cognitive operations. Networks of interconnected neurons perform computations on information and combine their computations in ways that lead to thoughts, decisions, perceptions, and ultimately consciousness. Different subsystems are responsible for different aspects of cognition. Damage to an area of the brain just above and behind the left ear causes difficulty in understanding spoken language; damage to a region at the very top of the head causes difficulty moving your fingers; damage to an area in the center of the brain can block the ability to form new memories, while leaving old memories intact. The musical activity involves nearly every region of the brain that we know about, and nearly every neural subsystem. Different aspects of the music are handled by different neural regions, the brain uses functional segregation for music processing, and employs a system of feature detectors whose job is to analyze specific aspects of the musical signal, such as pitch, tempo, timbre, and so on. Listening to music starts with subcortical (below-the-cortex) structures, the cochlear nuclei, the brain stem, the cerebellum, and then moves up to auditory cortices on both sides of the brain. Trying to follow along with music that you know or at least music in a style you're familiar with, such as baroque

or blues, recruits additional regions of the brain, including the hippocampus (our memory center), and subsections of the frontal lobe, particularly a region called inferior frontal cortex, which is in the lowest parts of the frontal lobe (Levitin, 2006).

Sound is transmitted through the air by molecules vibrating at certain frequencies. These molecules bombard the eardrum, causing it to wiggle in and out depending on how hard they hit it (related to the volume or amplitude of the sound) and on how fast they're vibrating (related to what we call pitch). But there is nothing in the molecules that tells the eardrum where they came from, or which ones are associated with which object. The molecules that were set in motion by the cat purring don't carry an identifying tag that says cat, and they may arrive on the eardrum at the same time and in the same region of the eardrum as the sounds from the refrigerator, the heater or Mozart (Levitin, 2006).

How does the brain figure out, from this disorganized mixture of molecules beating against a membrane, what is out there in the world? In particular, how does it do this with music? It does this through a process of feature extraction, followed by another process of feature integration. The brain extracts basic, low-level features from the music, using specialized neural networks that decompose the signal into information about pitch, timbre, spatial location, loudness, reverberant environment, tone durations, and the onset times for different notes (and for different components of tones). These operations are carried out in parallel by neural circuits that compute these values and that can operate somewhat independently of one another, that is the pitch circuit doesn't need to wait for the duration circuit to be done in order to perform its calculations. This sort of processing, where only the information contained in the stimulus is considered by the neural circuits, is called bottom-up processing. At the same time as feature extraction is taking place in the cochlea, auditory cortex, brain stem, and cerebellum, the higher-level centers of our brain are receiving a constant flow of information about what has been extracted so far; this information is continually updated, and

typically rewrites the older information. As our centers for higher thought, mostly in the frontal cortex, receive these updates, they are working hard to predict what will come next in the music, based on several factors; first what has already come before in the piece of music we're hearing; second what we remember will come next if the music is familiar; third what we expect will come next if the genre or style is familiar, based on previous exposure to this style of music; fourth any additional information we've been given, such as a summary of the music that we've read, a sudden movement by a performer, or a nudge by the person sitting next to us. These frontal-lobe calculations are called top-down processing. The top-down and bottom-up processes inform each other in an ongoing fashion. At the same time as features are being analyzed individually. The brain faces three difficulties in trying to identify the auditory objects we hear. First, the information arriving at the sensory receptors is undifferentiated. Second, the information is ambiguous different objects can give rise to similar or identical patterns of activation on the eardrum. Third, the information is seldom complete. Parts of the sound may be covered up by other sounds, or lost. The brain has to make a calculated guess about what is really out there. It does so very quickly and generally subconsciously (Levitin, 2006).

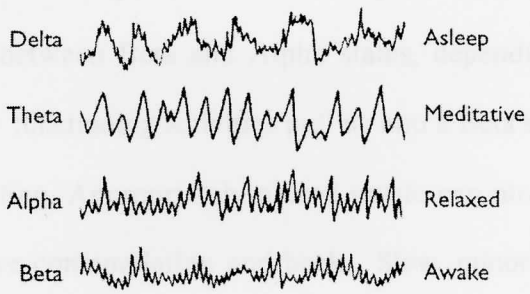
The right brain and the left brain.

Millbower (2006) explained that there appear to be two modes of thinking, verbal and nonverbal, represented separately in left and right hemispheres. It is important to state that no one function is totally isolated in any one hemisphere. The left hemisphere is predominately logical and analytical. It processes ideas sequentially, in a linear fashion. It tends to be the more academic brain, handling language, math, and logic. The left hemisphere is about 90 percent better than the right hemisphere at recognizing words and about 70 percent better at identifying meaningless syllables or backward speech. Whereas the left hemisphere tends to think sequentially, the right hemisphere thinks holistically, in concepts and metaphors. It needs to see the big picture first, perceiving, then absorbing, and then processing data, jumping from one

idea to the next in no seeming order. It is the creative side, dabbling in art, color, pictures, and music. The interaction of these two hemispheres is fascinating. For example, if your right brain was sedated, you could describe an automobile, but not draw it. If the situation was reversed and your left brain was sedated, you could probably draw a car, but you would be unable to give it a name. We all use both sides of our brain, but most of us have a preference for one side or the other. Music appeals to both the left and right hemispheres. The left hemispheres processes rhythm and lyrics while the right hemispheres listens for melodies and harmonic relationships across time.

Music and the Brain Waves

As per Millbower (2006), the electroencephalograph machine EEG has allowed to map the movement of electrical impulses within the brain, isolating these waves into four broad categories, Delta, Theta, Alpha and Beta as per below illustration



Delta Waves. The Delta waves (around 1 to 4 cycles) occur when you are in deep, dreamless sleep. I this sate, the brain, although not asleep, is at rest. As the person begin to wake, the mind switches to theta waves.

Theta Waves. The Theta waves (around 4 to 8 cycles per second) reflect your brains activities in the shallow stages of sleep, or in deep contemplation, or meditation. Your brain, in Theta state, exhibits free-flowing creativity, helping you experience sudden insights and inspirations.

Alpha Waves. The Alpha waves (around 8 to 13 cycles per second) occur when your brain is in a non-aroused, relaxed state of awareness. Some of the most important Alpha moments of the day occur after you wake up, but before you focus your mind on the day's activities. In these moments, your mind is alert but relaxed, allowing your right hemisphere to engage in its free-flowing metaphorical visions without left hemisphere interference. You are also in Alpha when you read, study, or think deep thoughts.

Beta Waves. The Beta waves (around 13 to 30 cycles per second) are the patterns of an awake, conscious mind, with the left hemisphere tending to dominate. This is the wave pattern you experience as you go about the daily business of living—talking, paying bills, doing work, analyzing situations, and concentrating on tasks at hand (Millbower, 2006).

All four waves are present in the brain at any given time, but EEG studies have confirmed that the amount of each varies as a person's brain becomes more alert or relaxed. The higher the wave cycle, the more alert your brain becomes. During a normal day, our brains shift between Beta and Alpha states, depending on the circumstances that surround us. Fully functioning activities pull us into a Beta state, while an Alpha state is best for alert reflecting. Appropriately placed music can move a person's mind from alert focus to reflective contemplation and back. Slow, minor-key music encourages an Alpha state, so that the brain can relax and drop its left-hemispheric rationality. As the brain waves slow, the limbic system emotional centers grow dominant, allowing information to reach the subconscious and pass into the long-term memory. These brain wave patterns are especially useful for reviewing material and for creative visioning exercises. If a more active climate is required, faster, major-key music will wake a body up, encouraging it to become more active (Millbower, 2006).

How does our brain process music into feelings?

New evidence shows that the mood-controlling systems of the midbrain are involved in the emotional appreciation of music. Schmidt and Trainor (2001) studied whether or not frontal brain electrical activity correlated with intensity and positivity or negativity, or valence, of emotion. The left frontal brain has been shown to be a part of how we experience positive emotions like joy, interest, and happiness; the right frontal brain with experiencing negative emotions like fear, disgust, and sadness. Additionally, evidence points to a correlation between the intensity of emotions experienced and the overall activation of the frontal region of the brain. The researchers theorized that left frontal brain activity would be greater when subjects were listening to music intended to provoke happiness and joy and that the right frontal brain would be more active during sad and fear-invoking music. In addition, they predicted that the more intense the music, the greater the overall frontal brain activity would be. Both of their hypotheses were verified. Activity in subjects' left frontal brain was greater while they listened to music chosen to elicit positive emotions and right frontal brain activity was higher while they listened to music chosen to elicit negative emotions. Overall frontal brain activity increased as the emotional intensity of the musical selections increased.

There is yet more evidence supporting the idea that people genuinely experience emotion while listening to music. As with language, then, music seems to be something that we are predisposed to interpret on an innate, subconscious level. We appear to have a biological framework that allows music to elicit emotion from us. Although we are not sure of the nature of this framework, we believe it to be an interaction between the different systems in the brain, rather than a single system. These systems, many of which are also involved in emotion, take in the auditory stimuli of music. Through some unknown process, they recognize patterns in those stimuli and create emotion in correspondence with the particular patterns recognized (Boswell, 2008).

How can we use Music to Improve our Lives?

Music and Emotion

In an article by Ian Boswell of Macalester College, the researcher refers to a study by Krumhansl (1997), who conducted a study in which two groups of college students participated in two separate activities. One group of 40 students dynamically rated the levels of sadness, fear, happiness, and tension in six sample pieces intended to evoke sadness, fear, or happiness. A separate group was hooked up to physiological sensors monitoring a variety of cardiovascular, electrodermal, and respiratory responses which recorded their change over time. Both groups heard the six musical samples with a 90-second pause in between each. The results supported the emotivist position (that humans experience emotions in reaction to music). Each of the musical selections was rated as having the intended emotion, and consistent physiological responses were found for each measured emotion: sad music was correlated with a decreased heart rate, lowered finger temperature, increased blood pressure, and decreased skin conductance level; happy music was correlated with faster and shallower breathing, and fear-invoking music with a slower pulse, faster breathing, and decreased finger temperature. These effects were consistent over the duration of the pieces. Regardless of the way we learn, the evidence indicates that humans do actually experience emotion as an effect of listening to music (Boswell, 2008).

Music as a Mood Induction tool

Mood Induction Procedures. In the last decades, a set of experimental procedures were developed that were able to induce emotional changes in participants in a controlled way, manipulating variables inside the laboratory. The initial objective has been to go more deeply into the knowledge of emotions and their relations with cognitions. This set of procedures, called "Mood Induction Procedures" (MIPs), includes a broad diversity of methods and they can be defined as strategies whose aim is to provoke in an individual a

transitory emotional state in a non natural situation and in a controlled manner; the mood induced tries to be specific and pretends to be an experimental analogue of the mood that would happen in a certain natural situation. MIPs have proven to be efficient in achieving these changes in the target mood.

