The Effects of Vibrational Frequencies of Sound and Positive Emotional States on Energetic and Psychophysiological Balance

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The work reported in this thesis is original and carried out by me solely, except for the acknowledged direction and assistance gratefully received from colleagues and mentors.

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Our deepest fear is not that we are inadequate,
Our deepest fear is that we are powerful beyond measure.
It is our light, not our darkness
that most frightens us.

ABSTRACT

The aim of the study was to enhance energetic and psychophysiological balance or coherence through the use of sound and positive emotional states. The participants were a group of 60 employees of a medium business bank. Their stress levels as prediction of susceptibility to disease were determined by the Holmes-Rahe Social Readjusting Rating. A matched-pair design was used to divide participants quasi-randomly in control and experimental groups referring to age, gender and the Holmes-Rahe Social Readjustment Rating scores. Pre- and post-test measurements of the dependent variables were done in both groups. This included the Profile of Mood States (POMS) questionnaire to determine emotional states, the Freeze-Framerâ 2.0 software to measure psychophysiological coherence using Heart Rate, Coherence Ratio and Power Spectral Density (PDS) and VoiceBio Analysisä software to measure energetic balance through a recording or VIBEprintä of the sound frequencies present in the voice. A VIBEprint™ reveals frequency patterns in the body that are either overworked or exhausted or stagnant or not working. The selected piece of music for this project was Program 1 Deep Relaxation, from the AlphaRelaxationSystem by Jeffrey Thompson. The positive emotional state was created by a heart-focus technique inducing a state of gratitude while the music was being listened to. Participants from the experimental group used the sound formula combined with the positive emotional state for thirty minutes each day, for a period of two weeks. The control group received no intervention. After two weeks all the measurements of the dependant variables were repeated on both groups. The results indicated a positive shift in emotional states and energetic balance. Results showed no conclusive evidence on the level of psychophysiological balance. Implications and suggestions for future research are included.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1:
INTRODUCTION

In the world of business a new paradigm is emerging where a gradual shift is taking place to support a more organic and holistic view of managing organizations. Even more importantly, this paradigm shift is triggering corporate cultures to be more flexible and fluid when managing people, to take them to higher levels of achievement and excellence.

Garfield and Toms describe this shift as a new human-based story that moves away from the imagery of the old story of Horatio Alger, the lone pioneer and rugged individual who made it work against all odds:

> ...that imagery, that mythology, that way of viewing the world, that paradigm, simply doesn't work anymore. We are living on an interdependent planet, and corporate systems are always subsystems of that interdependence, and they require collaboration and partnership. We're moving toward a fundamentally different understanding of what it takes to nourish human beings and to nourish living systems, called corporations or any other institution….I think we're in the very beginning stages of the blossoming of the new story, a new mythology, the form of which is now becoming evident…even in the midst of what looks like a profoundly old story, which you certainly can see around the world, there are also strong examples of leadership of a new story emerging.[1]

We now have the opportunity to create a new story that is based on a living systems perspective, where there is an understanding that every process contributes to all other processes.[2] In this new story, a new image can emerge where the individual becomes a participant or partner in the system, while contributing in positive and uplifting ways to the organizational culture. Oscar Wilde's timely reminder speaks to us all, when he says "To live is the rarest thing in the world…most people just exist, that is all." When a sense of aliveness is cultivated within a healthy and balanced individual, that person becomes an asset to any organization, being fully alive and present.

The research presented in this study reports on the role of an integrative, living systems perspective used to promote balance or coherence within employees who are experiencing high stress levels. The specific focus was on the role of sound frequencies and positive emotional states to create energetic and psychophysiological balance or coherence.

Background of Problem

Stress- related diseases are paramount in our modern society, affecting individual health while crippling organizations. Research conducted in various fields indicate that cardiovascular disease, musculoskeletal disorders, psychological disorders, suicide, cancer, impaired immune function and work place injury are a range of symptoms indicative of a stress-ridden society.[3] Occupational stress is a major contributor to that and is defined by The National Institute for Occupational Safety and Health (NIOSH) as the "harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker." Research has indicated that one-fourth of employees view their jobs as the number one stressor in their lives; three-fourths of employees believe the worker has more on-the-job stress than was the case a generation ago; problems at work are more strongly associated with health complaints than any other life stressor, even when compared with financial or family problems.[4]

Environmental factors play a role in the level of stress that is experienced by an individual but the coping style and personality is just as important. Paul Rosch uses the analogy of riders on a steep roller coaster ride to explain the different coping styles. The thrill-seekers are in front, yelling and more than ready to get on the next ride, while riders

at the back have their eyes shut, gripping the retainer bar and wishing that the ride be over. In between, there might be a few who are quite indifferent to it all and do not care one way or the other.[5] What distinguishes the reactions of the different riders is their sense of control, based on unique perceptions and expectations. The same experience or stressor can trigger totally different reactions and coping mechanisms in people.