However, the magnitude and the specificity of the change vary according to the specific MIP used. Some of the MIPs used are Self-statements or Velten procedure, music, music "in crescendo", hypnotic suggestions, facial expressions, game feedback, social feedback, autobiographical recall, social recall, imagery, empathy, experimenter behavior, films, threat, public speaking, gifts, drugs, social interaction or combination of different MIPs. 'Self-statements or Velten procedure' have been developed by Velten in 1968 where the induction is achieved by means of 60 statements relative to the mood, written in the first person. The 'Music' has been used the first time by Sutherland, Newman and Rachman in 1982 where participants were asked to use the music piece as a base to enter themselves into a mood, and they were told that music alone can't induce the mood automatically and that they must follow their own strategies to reach the mood. The 'Autobiographical recall' was developed by Brewer, Doughtie and Lubin in 1980 where participants are asked to remember autobiographical events that provoke in them a certain mood. The 'Films' (or fragments of films) method has been used by the James Gross group in 1995, where the participants were asked to feel all the emotions provoked by the film as intensely as possible, without trying to content themselves or hide their feelings. To get a more effective induction, some authors combine different kinds of MIPs. Some of the procedures seem especially appropriate for these combinations. That is the case of very similar procedures, for example the Velten and the Imagery procedures that can be applied simultaneously, like the Velten and the Music procedures (Banos, 2008)

The three mood manipulation procedures commonly cited in the literature are hypnosis, the Velten Mood Induction Procedure (VMIP), and the Musical Mood Induction Procedure (MMIP). The procedure for mood inductions through hypnosis requires the participants, after being hypnotized, to imagine personally relevant scenes in which they were either happy or sad to get themselves into the corresponding mood state. Mood states are thereby induced by remembering emotional events. Participants are then told to "adjust" their mood states until the mood was intense but not unbearable and were then told to maintain the mood state. The main advantage of mood induction by hypnosis is that mood states can be quickly produced and can be maintained for several minutes while the participant performs other tasks. However, hypnosis has been criticized as being able to affect only a small percentage of the participants, making any conclusions limited in their generality to the population. *(Hinn, 1996)*.

Pinkus (2002) in an article about the Velten Mood Induction Procedure (VMIP) stated that the VMIP is one method of mood manipulation that has been widely employed in cognitive, social, and clinical (where it is used as an analogue of depression) psychology experiments. The procedure involves asking individuals to read (first silently, then aloud) and concentrate on a series of 60 statements, each printed on a different page or card. Through this procedure, individuals can be induced into an elated mood by reading self-referent statements that get progressively more elative, a depressed mood by reading self-referent statements that get progressively more depressive or a neutral mood. The VMIP appears to be very successful in inducing the desired mood changes although some researchers contest that. Furthermore, the VMIP is simple and quite easy to administer.

Hinn (1996) cites three major problems with the VMIP. The first is role demand; Due to the transparent purpose of the procedure, it has been suggested that any differences in behavior may be due to motivation to comply with perceived expectation of the experimenter.

For example the participants are informed that they will be undergoing a mood induction procedure and since the procedure alone cannot sufficiently induce mood, they are to work on "feeling" the mood that they have been requested to maintain. Given this, assuming that a particular mood state has been induced, the behavior of the participants may be due to instructions to adopt and maintain the requested mood versus being due to the actual mood induction procedure. Experiments designed to control for demand characteristics have failed to reject the hypothesis that observed mood induction is due to role demand. The second major problem is that the VMIP is fairly weak as well as time-limited. A study by Isen and Gorgoglione suggested that the mood induced by the VMIP might not last beyond an initial mood manipulation measure, seriously affecting the 10 mood's influence on an experiment's dependent measure(s). Lastly, the VMIP has been criticized for its ineffectiveness on males. Many experimenters, including Velten himself, therefore, limited the study of the VMIP to female subjects because of this.

Hinn (1996) stated another alternative of mood induction technique which is the Musical Mood Induction Procedure (MMIP). It was originally developed to overcome flaws such as demand effects and gender bias of techniques such as the VMIP. The procedure of the MMIP is as follows: Prior to mood induction, participants are told that they would be listening to music that would help them develop a happy/sad mood. However, they are also told that the music alone could not create the desired mood and were encouraged to think happy/sad thoughts, concentrating on personally experienced happy/sad events. Although subsequent induction procedures have used pieces chosen by the experimenter, the original study allowed the participants to choose between several different musical selections, selected for their particular mood qualities to enable them to find a piece that was personally relevant. The results suggested that musical mood induction can produce more sustained changes than the Velten Mood Induction Procedure and produces larger mood changes

especially for depressed mood state inductions. There are several advantages of the MMIP. Despite the transparency of the procedure, Seta, Hayes and Seta (1994) found that only ten percent of the participants in their study correctly reported the actual purpose of the study. Further analysis of the study, indicated that the results with and without the biased participant pool had no difference in the outcome of the study, supporting the power of the MMIP. Early findings concluded that mood induction through music caused greater and more sustained changes in mood than the Velten Technique. Clark (1983) examined existing research using both techniques and found that the main advantage musical-mood induction held over the Velten technique is that almost all of the participants responded to it.

A nonverbal, musical-mood induction procedure was introduced by Pignatiello, Camp, and Rasar (1986). The induction procedure, which used non-lyrical selections from classical, popular and musical soundtrack recording chosen on the basis of the structural characteristics of pitch, rhythm, mode, loudness, melody and tempo, was successful in inducing depressed and elated effect. Furthermore, the induction procedure achieved these effects without informing the participants of the purpose of the music (demand effects) and demonstrated that the effects were not gender specific.

The Music Mode and the Mood. Traditionally, the minor mode has been attributed to feelings of grief and melancholy whereas the major mode has been attributed to feelings of joy and happiness (Saad Selim, personal communication, May 1, 2008). Hinn (1996) supported this by noting several studies on viewer reactions to music in television commercials which found that commercials with music in the major mode had more positive reactions than commercials with music in the minor mode while the commercials with music in the minor mode were rated as more irritating whereas the commercials with music in the major mode were rated as relevant and newsworthy. In addition, the products introduced with major mode music were viewed as more purchase worthy than products introduced with

minor mode music. Other studies as stated by Hinn (1996) found that people induced into a happy mood state through musical mood induction using a piece composed in the major mode showed a significant increase in recall compared to people who had not been induced into an experimental mood state.

In this present study the selection of the classical music was labeled Joyful because it is on key major.

Benefits of Listening, Learning and Playing Music

What benefits could we derive from listening to music? One interesting property of music is its ability to create a state of relaxation in people. Voss, Good, Yates, Baun, Thompson, and Hertzog (2004) collaborated on a study investigating the effects of sedative music on patients receiving chair rest after open-heart surgery. These patients, medicated with opiates, were helped into a chair eight to twelve hours after surgery. Despite the opiates, they still reported moderate to severe anxiety and pain. Sedative music, defined as slow, continuous instrumental music lacking strong percussion, has been found to reduce anxiety and pain, but no more than scheduled rest. Scheduled rest differed from the standard procedure in that the patient was alone in a quiet room with the lights turned off and told to relax.

Researchers are working out to find about the efficacy of the musical rhythms for treating Parkinson's disease. The research being conducted at the Methodist Neurological Institute, if found positive will be of immense help and could be a better alternative for treating the patients. Studies already have shown that music therapy can have a greater impact than physical therapy on Parkinson's patients, but Dr. Ron Tintner, a neurologist at the Methodist NI, is studying the use of different rhythms to facilitate movement in people with the debilitating disease. "We already know that rhythm can make people move. The question is, 'Are there particular rhythms that work better for these patients?'" said Tintner,

co-director of the Movement Disorders Clinic at the NI. Tintner is also a participating physician in Methodist's Center for Performing Arts Medicine program. The first phase of this trial, will study a group of patients without Parkinson's disease and determine what rhythms most stimulate them. Once determined, these rhythms will be tested on a group of Parkinson's disease patients to determine their response. They want to determine which acoustic stimuli will help Parkinson's patients move and function better. Ultimately, the goal would be to create a device, perhaps similar to a personal music device that would be tailored to each Parkinson's patient's needs (Bio Medicine, 2006)

A study conducted by researchers at the Chinese University of Hong Kong, indicated that children with music training had significantly better verbal memory than their counterparts without such training. Plus, the longer the training, the better the verbal memory. These findings underscore how, when experience changes a specific brain region, other skills that region supports may also benefit, a kind of cognitive side effect that could help people recovering from brain injury as well as healthy children (APA Online, 2003).

Spatio-temporal math reasoning ability in second-graders is significantly enhanced by musical keyboard training (Wicke, 2002).

Music Therapy

Music therapy consists of the use of music, in a therapeutic setting, to promote healing, relaxation, and create a general sense of health and well-being. Music therapists work in a variety of settings, including psychiatric, medical, educational and wellness. Music therapists work with all age groups, including small children and elderly people (SafeAlternativeMedicine, 2008).

History of Music Therapy. Music therapy in the United States began in the late 18th century. However, using music as a healing medium dates back to ancient times. This is evident in the historical writings of ancient civilizations such as Egypt, China, India, Greece

and Rome. Today, the power of music remains the same but music is used much differently than it was in ancient times. The profession of music therapy in the United States began to develop during W.W.I when music was used in Veterans Administration Hospitals as an intervention to address traumatic war injuries. Veterans actively and passively engaged in music activities that focused on relieving pain perception. Numerous doctors and nurses witnessed the effect music had on veterans' psychological, physiological, cognitive, and emotional state. Since then, colleges and universities developed programs to train musicians how to use music for therapeutic purposes. In 1950 a professional organization was formed by a collaboration of music therapists that worked with veterans, mentally retarded, hearing/visually impaired, and psychiatric populations. This was the birth of the National Association for Music Therapy. In 1998 they joined forces with another music therapy organization to become what is now known as the American Music Therapy Association. The Music Program was established in 1984 (Music as Medicine, 2008)

How Music Therapy Works. Music produces a very strong emotional response in most people. Music can energize you or give you a sense of soothing calm, depending on the style of music. Studies have even shown that music can affect not only moods, but also your heart rate, respiration and blood pressure levels. Music therapists often use music as a form of communication. In this sense, music is almost a form of language, communicating through its beat, melody, and rhythm. Music therapy has been used in this sense to help physically and mentally disabled people to express themselves. It has also been used to help autistic and schizophrenic patients express themselves more readily (Music as Medicine, 2008).

Some of the Benefits of Music Therapy. It can distract you from negative thoughts, feeling and experiences. It is effective for helping people manage pain. It can help people sleep better. It can improve motor skills. It relieves depression and anxiety and lowers blood pressure and reduce stress levels. It can help children who have suffered from abuse. It can

improve memory and concentration

Music Therapy in Hospitals. Hospitalization can result not only in physical stress from invasive treatments and therapies, but emotional stress as well from unexpected news, unfamiliar environments, inability to conduct normal activities and lack of control. Music therapy in the medical setting provides patients a familiar and positive way to cope with their hospitalization. Through successful music experiences, patients can regain a sense of control, independence, and confidence. Music can be a medium of communication and a strategy for refocusing attention during painful procedures or long treatments such as hemodialysis, and a source of emotional support. Music is clinically recognized to influence biological responses such as heart rate, blood pressure, respiration rate, cardiac output, muscle tone, pupillary responses, skin responses, the immune system, and endorphin production. Music can entrain the body to calm or to accelerate depending on what type of music is used. Sedative music can lower anxiety, pain, tension and stress levels resulting in less use of anesthetics and pain medication, a shorter recovery period, higher patient compliance and higher patient and family satisfaction. Stimulative music can be a source of motivation both physically and psychologically and becomes a positive reinforcement during physical therapy and rehabilitation. In summary, Music therapy can contribute significantly to medical care providing psychological and physical comfort to patients with various needs ((Music as Medicine, 2008).

Trials have shown that old people who suffer from dementia benefit from music therapy. The therapy involves professional musicians and patients playing instruments and making music. The trials have found that the therapy is popular with patients and can help them to communicate. Specialists say exercise seems to cause positive changes in the nervous system, and these changes may have a direct effect on cognitive ability. On the other hand listening to music may influence function through different pathways in the brain. The

combination of music and exercise may stimulate and increase cognitive arousal while helping to organize cognitive input (Bio Medicine, 2001).

There are numerous other studies from hospitals and medical schools that have demonstrated effects of music on human behavior and physiology; Melodic intonation therapy, which involves speaking in a strongly musical manner, promotes recovery from aphasia in stroke patients who had failed to recover spontaneously after a prolonged period; Reactivation of Broca's area was verified by measurements of cerebral blood flow and PET scanning; Mozart's music (Sonata for Two Pianos, K.448) has been shown to reduce total seizure activity in epileptic patients by 65%, when compared with silence and with "Old Time Pop Tunes", which had no effect. Moreover, the music was effective even for epileptics who were comatose at the time; Music has been shown to help reduce post-surgical stress and pain, to reduce symptoms of depression in home-bound elderly people, and to aid children who are developmentally delayed by enhancing hand-eye coordination (Wicke, 2002)

The use of music by school counselors

The majority of elementary school counselors who were surveyed in a study conducted by Bixler (2001) believed strongly in music's ability to provide positive outcomes with the elementary school population. Counselors used music mostly in the classroom guidance setting, where the main purpose of activities is to provide information. They also indicated strong support for music to improve the focus and maintenance of attention, to improve group participation, to improve student/counselor rapport, and to improve the retention of concepts.

Music and vigilance

In their study, Beh and Hirst (1999) sought to answer some of the questions with respect to driving and listening to music. They used a computer program to simulate driving conditions and different tasks associated with driving. The researchers found that

low/moderate intensity music facilitated and improved responses on the stop-light task and vigilance task. For Other findings it was concluded that moderate music helps performance on broad attention span tasks, whereas high intensity music impairs these tasks but does not impair tracking or vigilance performance. This last finding is interesting because it is often assumed that high-intensity/loud music will have detrimental effects when it comes to driving. Overall, the researchers found that vigilance performance is enhanced by low-to-moderate-intensity music and that listening to high-intensity/loud music could actually improve performance in conditions of 'increased attentional demand'.

In a study conducted by Teresa Lesiuk (2005) at University of Windsor, investigating the effect of music listening on state positive affect, work quality and time-on-task of computer information systems developers, data from 56 developers (male = 41, female = 15) was obtained from four different Canadian software companies. Data were collected in the participants' actual work environments over five weeks. Results indicated that state positive affect and quality-of-work were lowest with no music. Narrative responses revealed the value of music listening for positive mood change and enhanced perception on design while working. Evidence was provided of the presence of a learning curve in the use of music for positive mood alteration. Overall, the study contributed to the development of a model that aspired to elucidate music and workplace interactions; in addition, it had implications for organizational practice.

In another study, sixty-three subjects worked at a vigilance task for an hour while listening to one of three musical programs. While all three programs included the same 23 selections, the Ascending Program grew steadily more lively, and the Descending Program grew steadily less lively, while the Increasingly Variable Program progressively increased the contrast between adjacent selections. Results showed that changing the sequence of the 23 selections profoundly affected reaction times and variabilities, as well as individual

consistency. Subjects performed the vigilance task better with the Ascending Program than with the other two programs (Lesiuk, 2005)

Designer Music

The term "designer music" was introduced by the music industry to describe a new genre of music designed to affect the listener in specific ways. The term has been used in the scientific literature to specify this type of music. Research and clinical studies have shown that designer music produces significant effects in listeners' physiological and psychological status. For example, Medical Resonance Therapy Music (MicroMusic-Laboratories), composed by Peter Hubner, is designed to affect the brain by activating and strengthening the body's natural regenerative processes. Jeffrey Thompson's Brainwave Suite (The Relaxation Company, Acoustic Research Series) used sound frequency patterns built into musical soundtracks to stimulate brainwave frequencies associated with specific states of mind (e.g. alert relaxation, creativity and inspiration, rejuvenating sleep, and so on). Doc Lew Childre, the composer of the designer music, has produced several designer music releases intended to improve listeners' mental and emotional states and to enhance the autonomic nervous system (ANS) function and balance. The designer music investigated in the present study was titled Speed of Balance—A Musical Adventure for Emotional & Mental Regeneration (Planetary Publications). Childre describes this work as "a musical tool useful for enhancing emotional balance, creativity, clear decision making and boosting physical energy". These effects are associated with increased physiological coherence and ANS balance.

In a study investigating the effects of different types of music on mood, tension, and mental clarity the designer music had the greatest and most favorable effects on the listeners. In the full sample, all positive scales (caring, relaxation, mental clarity, and vigor) increased, while all negative scales (tension, hostility, fatigue, and sadness) decreased (Atkinson et al., 1998).

Purpose and hypotheses

This present study's aim was to determine how different types of music (classical and Grunge Rock) affect the mood and vigilance and to investigate the effects of designer music on mood and vigilance. Thus based on the above study's literature, the following was hypothesized:

Hypothesis 1: Classical music (Joyful type : key major with moderate tempo) will increase pleasantness and relaxation and decrease hostility among participants.

Hypothesis 2: Designer music will increase pleasantness and relaxation and decrease hostility among participants.

Hypothesis 3: Grunge Rock music will increase hostility and decrease pleasantness and relaxation among participants.

Hypothesis 4: Participants will need less time to complete vigilance task when listening to Classical (joyful type) and Designer music, than when listening to Grunge Rock music.

Hypothesis 5: Participants will make less errors on vigilance task when listening to classical (joyful type) and designer music, than when listening to Grunge Rock music.

CHAPTER 3

METHOD

Participants

The sample of the present study included randomly selected students from Beirut Baptist School. It comprised of 60 students (Males N =31, Females N =29) from the intermediate and secondary grades. Their ages ranged between 13 and 18. For each type of music as well for the control group related to the vigilance task with no music, the number of participants was 15 (group of N =5 participated each time).

Design

The effects of the three categories of music on mood were assessed in a crossover design in which subjects acted as their own controls. Study participants were unaware of the specific aims of the study and of the predicted effects of the different types of music. They also were not told the category name of any of the music selections. The protocol used for conducting the listening sessions at the Beirut Baptist School Bible Room was as follows: Once all the participants were seated, I handed out the mood questionnaire (appendix A in 2 pages). The participants were instructed to complete all the questions on the related page 1/2, and asked to be as honest as they could in answering the questions. Next, subjects were told that they would be listening to 7 minutes of music. After 3 minutes the Star-Tracing activity paper (appendix C in 01 page) was distributed and the participants were to complete the activity. During the vigilance activity the time was recorded using digital chronometer "virtual Stopwatch v3.17" of spring creek software company (an evaluation copy was used) the display was on a screen using computer and the digits were clear for the participants to see. Each participant recorded the time needed for completion by just looking to screen to record the time displayed.

For all particpants, the music was always listened to in the same room with the same lighting and close to the same temperature, and played at the same volume and on the same stereo system. The room is equipped with a sound system and LCD projector as well with and air-conditioning system to keep the room fresh and the temperature constant.
The crowd effect was minimized by keeping the participants' groups equal to 5.
Before the music was played, the participants were instructed to : "Sit quietly and listen to the music without distracting one another. Listen in a casual, relaxed way, but try to avoid falling asleep. Allow the music to take you wherever it takes you in regards to your moods and feelings." Immediately after the music was over, the participants were instructed to turn over the questionnaire and complete the side page 2/2.

Instruments

The Classical music selection was a compilation of Camille Saint-Sans (Samson and Dalilah Bacchanaliae), Johann Strauss (The Beautiful Blue Danube), Dimitri Shostacovich (Galop Waltz), Manuel De Faila (Ritual Fire Dance), Hector Berlioz (Hungary March), Interlude from Ode to Joy (Ninth Symphony), Arcangelos (Chamber ensemble) and Mozart (Tune up your mind album (track 1 & 2))

The Music selections of the Grunge Rock type are solo male vocals, half-sung and half-screamed or shouted, electric guitar, and heavy percussions. The selections are characterized as generally loud, with little dynamic variation; most have a heavy, pounding beat emphasized by drums and repeating bass lines. Some selections are primarily dissonant, while others have more clearly distinguishable, simple chord progressions and melodic lines. The selection was taken from Slipknot, Mudvayne and other heavy percussions from unknown band.

The designer music selections used were "Street Sax", "Cappuccino—A Way to Start the Day", "Global Anthem", "Intentional Yet Sensitive", and "Heart March", from Speed of

Balance album which is an instrumental composition performed by Childre with multiple synthesizers. The designer Music CD entitled "Speed of Balance" was purchased thru the web www.amazon.com.

The Selections within each of the three categories were recorded onto a CD in the order listed above. The target time for the total duration of the music in each category was 7 minutes.

Mood Scales

In a study investigating the impact of different types of music on tension, mood, and mental clarity (Atkinson et al., 1998), the researchers felt it was crucial to limit the questionnaire regarding mood assessment to one page that could be completed quickly. No single survey instrument was available that could meet this requirement. Therefore, the researchers decided to create an instrument that used adjective descriptors. They developed a two-factor structure of mood: "positive affect" and "negative affect." Although the terms positive affect and negative affect might suggest that these mood factors are opposites (that is, negatively correlated), they are in fact independent, uncorrelated dimensions. They chose "vigorous" to represent high positive affect, "fatigued" to represent low positive affect, "hostile" to represent high negative affect, and "relaxed" to represent low negative affect. This scale of 30 mood adjectives was next subjected to factor analysis for confirmation of the underlying structure, where the "unhappy" item was canceled due to high loadings on two factors. The reliability results exceeded 0.7 on all scales. Thus this scale of 29 mood adjectives ("unhappy" canceled) will be used in this study (appendix A).

To guard against other forms of response set-bias, the items were randomly ordered for page 1/2 (pretest-before listening to music) and page 2/2 (protests-after listening to music).