In the views of energy medicine and the shift in organizations from a mechanistic view to a more fluid, organic structure where organizations are viewed as whole systems, the role of the individual is paramount in creating a healthy work environment. The current view in the new sciences is that all living beings and living systems are surrounded by subtle energy that is the dynamic, ever-changing aspects of all living matter. Subtle energy flows through all things in a fluent yet systematic manner according to natural laws. Research provides evidence of a shared field of energy that literally connects everything.[6] When this energy becomes blocked or stagnant in any part of a system, whether it is in the human body or in the "body" of the organization, imbalances occur that can lead to disease or illness. Any factor that causes stress on a system will interfere with the normal functioning of that system, and when the situation is prolonged, irreversible damage might eventually be caused.

The Anglo-Saxon word for health is *häl*, which can also be translated as "whole." True health, therefore, implies a state of wholeness, whether within the individual or the organization. Energy medicine provides a scientific approach to explain the energy fields within and around living systems, which are important to the health of an organism. The energy field of the individual or employee contributes to the organizational energy, which is equally important to view as being an "organism." By moving away from the

Newtonian view of reality, towards the possibilities provided by subtle energies and energy medicine, a new dimension opens for managing people within an organization. Any intervention that strives to better the health or wellness of an individual within the organization will improve the overall energy within that organization, hopefully in a positive and uplifting way. According to Colin Hall, CEO of Learning to Lead, personal energy is the cornerstone in any organization, as it influences leadership energy, team energy and, ultimately, organizational energy.[7] Personal energy can contribute optimally to organizational energy when it is balanced, authentic and comes from a place of personal empowerment.

Statement of the Problem

The challenge is to measure organizational and personal energy, followed by interventions that can change the energy of employees, as well as that of the organization. Furthermore, as the awareness develops of the important role of energy, a need to implement integrative, energy-based and practical solutions to support employees to manage their personal energy is revealed.

A number of these solutions are provided through The Institute of HeartMath (IHM), where user-friendly tools and techniques to provide stress-relief, improve a sense of balance and creativity, as well as enhance performance and energy were developed. The research conducted there focuses on the electromagnetic field that surrounds the heart. The Institute of HeartMath research provides a scientific basis through key indicators of physiological and psychological well-being, to explain how positive emotional states can change heart rhythms, affect mental clarity, emotional balance and personal effectiveness.[8] Research at the IHM also examines the physiological and

psychological effects of music that integrates particular rhythmic patterns, tone textures, chord progressions and harmonic resonances, that are specifically designed to help reduce stress, facilitate the experience of sustained positive emotional states and enhance the benefits of stress management interventions. Music has been demonstrated to help reduce stress and negative emotions, while increasing positive emotions, in both healthy populations and in individuals with clinical conditions, such as, anxiety, depression, panic, arrhythmias, diabetes and chronic fatigue. It was found that scientifically designed music, when used regularly in conjunction with an emotional self-management program, facilitates the entrainment of physiological systems and increased DHEA, along with reduced cortisol production and improved balance or coherence in the autonomic nervous system (ANS).[9]

The principles and effects of sound therapy on health and well-being are recognized in the field of energy medicine. Sound influences the body directly by its effect on geometric patterns and organization of cells and living systems.[10] Various therapeutic approaches using sound frequencies have developed over the past twenty years, ranging from sonic acupuncture, sound tables, bio-entrainment brain machines, binaural-beat technology, meditative and healing sound tapes. Computer analysis of sonic voice patterns provides a diagnostic instrument to measure frequency patterns in the body. Missing frequencies can then be supplemented by toning the missing frequencies or by listening to recordings of those frequencies. It has been demonstrated that scientifically designed music induces more relaxed states, by influencing brainwave patterns and biochemistry, and has a direct effect on the vibratory anatomy of the human body.

Purpose of the Study

The focus of this study is on the application of two methods to address personal energy from an electromagnetic perspective, namely sound frequency and positive emotional states. The purpose of this study is to measure personal energy in subjects/employees who are experiencing a high stress level and to then introduce energy-based solutions, namely sound frequency and positive emotional states, in an attempt to improve their energetic and psychophysiological balance or coherence. The personal energy of the subjects will then be measured again. The study will be conducted in the working environment of those subjects, to test the hypothesis that stress can be addressed in practical ways from an electromagnetic perspective and in "real-life" settings. Furthermore, the application of these methods will provide an opportunity to explore the relevance of a balanced energetic state in individuals and the influence this has on the overall energy within an organization.

Research Questions

Can the management of personal energy within an organization be approached from an electromagnetic perspective, by using sound frequencies and positive emotional states, to create balance or coherence on energetic and psychophysiological levels within individuals?

That research question led to the following hypotheses: 1) Scientifically designed music can improve energetic and psychophysiological balance within individuals experiencing high stress levels; 2) Positive emotional states can improve energetic and psychophysiological balance within individuals experiencing high stress levels; 3) Positive changes on an energetic level can influence the over-all climate or culture within

an organization and 4) It is possible to measure energetic changes within a “real-life” working environment.

Importance of this Study

The focus of the research done for this study was specifically aimed at the “real-life” setting within a company, to measure the influence of energy on that environment. Scientific research in the field of energy medicine may initiate leading-edge solutions for health and well-being, stress management and stress related diseases in ways that have not been considered before. This would then provide an opportunity for individuals and companies to consider new strategies that are effective, practical and easy to implement and can directly influence the energy profile of their company.