For the Mood Assessment sheet showing the five Mood Factors refer to appendix B.

Variables to study

The independent variable is the type of music. The 1st dependent variable is the Mood, the 2nd dependent variable is the time needed to complete the star-tracing activity and the 3rd dependent variable is the number of errors committed while drawing the line in the Star-Tracing activity. The change in mood was scored by calculating the difference for each scale.

CHAPTER 4

RESULTS

The change in mood was scored by calculating the difference for each scale. e.g. for the Hostility Scale with the related subscales peeved, annoyed, angry, mad and irritated (appendix B), the mood change was calculated as follows :

HostilityDifference = Posttests scores of the sum of the related subscales of Hostility after listening to music minus the related Pretests scores before listening to music.

The same was repeated for all scales and the related results were converted to T scores.

Reliability Analysis

The Mood Assessment Scales were examined for reliability. The Gronbach alpha α coefficients were relatively high for all the scales, and they were all above .75 indicating that all scales had displayed good internal consistency.

Table 1

Reliabilities of the scales used in this study

Subscale	Gronbach α in this study Pretests	Gronbach α in this study Posttests
Fatigue	.880	.835
Hostility	.793	.833
Pleasantness	.890	.906
Relaxation	.756	.913
Sadness	.905	.860

Hypotheses Testing

Hypothesis 1: Classical music (Joyful type : key major with moderate tempo) will increase pleasantness and relaxation and decrease hostility among participants.

To test the above hypothesis, two tailed paired *t* test was performed using T scores of the Pleasantness, Relaxation and Hostility Scales (Pretests minus Posttests) . The results are as per the following table. The results related to all five scales are reproduced in appendix D.

Table 2

Two tailed paired t test using T scores of the Pleasantness, Relaxation and Hostility Scales (Pretests minus Posttests) for the Classical type of Music

Pretests minus Posttests		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	TPleasantnessBefore – TPleasantnessAfter	-5.07371	5.84729	1.50976	-8.31183	-1.83558	-3.361	14	*.005
Pair 3	TRelaxationBefore – TRelaxationAfter	-4.89163	6.22490	1.60726	-8.33886	-1.44439	-3.043	14	*.009
Pair 2	THostilityBefore – THostilityAfter	4.91779	4.41529	1.14002	2.47268	7.36290	4.314	14	*.001

* Significant at the .05 level

Shifts in feelings were observed with a significant increase in pleasantness and relaxation ($P<.05$) and significant reduction in hostility ($P<.05$), thus hypothesis 1 was supported.

Hypothesis 2: Designer music will increase pleasantness and relaxation and decrease hostility among participants.

To test the above hypothesis, two tailed paired *t* test was performed using T scores of the Pleasantness, Relaxation and Hostility Scales (Pretests minus Posttests) . The results are as per the following table. The results related to all five scales are reproduced in appendix D.

Table 3

Two tailed paired t test using T scores of the Pleasantness, Relaxation and Hostility Scales (Pretests minus Posttests) for the Designer type of Music

Pretests minus Posttests		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	TPleasantnessBefore – TpleasantnessAfter	-6.01586	6.49826	1.67784	-9.61448	-2.41725	-3.585	14	*.003
Pair 3	TRelaxationBefore – TrelaxationAfter	-3.85830	10.49205	2.70904	-9.66861	1.95200	-1.424	14	.176
Pair 2	THostilityBefore – ThostilityAfter	5.61728	7.35654	1.89945	1.54336	9.69119	2.957	14	*.010

* Significant at the .05 level

Shifts in feelings were observed with a significant increase in pleasantness (P<.05) and significant reduction in hostility (P<.05) while the increase in relaxation is not significant (P>.05). Thus Hypothesis 2 was supported for pleasantness and hostility and not supported for relaxation. As per appendix E we notice that for the subscale 'Relaxed' the designer music shows an effect and the increase in this subscale is significant (P<.05).

Hypothesis 3: Grunge Rock music will increase hostility and decrease pleasantness and relaxation among participants.

To test the above hypothesis, two tailed paired *t* test was performed using T scores of the Pleasantness, Relaxation and Hostility Scales (Pretests minus Posttests) . The results are as per the following table. The results related to all five scales are reproduced in appendix D.

Table 4

Two tailed paired t test using T scores of the Pleasantness, Relaxation and Hostility Scales (Pretests minus Posttests) for the Grunge Rock type of Music

Pretests minus Posttests		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	THostilityBefore – ThostilityAfter	-8.75802	9.16080	2.36531	-13.83111	-3.68494	-3.703	14	*.002
Pair 2	TPleasantnessBefore – TpleasantnessAfter	4.79344	5.57818	1.44028	1.70435	7.88253	3.328	14	*.005
Pair 3	TRelaxationBefore – TrelaxationAfter	12.59135	7.85146	2.02724	8.24335	16.93935	6.211	14	*.000

* Significant at the .05 level

Shifts in feelings were observed with a significant decreased in pleasantness and relaxation ($P<.05$) and significant increased in hostility ($P<.05$), thus hypothesis 3 was supported.

Hypothesis 1, 2 and 3 : Significance of the Means Difference

To test the significance of the means difference for the scales (Posttests minus Pretests) for Pleasantness, Relaxation and Hostility scales, One Way Analyze of Variance was computed using T scores. The results are as per the following table 5 and the means plot figures 1, 2 and 3.

Table 5

One Way analysis of Variance. Tests of between-groups effects with the dependant variable being the Mood affects and the independent variable being the type of music.

Posttests minus Pretests		Sum of Squares	df	Mean Square	F	Sig.
TPleasantnessDifference	Between Groups	1075.446	2	537.723	15.001	*.000
TRelaxationDifference	Between Groups	2886.566	2	1443.283	20.572	*.000
THostilityDifference	Between Groups	1970.832	2	985.416	18.766	*.000

* Significant at the .05 level

Figure 1

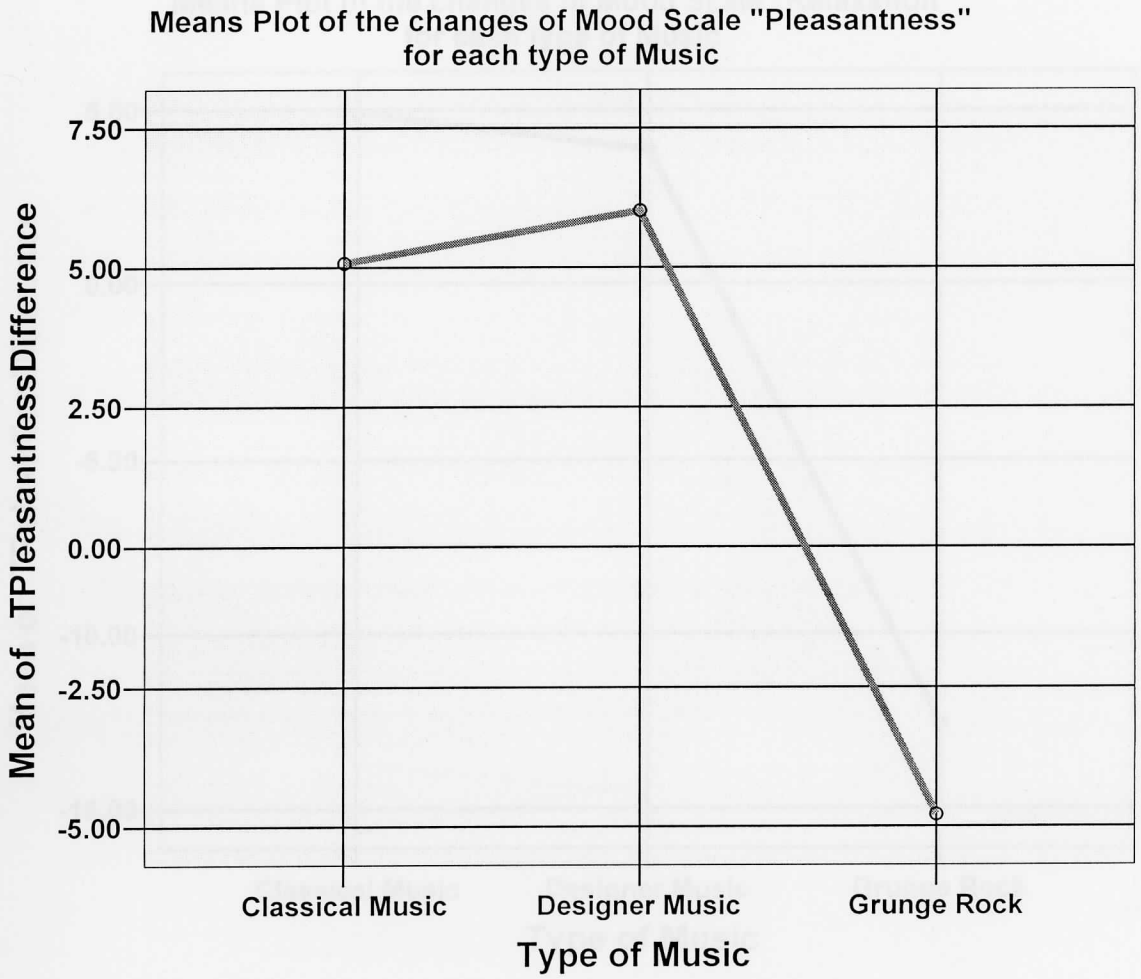

Means Plot of the changes of Mood Scale "Pleasantness"
for each type of Music
Mean of TPleasantnessDifference
7.50
5.00
2.50
0.00
-2.50
-5.00
Classical Music
Designer Music
Grunge Rock
Type of Music

Figure 2

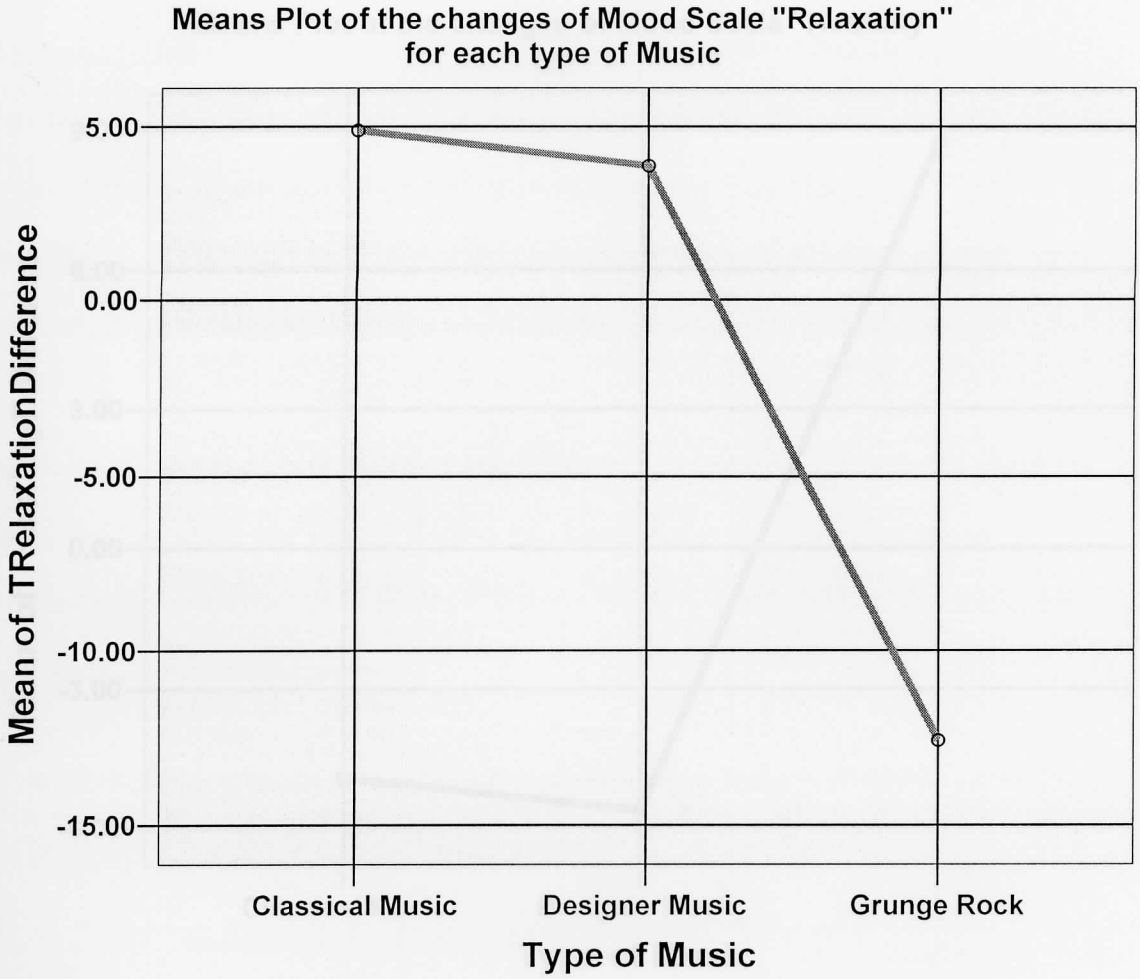
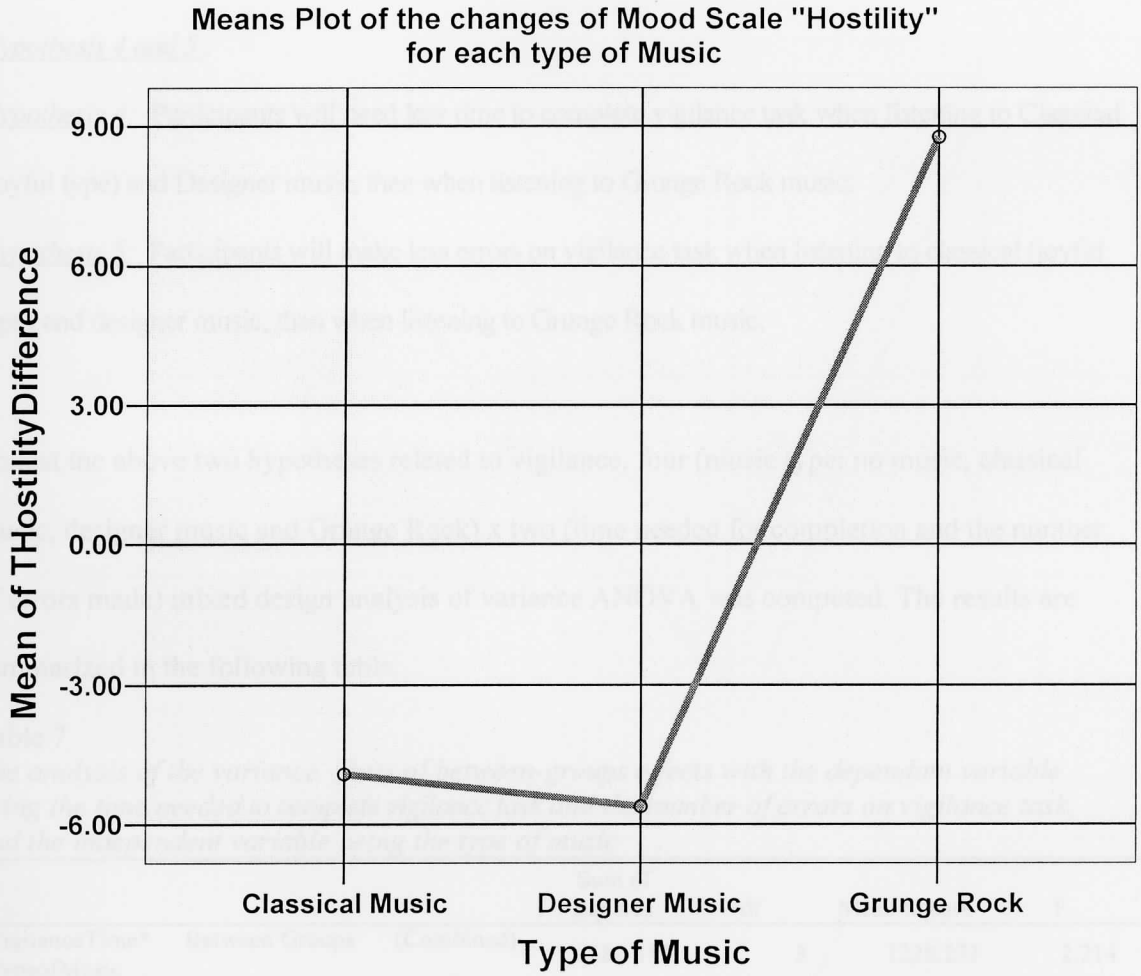

Means Plot of the changes of Mood Scale "Relaxation"
for each type of Music
Mean of TRelaxationDifference
5.00
0.00
-5.00
-10.00
-15.00
Classical Music
Designer Music
Grunge Rock
Type of Music

Figure 3


Means Plot of the changes of Mood Scale "Hostility"
for each type of Music
Mean of THostilityDifference
9.00
6.00
3.00
0.00
-3.00
-6.00
Classical Music
Designer Music
Grunge Rock
Type of Music

In figure 3 we notice the big increase in hostility for the Grunge Rock music compared to Designer music.

Hypothesis 4 and 5 :

Hypothesis 4: Participants will need less time to complete vigilance task when listening to Classical (joyful type) and Designer music, than when listening to Grunge Rock music.

Hypothesis 5: Participants will make less errors on vigilance task when listening to classical (joyful type) and designer music, than when listening to Grunge Rock music.

To test the above two hypotheses related to vigilance, four (music type: no music, classical music, designer music and Grunge Rock) x two (time needed for completion and the number of errors made) mixed design analysis of variance ANOVA was computed. The results are summarized in the following table.

Table 7
The analysis of the variance. Tests of between-groups effects with the dependant variable being the time needed to complete vigilance task and the number of errors on vigilance task, and the independent variable being the type of music

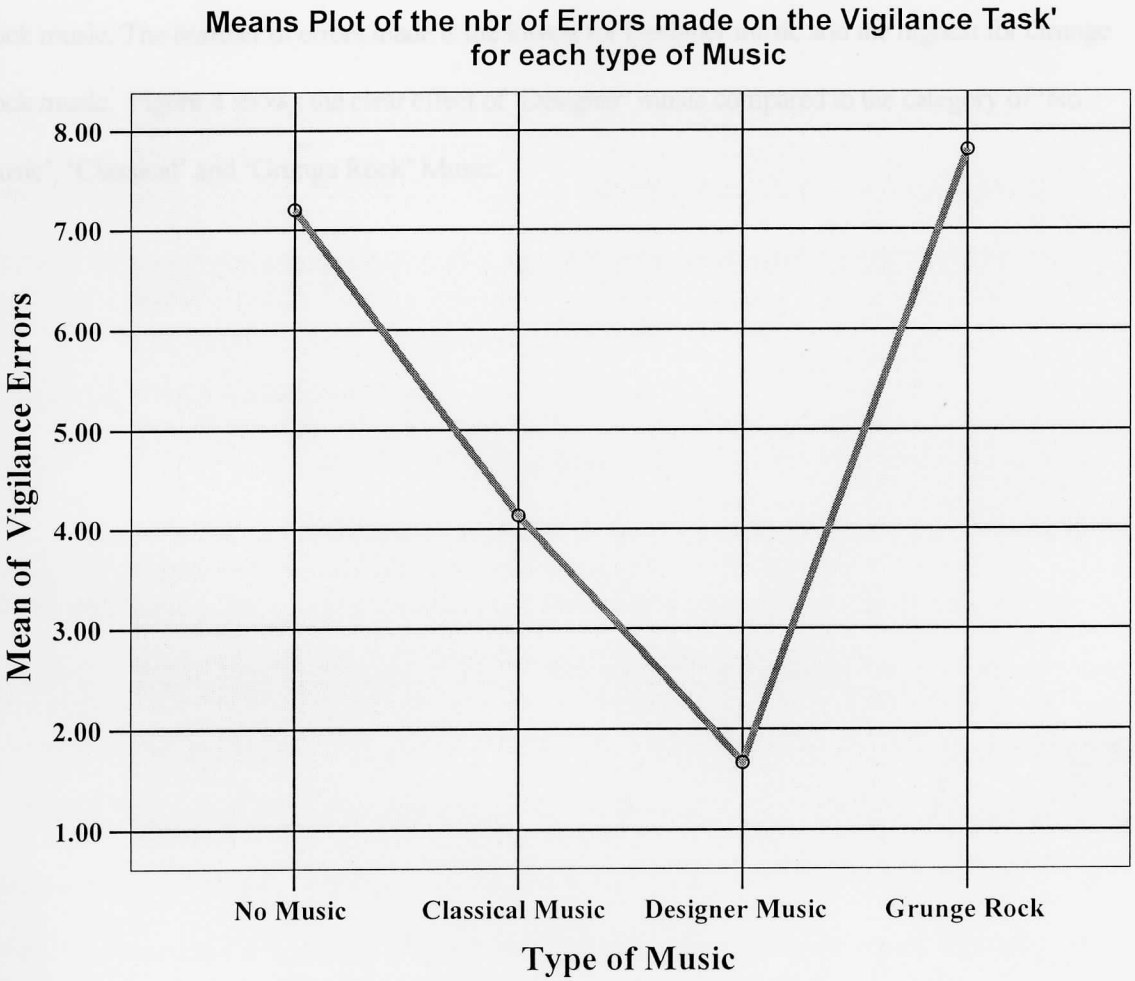
			Sum of Squares	df	Mean Square	F	Sig.
VigilanceTime* TypeofMusic	Between Groups	(Combined)	3684.813	3	1228.271	2.214	.096
	Within Groups		31062.553	56	554.688		
VigilanceErrors * TypeofMusic	Between Groups	(Combined)	365.733	3	121.911	4.984	*.004
	Within Groups		1369.867	56	24.462		

* Significant at the .05 level

We can notice from table 7 that the interaction music type and vigilance time is not significant while there was a main significance effect for the number of errors made (P<.05). We can conclude that hypothesis 4 was not supported because the interaction type of music and time is not significant.