Scope of this Study

The practical part of this study was conducted in the Medium Business Banking Division, a sub segment within the Business Banking Services Department of a large Corporate and Business bank, which, for confidentiality, will remain unnamed. The Medium Business Banking Division is divided into various branches or cells that are set up throughout the public areas to service prospective clients. Two cells were chosen to participate in this research project, Cell A (N=38) and Cell B (N=22). A group of 60 healthy males and females were chosen for the purposes of the study, all of whom were experiencing high stress levels in their work environment at that time. The experimental design utilized a matched pair design, to create a compatible profile between the experimental and the control group. Participants were quasi-randomly assigned to either the experimental or control group by making use of age, gender and stress levels as

determined with the Holmes-Rahe Social Readjustment Rating. Pre-tests and post-tests were applied by repeated measurements of dependent variables in the experimental and control groups. The dependant variables included the Freeze Framer 2.0®; Voicebio Analysis™ and the Profile of Mood States (POMS). The working environment was selected in which to conduct the testing and experimental part of this research. During the experimental phase the experimental group was provided with a stereo headset and a copy of scientifically designed music on a compact disc, which they were required to listen to for 30 minutes each day. They also received instructions to consciously induce a positive emotional state while listening to the music. The control group received no intervention. After fourteen days post-tests were conducted on both control and experimental groups by repeating the measurement of the dependent variables.

Definition of Terms

Amygdala – a key brain center in the coordination of behavioral, immunological and neuroendocrine responses to environmental threats. The amygdala makes instantaneous decisions about the potential threat that incoming sensory information may pose, while activating autonomic and emotional responses before the higher brain centers receive the sensory information. In this way, emotional memory patterns affect moment-to-moment perceptions, emotions and behaviors.

Autonomic Nervous System (ANS) – the part of the nervous system that regulates the visceral functions of the organs of the body, including the action of the heart, the movement of the gastrointestinal tract and secretions from different glands.

Balance - also described as coherence and indicating a harmonious state within a person, system or organization.

Biofeedback – a method of treatment that uses monitors to feed back to patients physiological information of which they are normally unaware. By watching the monitor, patients can learn by trial and error to adjust their thinking and other psychophysiological processes, to then control "involuntary" bodily processes, such as blood pressure, body temperature, gastrointestinal functioning, and brain wave activity.

Coherence – the synchronization between two or more systems, such as the heart's rhythm, respiration and blood pressure rhythms. In the human system, the heart, as the body's most powerful oscillator, can set the stage for coherence of other physiological systems. Coherence is an important word in high performance physiology. Coherence means clarity of thought and emotional balance; the quality of being orderly, consistent and intelligible (e.g., a coherent argument). Coherence can also be used to describe how ordered a wave or a rhythm is. A more coherent rhythm is like a stable sine wave.

Coherent heart rhythms – mean that the two branches of the autonomic nervous system (the sympathetic and parasympathetic) are working in conjunction with each other in a more harmonious manner and that the heart rhythm, the respiratory rhythm and the blood pressure rhythm are more synchronized. The heart is a primary generator of rhythm in the body and influences brain processes, like the nervous system, cognitive function and emotions.

Cortisol – the so-called "stress-hormone," a glycocorticoid hormone that is involved in the metabolism of protein, carbohydrate and fat. Cortisol secretion increases with chronic stress and has a corresponding suppressive effect on the immune system.

Cymatics – a general systems study of sound, invented by Hans Jenny who studied the effects of sound waves on physical matter.

DHEA/cortisol ratio – a biological marker of stress and aging. Stress causes an increase in cortisol secretion with a corresponding decreased level of DHEA and may indicate elevation in blood sugar levels, increased bone loss, compromised immune function, decreased skin repair, increased fat accumulation and brain cell destruction.

DHEA –dehydroepiandrostene is the precursor to the human sex hormones estrogen and testosterone. It is also called the "anti-aging hormone" due to its enhancing effects on the immune system, stimulating bone deposition, lowering cholesterol levels and building of muscle mass. DHEA has been found to be deficient in obesity, diabetes, hypertension, cancer, Alzheimer's disease, immune deficiency, coronary artery disease and various autoimmune diseases.

Energetic balance – a state of balance within the energetic system of the multidimensional human make-up, where there is communication and flow between the different subtle energy bodies and the physical body.

Entrainment – a principle based on rhythm, so that the rhythmic vibrations of one object can change the rhythmic vibrations of another object and still be synchronized.

Frequency – the amount of cycles per second in a sound wave. For instance, a string that moves back and forth a 100 times in one second will have a sound that can be measured as a frequency of 100Hz.

Heart Rate Variability (HRV) – used as a non-invasive measurement of naturally occurring beat-to-beat changes in heart rate. It is a measure of neurocardiac function that reflects heart-brain interactions and autonomic nervous system dynamics, which are particularly sensitive to changes in emotional states.

Homeostasis – the ability or tendency of an organism or cell to maintain internal equilibrium by adjusting its physiological processes.

Hypothalamic-pituitary-adrenal cortex – the hypothalamic-pituitary-adrenal axis (HPA) is a complex set of direct influences and feedback interactions among the hypothalamus , the pituitary gland and the adrenal glands. The interactions between these organs constitute the HPA axis, a major part of the neuroendocrine system that controls reactions to stress and regulates many body processes, including digestion, the immune system, mood and emotions, sexuality, and energy storage and expenditure.

Ligand – a Latin word meaning 'to bind' and includes hormones, neurotransmitters and peptides.

Medulla –the heart transmits information relative to a person's emotional state to the cardiac center of the brain stem or medulla, which in turn feeds into the thalamus and the amygdala. These areas are directly connected to the base of the frontal lobes, which are critical for decision making and the integration of reason and feeling. The thalamus sends signals to the rest of the cortex, to help synchronize cortical activity, thus providing a pathway and mechanism which explain how the heart's rhythms can change the coherence in the brainwave patterns and modify brain function.

Parasympathetic nervous system – the parasympathetic branch of the autonomic nervous system slows the heart rate and has a relaxing function, to create balance in the autonomic nervous system.

Power Spectral Density **(**PSD): the HRV signal is reduced into its constituent frequency components and quantifies the relative power of these components. The Power Spectrum Density (PSD) analysis is used to assess the balance between the sympathetic and

parasympathetic parts of the autonomic nervous system. The power spectrum is divided into three main frequency ranges. The very low frequency (LF) (0.01 to 0.05 Hz) represents slower changes in heart rate, as an index of sympathetic activity. The low frequency range (MF) (0.05 to 0.15 Hz) is referred to as the baroreceptor band, because it reflects the blood pressure feedback signals sent from the heart back to the brain, which also affects the HRV waveform. The LF band is a mixture of sympathetic and parasympathetic activity. The high frequency range (HF) (0.15 to 0.4 Hz) represents changes in the heart rate due to parasympathetic activity.

Psychoneuroimmunology (PNI) – a scientific field of study that explains the links between thoughts, perceptions, coping styles and emotions, and the effect they have on the functioning of the hormonal, nervous and immune systems.

Psychophysiological coherence – a state of emotionally driven coherence, which is influenced by positive and negative emotions.

Resonance – the frequency (cycles per second) at which an object most naturally vibrates.

Sympathetic nervous system – the sympathetic branch of the autonomic nervous system (ANS) increases the heart rate and the secretion of the stress or adrenal hormones.

Sympathovagal balance – is the balance between the sympathetic and parasympathetic branches of the autonomic nervous system. Interventions that aim to promote self-management of mental end emotional states can alter the sympathovagal balance, by decreasing the sympathetic activity and increasing the parasympathetic activity.

Delimitations and Limitations

The delimitations to this research study are as follows:

- Due to the time frame of the research study, the researcher had only access to the employees who were part of the two particular cells, and the work commitments of employees from other cells within the medium business banking environment.
- This study included a limited sample size of sixty participants.
- The study was conducted in the “real-life” setting of an office environment and, consequently, the work schedules and commitments of the participating employees affected the coordination of particular pre-tests and post-test dates.
- The research intervention was only implemented for a relatively short period of time, that of two weeks.
- The participants of the experimental group received no previous training in using a sound formulae or the induction of positive emotional states, apart from the instructions they were given during the information session and the written instructions they were given.

The limitations of this research study are as follows:

- Details of the physical and psychological health of the participants were not known by the researcher.
- The research was not conducted in a controlled environment.
- The researcher had no control over how successfully and effectively each participant applied the research tools and had to rely on their feedback.

- A true experimental design was not possible, as the participants shared the same working space.

CHAPTER 2:
REVIEW OF LITERATURE

Introduction

Chapter 2 provides an overview of an integrative approach to stress and energy management, with specific focus on the literature that explores the importance of sound and positive emotional states in creating energetic and psychophysiological balance.

Stress Explained from an Electromagnetic Perspective

The 19th century French physiologist Claude Bernard emphasized that good health depended on the ability of the organism to maintain constancy of the internal environment (*milieu interieur*) and, more specifically, the chemicals in the blood and tissues, body temperature, blood pressure, heart rate and various other physical parameters. Fifty years later, this state was also described as "homeostasis" by Walter Cannon. Hans Selye defined stress as "the non-specific response of the body to any demand or change."[11] Selye later added the term "stressors" to define the causes of stress, which resulted in the response in the hypothalamic-pituitary-adrenal cortex, also referred to as the "fight or flight" reaction. By Selye's own admission he struggled to get the correct term to describe stress, sometimes preferring the term "strain" to "stress."