For figure 4 data related to vigilance errors only is represented.

Figure 4


Means Plot of the nbr of Errors made on the Vigilance Task' for each type of Music
Mean of Vigilance Errors
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
No Music
Classical Music
Designer Music
Grunge Rock
Type of Music

As per figure 4, the hypothesis 5 was supported. Participants performed better on the vigilance task (nbr of errors made decreased) for Designer music and Classical music then for No music and Grunge Rock music. The number of errors made is the lowest for Designer music and the highest for Grunge Rock music. Figure 4 shows the clear effect of 'Designer' music compared to the category of 'No Music', 'Classical' and 'Grunge Rock' Music.

CHAPTER 5

DISCUSSION

This study supported the previous findings that music will make shift in the mood. It was interesting to check the effect of music on vigilance, since based on the information available (collected by asking teachers and administrators), there are no studies made in a school setting in Lebanon investigating the effect of music on vigilance tasks such as 'star-tracing' that needs precision and focus.

Classical Music

Classical music has been used in a number of studies, many of which have shown that it reduces anxiety and depression (Boswell, 2008) and create a state of relaxation in people (Voss et al., 2004). Other studies (Atkinson et al., 1998) reported how spatial task performance was enhanced when preceded by a Mozart sonata as compared with silence or relaxation conditions that employing classical music. In the present study, classical music led to a general reduction in the "negative" scales, with significant reductions in "hostility". This seems to contradict a common perception that teens find classical music less enjoyable than do adults.

Grunge Rock

Regarding the effect of Grunge Rock music, one recent study examining the effects of heavy metal music on adolescent psychiatric patients found that among subjects who preferred heavy metal, this type of music produced a short-term increase in positive affect. Another study showed that when the subject likes the music, there is a higher likelihood of its invoking a positive affect state. In the present study, following the grunge rock music, a decrease in all categories of positive affects and an increase in all

categories of negative affects were obtained, in addition to an increase in the amount of errors made on vigilance task. What conclusion can be drawn as for the effect of Grunge Rock on the mood, focus and attention?

The Grunge Rock used in this study is quite different from Grunge Rock music in general but not unfamiliar to the students, and it seems unlikely that all forms of Grunge Rock music would produce similar results. Although many teenagers say they like Grunge Rock and some of them find Trash Metal and Death Metal which are an extreme form of this category, "very cool" pointing to a feeling of contentment associated with such music, this present study still showed a significant increase in the negative affects, such as hostility, fatigue and sadness (appendix D) which could be contributing to the increase in the number of errors made in the vigilance task.

Whereas teenagers apparently enjoy listening to Grunge Rock, it is not clear whether they do so because of or despite the negative feeling states provoked by this music. One explanation is the fact that increased anger causes increased sympathetic stimulation, which in turn heightens levels of cortisol and other adrenal steroids. This produces a momentary high followed by negative psychological after effects. The stimulating experience of this initial high could account for teenagers' enjoyment of this type of music (Atkinson, McCraty, Rein, Tiller, Watkins, 1995).

For the Grunge Rock category, seven participants (nearly 50%) were in favor of such type of music, denying any negative effect on their emotions (this information was collected previously throughout the academic year 2008 from the several discussions held with the students regarding media in general). It was not feasible to show them the result (the increase of the negative mood scales), in order to know their feedback. In spite of the favorable taste for such music, I think that students cannot control its negative effect on them.

Designer Music

The term 'Designer music' was coined by the music industry to describe a type of music intentionally designed to have specific effects on listeners. 'Speed of Balance' the designer music recording used in the present study, is intended to facilitate mental and emotional balance, so that people can experience clearer and more positive perceptions (Childre D, 1995). It is well established that different types of music alter neuronal discharge rates, hormonal balance, and mood differently. It has been previously demonstrated that listening to designer music leads to greater shifts in autonomic activity and an increase in the mood positive affect (Atkinson et al., 1998). In this present study the 'Designer' music confirmed previous studies, because it had the greatest and most favorable effects on the listeners regarding pleasantness and vigilance and decrease in hostility. In the full sample, all positive scales increased, while all negative scales of hostility, fatigue, and sadness decreased.

Compared to the classical music the designer music had more significant effect on increasing the pleasantness and decreasing the hostility. It is interesting to note the significance decrease in the number of errors made during the vigilance task compared to the classical music, which makes also this type of music suitable to enhance clarity and precision.

Application

This study showed that music will make a shift in the mood in support of previous findings, and that joyful classical music (Key Major with moderate Tempo) increased the positive affect and decreased the negative affect in opposition to the effect of grunge music. while the designer music contributed in better vigilance and significant decrease in hostility and increase in pleasantness. Based on observation throughout the year at the school it can be noticed that in general students experience bullying and other stressful or anger triggering attitude mainly during recess time in the playground and while waiting for a turn at the kiosk where most of the frictions happen. The recess' quality time is less than 10minutes which is a

source of stress for the student s who are lacking the time to relax or to digest their snack; It would be beneficial to extend this study and check the effect of classical (joyful music) and Designer music on enhancing the mood by helping students to relax during recess time. This needs to be tested to check feasibility especially when the noise pollution is very high during recess time. The question to be asked if music to be played during recess time or just before the end of it and during the students walk toward classes and for few minutes after settling down ?

Many students enter the school's gate listening to music through earphones; thus with a proper musical education it is possible to help the students selecting certain types of music that can increase pleasantness and decrease hostility and sadness.

Lesiuk (2005) conducted a study to determine the effect of music listening on the positive affect, quality of work, and work efficiency of computer programmers. Positive affect, or mood, is important in a work environment because it has been shown to increase creativity by changing the way an individual organizes their thoughts. Participants with a positive mood performed better on a creative task than participants with neutral or negative moods.

This present study will broaden the field of knowledge on the subject of music's influence in specific on vigilance. However, many questions will remain unresolved. Future studies should be conducted to investigate whether individuals, through repeated exposure, can incorporate new musical structures into their existing "vocabulary" of structures. What sort of mood and productivity effects would these new structures, once inserted into otherwise normal music, provoke? Would individuals eventually acclimatize to them, deriving similar benefits from the new music as they do from more standard Western music? Another area where more research is needed is the development of the emotional perception of music. The field of music psychology is a complicated one. There are still

many unresolved mysteries on the topic of music and its influence oh human behavior. We can fairly predict that music will be much more prevalent in our day-to-day lives: in hospitals, schools, public transportation and so on. Perhaps soothing music in school playgrounds and hallways would reduce aggressive behaviors. Nonetheless, it does seem likely that research will uncover more and more practical applications for music.

Limitations and Implications for further Studies

It is possible that participants' personal tastes in music as well as popularized opinions concerning the beneficial or detrimental effects of different musical genres may have led to expectancy effects, which could have influenced these results.

The familiarity of music is a factor to be taken into consideration to see how this would influence the mood. More types of music such as Pop music should be introduced. A similar study in Lebanon concerning the type of music to listen to would give us information on the most pervasive type for the young Lebanese population.

Regarding the 'Designer' music, it is early to say that we can adopt this type of music as an instrument to enhance the mood and foster clarity and precision, since it needs further studying; First on a larger scale across schools in Lebanon and across age level to determine for which age level this instrument is suitable in the Lebanese context; second though it is true that listening to music costs you nothing and you do not need to be a musician to do so, but to adopt music as a tool for enhancement on the psychological and physiological levels in a school setting needs a feasibility study, e.g. what are the adjustment that the school needs to undertake in order to reduce noise pollution in the class ?

Can we adopt music in the school to enhance the mood regardless of the noise pollution? With reference to the 'broken window effect' stated before, we read about a small park in Edmonton, Alberta where the symphonies of Bach, Beethoven and Mozart were broadcasted throughout the park causing crime rate in the park to decrease by

approximately 800 percent (Holmberg, 1990), it seems that this area is worth investigating.

Conclusion

This study presents a rationale for the use of music-and designer music in particular-to reduce stress, fatigue, and negative affect, and to enhance emotional well-being and mental clarity. This study also opens the door into a new direction for research on the use of Designer and Classical music in the treatment of dysfunctional mental and emotional conditions, e.g. special education, grieving, depressed students. Given the connection between attitudes, emotions, and health, these results indicate that music can be an inexpensive and easy means (feasibility to be use in the classrooms without any modification in the classrooms structure still need to be investigated) for facilitating stress reduction, hostility and making the dream of a conflict free school a not so far dream.

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APPENDIX A
Participants Mood Assessment Sheet
Page 1/2

grade ..... age ..... Gender ☐ Male ☐ Female

Please indicate how you feel now by circling the appropriate number following each item below

		Not at all	Little	Medium	Lot	Intensely
Active	عمَليّ–فعَّال	1	2	3	4	5
Angry	غاضِب	1	2	3	4	5
Jubilant	شديد الإبتهاج	1	2	3	4	5
Joyous	فرِح	1	2	3	4	5
Irritated	مُثار	1	2	3	4	5
Happy	سَعيد	1	2	3	4	5
Gloomy	مُتشائم–عابِس–مُكْفَهِر	1	2	3	4	5
Fatigued	متعَب ومُرهَق	1	2	3	4	5
Exhausted	مُنهك	1	2	3	4	5
Energetic	نشيط	1	2	3	4	5
Elated	مُبتَهِج–مَزهو	1	2	3	4	5
Dynamic	مفعم بالقوّة والنشاط–ديناميكي	1	2	3	4	5
Depressed	مُحبَط–كئيب	1	2	3	4	5
Delighted	مسرور جداً	1	2	3	4	5
Calm	هادئ	1	2	3	4	5
Burned out	مُستَنــزَف	1	2	3	4	5
Annoyed	مُتَضايِق ومَزعوج	1	2	3	4	5
Blue	كَئيب	1	2	3	4	5

APPENDIX A
Participants Mood Assessment Sheet
Page 1/2
(continued)

Peeved	مُزْعَج–مَغيظ	1	2	3	4	5
Peaceful	مُسالم	1	2	3	4	5
Mad	شديد الغضب	1	2	3	4	5
Lively	حَيويّ	1	2	3	4	5
Listless	مُتوانٍ–كسلان–فاتر الهمة	1	2	3	4	5
Relaxed	مستَرخٍ – مستَريح	1	2	3	4	5
Sad	حَزين	1	2	3	4	5
Serene	هادئ وصافٍ–مُساكِن	1	2	3	4	5
Tranquil	مُستَقر	1	2	3	4	5
Vigorous	قوي النشاط	1	2	3	4	5
Weary	مُرهَق وسأم	1	2	3	4	5