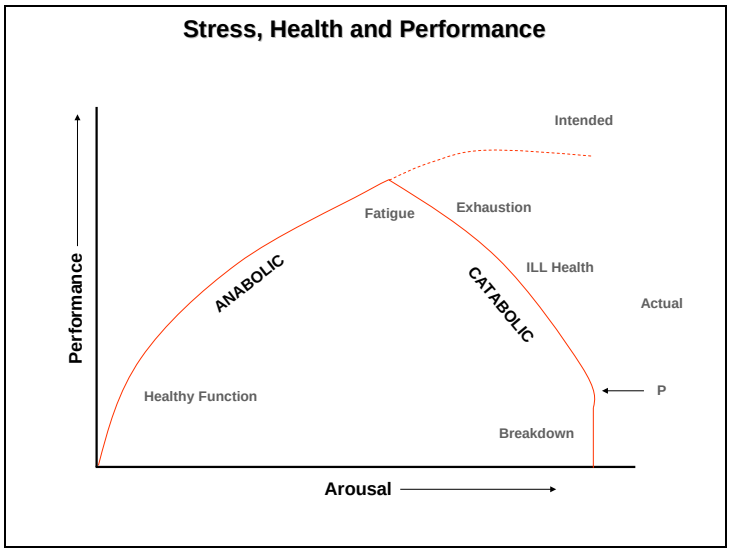
The stress response is as old as humanity itself and, in being also described as the "fight or flight" response, is similar to the classic response primitive men experienced in life threatening situations. However, the picture painted of stress has changed in our modern society. In these times the threat seems to be repetitive emotional or mental challenges that occur several times a day through interaction with colleagues, a difficult

manager, heavy traffic and more. Unfortunately, the body of the present-day office worker responds in a similar fashion to that of the hunter of old, with the result of repetitive triggering of the stress response during a single working day. This can result in the development of chronic stress, with all its associated health risks and poor performance. By making use of a sample of 1842 hospital workers in Northern Italy, Conway et al. demonstrated that work stress was the risk factor with the highest relevance for poor health, accelerated ageing as well as poor sleep patterns.[12] Results from a national survey, conducted by the Research Center for Occupational Health and Well-being among Icelandic nurses, demonstrated that 21.7% of nurses assessed their physical health as poor or very poor and 14.3% assessed their mental health as being such. Those who assessed their physical or mental health as poor or very poor, as compared to the others, reported more symptoms in general, less regular exercise, as well as more use of medication, more visits to physicians, trouble with sleep patterns, conflicts between work and family life, work absence, and they also experienced their work as more strenuous.[13]

Eisen et al. demonstrated that work stress contributed significantly to corporate health costs and, therefore, numerous corporations implemented worksite stress management interventions, to mitigate the financial and personal impact of stress on their employees. Outcomes from a stress-management intervention provided via an instructor led versus a computer-presented format were compared through a randomized, controlled design. Brief relaxation procedures presented in both formats led to highly significant reductions in immediately-reported stress, although there were no longer-term indices of workplace stress reduction following completion of the intervention at a one-month

follow-up. Outcomes suggested that the instructor led format was more successful than the computer presented format. Across both presentation formats, however, more frequent use of stress-reduction techniques was correlated significantly with greater reductions in stress indices (e.g., nervousness, social isolation, overall work stress) at follow-up.[14] A meta-analysis on studies that examined the effects of participation in an organizational wellness program (fitness or comprehensive) on absenteeism and job satisfaction revealed that participation in an organizational wellness program was associated with decreased absenteeism and increased job satisfaction.[15] Barnes et al. demonstrated that common health problems, such as pain, depressed mood and fatigue were often cited as causes of disability and incapacity for work.[16]

The relationship between performance, arousal or stress and health was demonstrated by Watkins, who showed that performance increases with initial arousal during the anabolic stage [17] (see Figure 1). During that phase energy is being stored with regeneration that is possible. However when fatigue sets in and nothing is done to restore those energy levels, performance actually decreases during the catabolic stage. The actual performance is then much lower than the intended performance, with the possibility of illness and burn-out to then occur.



Dotted line = intended activity

Solid line = actual performance

Figure 1. The human function curve model

The more individuals struggle with what they can accomplish and continue trying to accomplish it, the further down the curve they move. Factors such as coping style, personality traits, circumstances or unconscious behavior will influence the level of stress each individual is able to handle. Jacobs et al. used university-based statistics of performance and self-rated employee productivity in English academic institutions to examine the relationship between stress levels, organizational commitment, health and performance. The authors found that stressors had a negative linear relationship with all the performance measures applied and were also influenced by physical health, feelings of psychological well-being and organizational commitment.[18]

Psychoneuroimmunology

Since the early 1970's psychoneuroimmunology (PNI) research has explained the links between thoughts, perceptions, coping styles and emotions, and the effect they have

on the functioning of the hormonal and nervous systems. PNI continues to investigate these connections, and strives to apply this knowledge within a therapeutic framework, to alleviate symptoms of stress, stabilize immune functioning and prevent disease. Various contributors from the fields of psychology, neuroscience and psychiatry have added to an ever-growing body of scientific evidence which emphasizes the importance of the mind-body connection. Researchers like Robert Ader[19] and Candace Pert[20] and various other contributers made important contributions to this field of science.

Psychoneuroimmunology provides sufficient evidence to explain the connection between the mind and body as well as the links between perceptions, emotions, coping styles, and the endocrine, nervous and immune systems.[21] According to findings in PNI, mind-body awareness can be developed, and is described as the ability to become aware of sensations and feelings in the physical body, in response to emotions and thoughts. Apart from the benefit of good health, the ability to be attentive in every moment creates opportunity to function from a sense of inner control and connectedness, leaving one feeling more in control of one's own life and choices. This ability is also important when awareness has been created about the effects of repetitive negative thoughts on homeostasis or physiological balance.

Linda Witek-Janusek et al. introduced a mindfulness based program in women with early stage breast cancer and demonstrated improved immune function, quality of life and coping ability, as well as lower cortisol levels, in comparison to women with the same diagnosis who were not using mindfulness based techniques during the same period.[22] Recent studies in psychoneuroimmunology have also indicated that positive psychological events are related to immune function, as well as central nervous,

endocrine, and immune systems, by simultaneously recording brain, endocrine, and immune activities when positive emotions were evoked in participants as they watched films featuring their favorite persons. Interestingly, the activity of peripheral circulating natural killer cells and the peripheral dopamine level were elevated while participants experienced positive emotions, which indicate an interrelation between the central nervous, endocrine, and immune systems when positive emotions are elicited.[23]

The stress response includes intricate reactions from the nervous and endocrine systems facilitated by the secretion of ligands in response to a stressor. (*Ligand* is a Latin word meaning 'to bind' and includes hormones, neurotransmitters and peptides.) In the mind-body communication system, as described by Candace Pert, there are more than 200 peptides, each linked to different emotions, like bliss, anger, frustration etc.[24] In the earlier chemical/molecular model Pert describes the lock-and-key model, where each cell receptor is specific for a certain ligand and when the receptor and ligand bind, key processes are initiated within the cell.

However, the latest findings indicate a more dynamic relationship between ligand and cell receptor, based on 'vibratory attraction.' In this model of 'cellular resonance' the receptor is in a constant state of flux, creating a certain vibration that would then resonate with a ligand with the same frequency. "Cellular resonance – it's like you pluck one string on two different guitars in the same room – one will resonate with the other, both striking the same note. This creates a force of attraction, the way that peptides resonate with their receptors and come together to strike that emotional chord as they bind. And that's when the music begins!"[25]

The current scientific findings, in the field of energy medicine, strive to explain these resonating forces or vibrations present within the multidimensional energy 'anatomy.' According to Gerber, "vibrational medicine provides a scientific perspective of subtle physiology which will allow physicians to understand and treat the varied effects of stress on the human bioenergetic system."[26]

In this model of the multidimensional human being, the attracting vibration is the emotion carried by the specific ligand, and the connection of receptor and ligand is the physical or biochemical manifestation of the emotion, also referred to as a feeling. Another interesting fact is that the quantity of receptors wax and wane in number and sensitivity, depending on how often they are occupied by peptides or other informational substances. This explains how the body changes in response to emotions on a vibrational level. Pert compares this to "a cartoon version of this whole process-peptides binding, receptors pumping, electric current moving out – we'd see bright, colorful clouds of vibrating, singing energy surrounding each cell; and we'd hear a chorus of resonating voices soaring in the background."[27]

According to Rosch, electromagnetic communication can explain the myriad homeostatic and "fight or flight" responses that take place instantaneously and automatically when stress is experienced. Instruments such as magnetometers can measure the influence of various emotions on the energy fields surrounding the body that is supported by measurable psychophysiological changes in the body.[28] McCraty et al. describes changes in skin conductance, the electroencephalogram (EEG) and the electrocardiogram (ECG) in response to emotional arousing stimuli seconds before it actually happens. The findings of that study provide electrophysiological evidence of

emotional information that is present in the electromagnetic fields that surround and have a direct effect on the physiology of the body.[29]

Those, and similar studies, open the way to explore new ways of managing stress and introduce practical tools, based on the understanding that there is a need to address conditions of stress, from an electromagnetic perspective to create balance and health on the psychophysiological level.

Science and Energy Medicine

> Meaningfulness in science is an important dimension, even if it is an often neglected one. Science is not only a collection of formulas, abstract and dry, but also a source of insight into the way things are in the world. It is more than just observation, measurement, and computation; it is also a search for meaning and truth.[30]

Parfitt describes the problem of modern society as a suffering from two distinct illnesses. The first is the "crisis of meaning," where people experience themselves as living in an existential vacuum where life has lost its meaning. The second is that of duality, where the world is experienced as a reality of opposites, for instance either-or; us and them; love and hate etc.[31] This might contribute to the quiet sense of desperation that leave many people feeling paralyzed within many aspects of their lives. According to Ballantine, "our suffering comes from forgetting our wholeness. The word [health] comes from the Anglo Saxon häl, whence also comes [heal] and [whole]. Perhaps the simplest definition of healing is [to make whole]."[32]

Over the past twenty years there has been a gradual movement away from the pharmacokinetic Newtonian approach of orthodox medicine that offers surgery, drugs, medication and behavioral modification as solutions, towards the Einsteinian view of energy healing that includes a wide range of therapies focusing on emotions, attitudes,

imagery, visualizations and natural remedies. According to Gerber, a new model of medicine is emerging that "will begin to comprehend that the human organism is a series of interacting multidimensional energy fields."[33] This model includes the understanding that human beings are much more than physical beings, and embraces the shift towards a more integrative perspective, that recognizes human beings as multidimensional in nature. Donella Meadows, an ecologist and author, refers to a Sufi teaching that sums this up: "You think because you understand *one* you must understand *two*, because one and one makes two. But you must also understand *and.*"[34]