APPENDIX A
Participants Mood Assessment Sheet
Page 2/2

Please indicate how you feel now by circling the appropriate number following each item below

		Not at all	Little	Medium	Lot	Intensely
Weary	مُرهَق وسأم	1	2	3	4	5
Vigorous	قوي النشاط	1	2	3	4	5
Tranquil	مُستَقر	1	2	3	4	5
Serene	هادئ وصافٍ–مُساكِن	1	2	3	4	5
Sad	حَزين	1	2	3	4	5
Relaxed	مستَرخٍ – مستَريح	1	2	3	4	5
Peeved	مُزْعَج–مَغيظ	1	2	3	4	5
Peaceful	مُسالِم	1	2	3	4	5
Mad	شديد الغضب	1	2	3	4	5
Lively	حَيويّ	1	2	3	4	5
Listless	مُتوانٍ–كسلان–فاتر الهمة	1	2	3	4	5
Jubilant	شديد الإبتهاج	1	2	3	4	5
Joyous	فرِح	1	2	3	4	5
Irritated	مُثار	1	2	3	4	5
Happy	سَعيد	1	2	3	4	5
Gloomy	مُتشائم–عابِس–مُكْفَهِر	1	2	3	4	5
Fatigued	متعَب ومُرهَق	1	2	3	4	5
Exhausted	مُنهك	1	2	3	4	5
Energetic	نشيط	1	2	3	4	5

APPENDIX A
Participants Mood Assessment Sheet
Page 2/2
(continued)

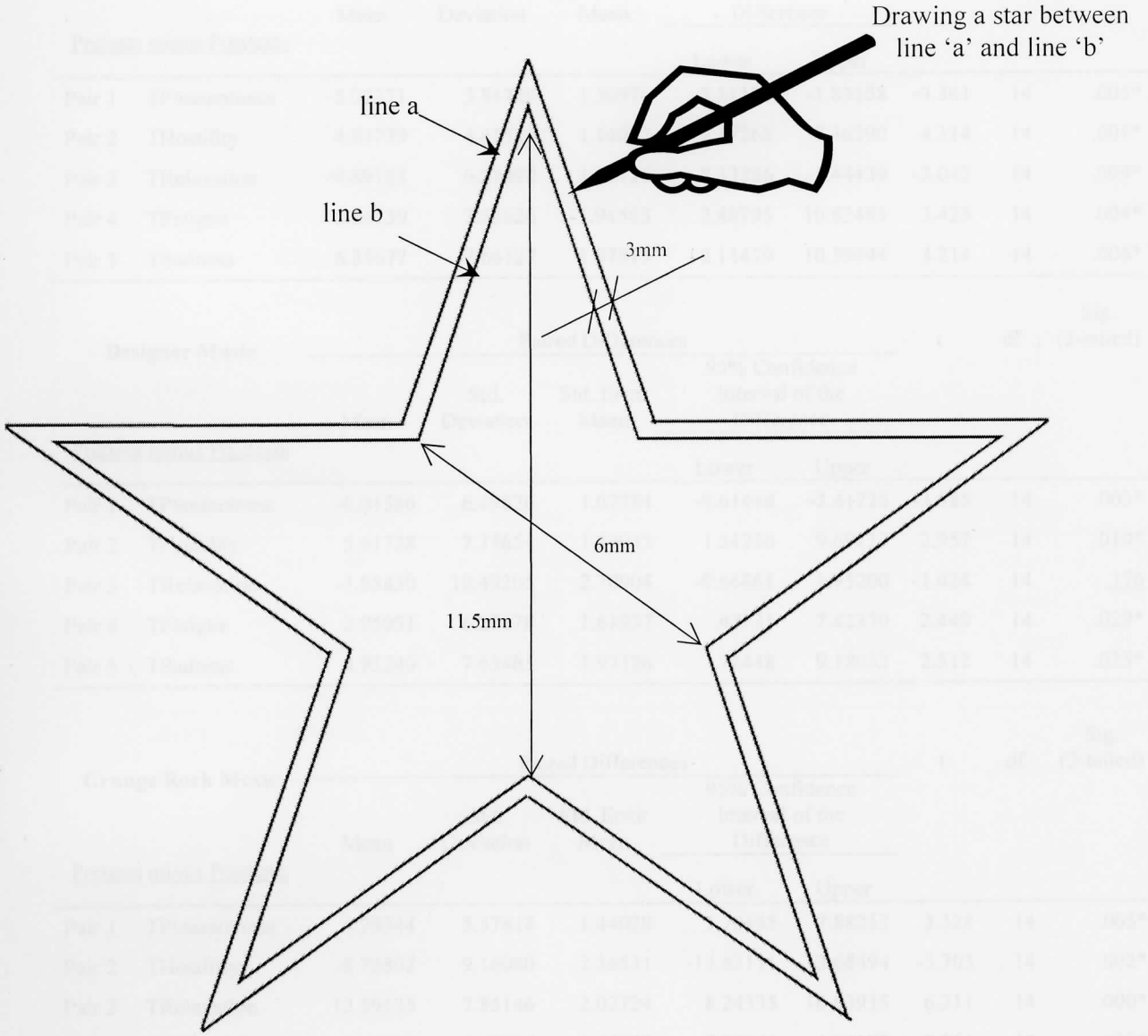
Elated	مُبتَهِج–مَزهو	1	2	3	4	5
Dynamic	مفعم بالقوّة والنشاط–ديناميكي	1	2	3	4	5
Depressed	مُحبَط–كئيب	1	2	3	4	5
Delighted	مسرور جداً	1	2	3	4	5
Calm	هادئ	1	2	3	4	5
Burned out	مُستَنــزَف	1	2	3	4	5
Blue	كَئيب	1	2	3	4	5
Annoyed	مُتَضايِق ومَزعوج	1	2	3	4	5
Angry	غاضِب	1	2	3	4	5
Active	عمَليّ–فعَّال	1	2	3	4	5

APPENDIX B
The Mood Assessment Sheet Showing the Five Mood Factors

			Not at all	Little	Medium	Lot	Intensely
High Positive Affect High Pleasantness	Lively	حَيويَ	1	2	3	4	5
	Energetic	نشيط	1	2	3	4	5
	Vigorous	قوي النشاط	1	2	3	4	5
	Active	عمَليّ–فعَّال	1	2	3	4	5
	Dynamic	مفعم بالقوّة والنشاط–ديناميكي	1	2	3	4	5
	Jubilant	شديد الإبتهاج	1	2	3	4	5
	Elated	مُبتَهِج–مَزهو	1	2	3	4	5
	Delighted	مسرور جداً	1	2	3	4	5
	Joyous	فرِح	1	2	3	4	5
	Happy	سَعيد	1	2	3	4	5
Low Negative Affect Relaxation	Calm	هادئ	1	2	3	4	5
	Relaxed	مسترخٍ – مستَريح	1	2	3	4	5
	Tranquil	مُستَقر	1	2	3	4	5
	Peaceful	مُسالم	1	2	3	4	5
	Serene	هادئ وصافٍ–مُساكِن	1	2	3	4	5
High Negative Affect Hostility	Peeved	مُزْعَج–مَغيظ	1	2	3	4	5
	Annoyed	مُتَضايِق ومَزعوج	1	2	3	4	5
	Angry	غاضِب	1	2	3	4	5
	Mad	شديد الغضب	1	2	3	4	5
	Irritated	مُثار	1	2	3	4	5
Low Positive Affect Fatigue	Exhausted	مُنهك	1	2	3	4	5
	Fatigued	متعَب ومُرهَق	1	2	3	4	5
	Weary	مُرهَق وسأم	1	2	3	4	5
	Burned out	مُستَنــزَف	1	2	3	4	5
	Listless	مُتوانٍ–كسلان–فاتر الهمة	1	2	3	4	5
Sadness	Blue	كَئيب	1	2	3	4	5
	Sad	حَزين	1	2	3	4	5
	Gloomy	مُتشائم–عابِس–مُكْفَهِر	1	2	3	4	5
	Depressed	مُحبَط–كئيب	1	2	3	4	5

APPENDIX C

Star-Tracing Activity



APPENDIX D

Two tailed paired *t* test using T scores of the Pleasantness, Hostility, Relaxation, Fatigue and Sadness Scales (Pretests minus Posttests), for every type of Music

Classical Music		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
Pretests minus Posttests					Lower	Upper			
Pair 1	TPleasantness	-5.07371	5.84729	1.50976	-8.31183	-1.83558	-3.361	14	.005*
Pair 2	THostility	4.91779	4.41529	1.14002	2.47268	7.36290	4.314	14	.001*
Pair 3	TRelaxation	-4.89163	6.22490	1.60726	-8.33886	-1.44439	-3.043	14	.009*
Pair 4	TFatigue	6.66139	7.53626	1.94585	2.48795	10.83483	3.423	14	.004*
Pair 5	TSadness	6.35677	7.66127	1.97813	2.11410	10.59944	3.214	14	.006*

Designer Music		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
Pretests minus Posttests					Lower	Upper			
Pair 1	TPleasantness	-6.01586	6.49826	1.67784	-9.61448	-2.41725	-3.585	14	.003*
Pair 2	THostility	5.61728	7.35654	1.89945	1.54336	9.69119	2.957	14	.010*
Pair 3	TRelaxation	-3.85830	10.49205	2.70904	-9.66861	1.95200	-1.424	14	.176
Pair 4	TFatigue	3.95051	6.27178	1.61937	.47731	7.42370	2.440	14	.029*
Pair 5	TSadness	4.95240	7.63465	1.97126	.72448	9.18033	2.512	14	.025*

Grunge Rock Music		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
Pretests minus Posttests					Lower	Upper			
Pair 1	TPleasantness	4.79344	5.57818	1.44028	1.70435	7.88253	3.328	14	.005*
Pair 2	THostility	-8.75802	9.16080	2.36531	-13.83111	-3.68494	-3.703	14	.002*
Pair 3	TRelaxation	12.59135	7.85146	2.02724	8.24335	16.93935	6.211	14	.000*
Pair 4	TFatigue	-4.15068	5.61364	1.44943	-7.25941	-1.04195	-2.864	14	.013*
Pair 5	TSadness	-7.62439	9.39145	2.42486	-12.82519	-2.42358	-3.144	14	.007*

* Significant at the .05 level

APPENDIX E

Means Differences and Significance of the T Scores of the Twenty Nine Mood Subscales (Posttests Minus Pretests), for every type of Music