The International Society for the Study of Subtle Energies & Energy Medicine (ISSSEEM) defines energy as the common denominator that connects and links everything and includes "all energetic and informational interactions resulting from self-regulation or brought about through other energy couplings to mind and body." Energy is also part of the magnetic, electric, electromagnetic, acoustic and gravitational fields that have an effect on biology and psychology.[35] Oschman demystifies many preconceived ideas about energy therapies when he addresses the importance of electromagnetic fields in the body, their origin as well as their effect on biological structures.[36] Fritjof Capra states that any system functions as "an integrated whole whose essential properties arise from the relationship between its parts."[37]

The quantum perspective of reality consists of individual building blocks that form an intricate and unified whole or network that functions as one. Quantum physicists emphasize relationship and connection as the fundamental ingredients of creation.

> In a fractal world, if we ignore qualitative factors and focus on quantitative measures, we doom ourselves only to frustration. Instead of gaining clarity, our search for quantification leads us into infinite fogginess. The information never ends, it is never complete, and we accumulate more and more but understand less and less. When we study the individual parts or try to understand the system through discrete quantities, we get lost. Deep inside the details, we cannot see the whole. Yet to understand and work with the system, we need to be able to observe it as a system, in its wholeness. Wholeness is revealed only as shapes, not facts.[38]

New science provides an opportunity to move beyond the Newtonian perception of reality, to understand the totality of the human design. In *Leadership and the New Science,* Margaret Wheatley takes many of the insights and emerging ideas from quantum physics and applies them to the organizational world as a metaphorical analogy in search of innovative ways to change organizational culture.[39] The contribution of a vibrational or energy model to this new world view explains specifically the connection between body, mind, emotions and spirit, with a new understanding of the principles or processes that cause disease and illness. It is understood that imbalances that start on an energetic level can lead to diseases of cells, organs, systems and the body. Wheatley describes this as a reality where "everything is always new and different and unique to each of us."[40]

Ken Wilber depicts his view of the interconnectedness of creation as a Great Nest of Being, where every dimension transcends and includes the former way of being into an integral model that emerges, which defines almost everything. Wilber's definition of integral is "to integrate, to bring together, to join, to link, to embrace. Not in the sense of uniformity, and not in the sense of ironing out all the wonderful differences, colors, zigs and zags of a rainbow-hued humanity, but in a sense of unity-in-diversity, shared commonalities along with our wonderful differences."[41] Wilber's Theory of Everything

can be applied to many areas and provides one framework in which to explain science, philosophy and research.

In this worldview of connection and relationship, there are universal principles that can be used to change the way we experience ourselves and how we relate to others. These principles include connection, interdependence, and a sphere of influence that extends beyond our physical reality. The areas of connection also include the subtle levels of being, where no words are spoken, but where there is an exchange of information that is intuitively interpreted and understood by the parties involved. Integration of new knowledge is shifting consciousness as well, which Gerber describes as "a form of 'heart-based' consciousness that acts from a center of love, compassion, and empathy towards others."[42]

According to Wilber a "genuine or integral holism would include both the exterior holism of systems theory and the interior holism of phenomenal consciousness, morals, values, waves, streams, and states, all embraced in their own terms, not forced into the models of others."[43] The individual therefore needs to find ways to create balance between the two realities with the understanding that both are equally important.

If we presume that all is connected, all is one, how do people create a unique space for themselves in this new reality? How can people learn a sense of inner-control to manage their stress levels better while creating balance on an energetic level? Being aware of these new findings can lead to the implementation of new approaches and methods to manage stress, while the integration of the latest scientific knowledge into practical tools can help individuals to reach new heights of sustainable performance and balance.

Energetic Balance

In order to create energetic balance it is necessary to understand the multidimensional energetic system of the human make-up. Apart from the physical body, the human energy field consists of various subtle energy bodies, namely the etheric body, the emotional body, the mental body and the causal body. Scientific studies, such as the Rolf Study conducted by Valerie V. Hunt, provide evidence of the electromagnetic field that surrounds all living things, including the human body, and extends into the environment.[44] Measurements made in various laboratories have provided evidence of different components within the human energy field, such as electrostatic, sonic, thermal, magnetic, electromagnetic and visual.