Mood Scales	Mood Subscales	Type of Music	PreTests			PostTests		Means Difference = PostTests minus PreTests	Sig.
			N	Mean	Std. Deviation	Mean	Std. Deviation		
FATIGUE	BurnedOut	No Music	15	46.1607	8.17233	–	–	–	.008*
		Classical	15	53.0962	11.53465	48.258	9.23334	-4.8382	
		Designer	15	54.087	10.12655	49.4193	8.99553	-4.6677	
		Grunge Rock	15	46.6561	7.94392	52.3226	11.77791	5.6665	
	Exhausted	No Music	15	44.1861	6.46359	–	–	–	.002*
		Classical	15	54.5219	10.64499	48.8096	8.03289	-5.7123	
		Designer	15	54.5219	10.23383	50	10.59969	-4.5219	
		Grunge Rock	15	46.77	8.39006	51.1904	11.59174	4.4204	
	Fatigued	No Music	15	44.2748	9.12388	–	–	–	.075
		Classical	15	53.944	10.58789	49.7885	9.38022	-4.1555	
		Designer	15	53.4351	9.6558	49.7885	10.67087	-3.6466	
		Grunge Rock	15	48.3461	8.09235	50.423	10.58972	2.0769	
	Listless	No Music	15	44.0003	5.29472	–	–	–	.359
		Classical	15	53.4882	11.35003	48.9637	7.45057	-4.5245	
		Designer	15	51.2558	10.71476	50.2073	11.25894	-1.0485	
		Grunge Rock	15	51.2558	9.73559	50.8291	11.40517	-0.4267	
	Weary	No Music	15	44.6995	5.75432	–	–	–	.006*
		Classical	15	53.1803	10.176	45.6785	5.65677	-7.5018	
		Designer	15	53.1803	12.55925	50.9822	10.49459	-2.1981	
		Grunge Rock	15	48.9399	8.60529	53.3394	11.79656	4.3995	

* Significant at the .05 level

APPENDIX E

Means Differences and Significance of the T Scores of the Twenty Nine Mood Subscales (Posttests Minus Pretests), for every type of Music

(continued)

Mood Scales	Mood Subscales	Type of Music	PreTests N	PreTests Mean	PreTests Std. Deviation	PostTests Mean	PostTests Std. Deviation	Means Difference = PostTests minus PreTests	Sig.
HOSTILITY	Angry	No Music	15	49.2052	10.83117	–	–	–	.001*
		Classical	15	52.3844	11.15946	48.0322	9.33428	-4.3522	
		Designer	15	52.9142	9.90266	48.0322	8.45991	-4.8820	
		Grunge Rock	15	45.4962	6.62704	53.9357	11.43211	8.4395	
	Annoyed	No Music	15	49.1489	9.81387	–	–	–	.001*
		Classical	15	54.0126	9.94216	49.5152	10.23533	-4.4974	
		Designer	15	50.608	9.4989	46.6063	8.45696	-4.0017	
		Grunge Rock	15	46.2306	10.11904	53.8785	10.45442	7.6479	
	Irritated	No Music	15	49.0111	7.89933	–	–	–	.822
		Classical	15	50.9889	12.09212	49.1816	11.25774	-1.8073	
		Designer	15	49.6704	9.79425	50.4092	9.33713	0.7388	
		Grunge Rock	15	50.3296	10.70299	50.4092	9.96447	0.0796	
	Mad	No Music	15	48.834	9.744	–	–	–	.000*
		Classical	15	51.4251	10.86106	48.0967	8.56311	-3.3284	
		Designer	15	52.9797	10.53838	46.0204	8.14852	-6.9593	
		Grunge Rock	15	46.7612	8.54864	55.8829	10.79955	9.1217	
	Peeved	No Music	15	47.0422	8.12335	–	–	–	.004*
		Classical	15	52.9578	12.18503	48.7832	8.86953	-4.1746	
		Designer	15	51.1831	8.87337	45.6543	6.47739	-5.5288	
		Grunge Rock	15	48.8169	10.31901	55.5624	11.77666	6.7455	

* Significant at the .05 level

APPENDIX E

Means Differences and Significance of the T Scores of the Twenty Nine Mood Subscales (Posttests Minus Pretests), for every type of Music

(continued)

Mood Scales	Mood Subscales	Type of Music	PreTests			PostTests		Means Difference = PostTests minus PreTests	Sig.
			N	Mean	Std. Deviation	Mean	Std. Deviation		
PLEASANTNESS	Active	No Music	15	51.4736	8.08281	–	–	–	.570
		Classical	15	52.3156	10.88618	52.3808	9.22085	0.0652	
		Designer	15	48.9475	12.13987	51.7856	8.92805	2.8381	
		Grunge Rock	15	47.2634	8.53982	45.8336	11.02103	-1.4298	
	Delighted	No Music	15	54.3565	8.432	–	–	–	.216
		Classical	15	48.7352	11.78183	51.9392	12.04388	3.2040	
		Designer	15	45.9245	8.432	49.3536	8.72405	3.4291	
		Grunge Rock	15	50.9837	9.97688	48.7072	9.31954	-2.2765	
	Dynamic	No Music	15	55.0395	7.10394	–	–	–	.314
		Classical	15	48.5178	11.08041	50.8578	10.44501	2.3400	
		Designer	15	45.5534	11.74052	49.5711	8.68292	4.0177	
		Grunge Rock	15	50.8893	7.66495	49.5711	11.34071	-1.3182	
	Elated	No Music	15	52.2422	9.99854	–	–	–	.014*
		Classical	15	50.4484	11.88857	53.5976	10.45006	3.1492	
		Designer	15	43.2735	5.57005	48.2012	9.21021	4.9277	
		Grunge Rock	15	54.0359	8.80702	48.2012	9.97263	-5.8347	
	Energetic	No Music	15	56.9165	7.77876	–	–	–	.296
		Classical	15	47.6945	9.69367	50.803	9.93561	3.1085	
		Designer	15	45.9654	11.691	50.2008	10.1676	4.2354	
		Grunge Rock	15	49.4236	7.45158	48.9962	10.50598	-0.4274	
	Happy	No Music	15	54.4229	8.05203	–	–	–	.041*
		Classical	15	48.5257	12.26934	52.9869	10.95699	4.4612	
		Designer	15	46.7565	9.72854	51.1947	9.4991	4.4382	
		Grunge Rock	15	50.2949	8.76121	45.8184	8.61246	-4.4765	

* Significant at the .05 level

APPENDIX E

Means Differences and Significance of the T Scores of the Twenty Nine Mood Subscales (Posttests Minus Pretests), for every type of Music

(continued)

Mood Scales	Mood Subscales	Type of Music	PreTests			PostTests		Means Difference = PostTests minus PreTests	Sig.
			N	Mean	Std. Deviation	Mean	Std. Deviation		
PLEASANTNESS *(continued)*	Joyous	No Music	15	55.8442	8.77444	–	–	–	.000*
		Classical	15	46.8531	11.09889	53.441	11.25459	6.5879	
		Designer	15	45.0549	8.23116	51.5054	9.30189	6.4505	
		Grunge Rock	15	52.2478	8.64182	45.0535	7.73077	-7.1943	
	Jubilant	No Music	15	53.1296	9.29884	–	–	–	.001*
		Classical	15	47.4964	12.0164	52.2313	9.94457	4.7349	
		Designer	15	45.6186	8.29692	50.8925	11.25782	5.2739	
		Grunge Rock	15	53.7555	8.29692	46.8762	8.4859	-6.8793	
	Lively	No Music	15	52.8478	8.27211	–	–	–	.673
		Classical	15	49.288	12.0191	51.0648	11.14443	1.7768	
		Designer	15	47.8641	9.43741	49.787	8.46877	1.9229	
		Grunge Rock	15	50	10.26436	49.1482	10.78548	-0.8518	
	Vigorous	No Music	15	56.8443	8.3973	–	–	–	.004*
		Classical	15	47.5112	10.38489	53.3428	9.96678	5.8316	
		Designer	15	45.6446	9.89398	50.8357	8.60707	5.1911	
		Grunge Rock	15	50	8.24778	45.8214	10.4613	-4.1786	
RELAXATION	Calm	No Music	15	48.2475	7.48841	–	–	–	.001*
		Classical	15	47.1691	12.17746	53.0043	9.32915	5.8352	
		Designer	15	50.4044	10.35219	54.0057	8.45299	3.6013	
		Grunge Rock	15	54.179	8.89549	42.99	8.73431	-11.1890	
	Peaceful	No Music	15	47.5301	7.91033	–	–	–	.000*
		Classical	15	49.09	12.43765	53.263	10.30334	4.1730	
		Designer	15	50.13	10.97778	51.8645	8.68496	1.7345	
		Grunge Rock	15	53.2499	8.05549	44.8725	9.45499	-8.3774	
	Relaxed	No Music	15	48.0043	9.381	–	–	–	.006*
		Classical	15	50.6652	10.00707	53.1784	7.87817	2.5132	
		Designer	15	49.0687	10.09763	54.1821	10.97056	5.1134	
		Grunge Rock	15	52.2618	10.9622	42.6394	6.65248	-9.6224	

* Significant at the .05 level

APPENDIX E

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(continued)

Mood Scales	Mood Subscales	Type of Music	PreTests N	PreTests Mean	PreTests Std. Deviation	PostTests Mean	PostTests Std. Deviation	Means Difference = PostTests minus PreTests	Sig.
RELAXATION *(continued)*	Serene	No Music	15	45.9976	9.42869	–	–	–	.000*
		Classical	15	49.5553	10.55945	53.8785	10.57418	4.3232	
		Designer	15	51.3341	10.34319	53.8785	8.15374	2.5444	
		Grunge Rock	15	53.113	9.18585	42.243	6.26783	-10.8700	
	Tranquil	No Music	15	46.1531	7.45862	–	–	–	.000*
		Classical	15	49.4982	11.91448	52.7501	9.72157	3.2519	
		Designer	15	49.4982	11.91448	53.3394	9.37078	3.8412	
		Grunge Rock	15	54.8505	6.34701	43.9105	8.49612	-10.9400	
DEPRESSED	Blue	No Music	15	47.5512	8.56017	–	–	–	.004*
		Classical	15	55.0417	11.6873	49.0857	8.72349	-5.9560	
		Designer	15	49.856	9.35441	46.8913	8.68645	-2.9647	
		Grunge Rock	15	47.5512	9.1623	54.023	11.58193	6.4718	
	Depressed	No Music	15	45.5181	6.00399	–	–	–	.001*
		Classical	15	55.2968	12.99446	48.3919	6.6645	-6.9049	
		Designer	15	50.4074	8.71151	44.7738	5.07093	-5.6336	
		Grunge Rock	15	48.7777	9.34205	56.8343	12.73098	8.0566	
	Gloomy	No Music	15	47.3417	7.90277	–	–	–	.001*
		Classical	15	54.4305	11.96716	47.7389	8.95053	-6.6916	
		Designer	15	50.8861	10.78394	46.6084	5.42613	-4.2777	
		Grunge Rock	15	47.3417	7.90277	55.6527	12.35687	8.3110	
	Sad	No Music	15	46.7119	7.77941	–	–	–	.050
		Classical	15	53.6012	11.59687	50.9387	12.44951	-2.6625	
		Designer	15	52.3486	11.88325	48.1226	7.04443	-4.2260	
		Grunge Rock	15	47.3382	6.79927	50.9387	10.19836	3.6005	

* Significant at the .05 level