In Eastern philosophies and healing traditions most of the views have been based on an understanding that energy, described as "ch'i" or prana, flows through the human body, for nourishment and balance. Eastern schools of thought and healing describe energy systems, such as the acupuncture meridians of Chinese medicine and the chakra-nadis system of the ancient Indian philosophy. According to Chinese medicine there are 12 pairs of meridians that are connected to specific organ systems in the human structure. The basis of Chinese medicine is to prevent blockages in the flow of "ch'i" or energy, through the various meridians, by stimulating specific acupuncture points on the body. This is done to prevent dysfunction in the organ system and is a preventative approach in dealing with disease. Current research reveals the benefits of acupuncture, as demonstrated by W. Weidenhammer et al., who examined the benefits of acupuncture in treating chronic pain conditions within the statutory framework of health insurance in Germany. Whereupon their recommendations were that acupuncture proved to be a

highly demanded treatment option for conditions of chronic pain and those results further indicated that acupuncture provided by qualified therapists was safe, with patients benefiting from the treatment.[45]

The roots of the chakra system are part of Hindu tradition and some of its myths and rituals might be as old as the Paleolithic period (20,000 B.C.)[46] For many centuries the principles of the chakra system were practiced in Eastern religions to enhance spiritual enlightenment through breathing techniques, yoga and meditation. In a modern day context, a randomized comparative trial of yoga and relaxation to reduce stress and anxiety, performed by Caroline Smith et al., demonstrated that yoga appeared to provide a comparable improvement in stress, anxiety and health status when compared to relaxation.[47]

The chakras, which are also called "wheels of light," represent spinning vortices of energy. Judith Anodea provides a complementary view with much emphasis on the psychological development of humans and how that relates to the chakras,[48] while Caroline Myss presents valuable information about the links between disruptions in the energetic flow of the chakras and the development of illness or disease.[49] The nadis distribute the energy of each chakra through the physical body. The nadis are fine threads of subtle energetic matter that represent an extensive network of fluid-like energies similar to the structure of the nervous system. From the Western perspective, chakras are now understood to be involved with the flow of energy through subtle energetic channels into the cellular structure of the physical body. The seven main chakras each correspond with a major nerve plexus and a major endocrine gland, and, as such, have been well described by Norman Shealy and Caroline Myss, both pioneers in the field of Energy

medicine.[50] Both the meridians and the chakras (together with their nadis) form part of the interface between the etheric body and physiological structure of the body.

The emotional body is the next "layer" in the human energy field and is described as a strong field of electromagnetic energy, composed of higher energetic frequencies than the etheric body. Using the analogy of a piano keyboard, Gerber describes the differences in frequency of the physical, etheric, emotional and mental bodies as different octaves on the keyboard.[51] The lowest set of keys would be the physical body. The next set of keys to the right would represent the etheric body, followed by the emotional and, then, mental bodies. This model can be extended to include even higher frequencies. Gerber describes these octaves "as distinct, but not separate, within our being."

In striving for energetic balance there needs to be communication and flow between the different subtle energy bodies and the physical body. Any disruption or obstruction will cause the whole energetic system to be out of balance. Modern technology provides a means to measure the flow of energy in the body. Examples include the computerized Motoyama AMI machine (Apparatus for Measuring the Functions of the Meridians and Corresponding Internal Organ), that uses electrodes attached to acupoints of the twelve meridians to compare the electrical balance in the left and right sides of the body; the Dermatron or Voll machine, that measures frequencies at individual acupoints; a number of meridian / acupoint-based electronic systems, that includes the Mora device and the Interro System.[52] As modern technology provides the means to measure the various frequencies within the energetic make-up of the body, methods can be used to apply the correct frequencies that need restoration, which in turn can restore energetic balance.

Psychophysiological Balance

The Institute of HeartMath (IHM) is a nonprofit research and education organization with a specific focus on the electromagnetic field that surrounds the heart, which is also the largest electromagnetic field surrounding the body, which is 5,000 times stronger than the field generated by the brain and measurable several feet away from the body by SQUID-based magnetometers.[53] The electromagnetic field of the heart is influenced by emotional states, which have a direct affect on the balance and coherence within various bodily systems. The IHM research provides a scientific basis through key indicators of physiological and psychological well-being, to explain how changes in heart rhythms affect mental clarity, emotional balance and personal effectiveness.

The research done at IHM builds on previous work done by Walter Cannon, who demonstrated that emotional changes are accompanied by predictable changes in heart rate, blood pressure, respiration and digestion; John and Beatrice Lacey's observations that the heart communicates with the brain, while affecting behavior, and the subsequent findings in the field of neurocardiology by Armour & Ardell, explained more of the communication system between the brain and the heart.[54]

The heart is described as "a highly complex, self-organized information processing center with its own functional "brain" that communicates with and influences the cranial brain through the nervous system, hormonal system and other pathways."[55] The heart communicates with the brain in four major ways: neurologically (through the transmission of nerve impulses); biochemically (through hormones and neurotransmitters); biophysically (through pressure waves) and energetically (through electromagnetic field interactions).

The intrinsic nervous system of the heart consists of ganglia that contain neurons of several types as well as sensory neuritis, which are distributed throughout the heart. The heart contains 40,000 neurons or sensory neurites, which detect changes in the circulating hormones and neurotransmitters, heart rate and pressure information, to maintain cardiovascular function and stability. The information received by the neurons is sent through *afferent* (flowing to the brain) nerve pathways to the medulla in the brain stem, to play a part in the regulatory function of the autonomic nervous system that in its turn sends signals from the brain to blood vessels, the heart and other organs. The signals from the heart also stimulate higher brain functions through the subcortical areas (thalamus, amygdala, etc.) and the cortical areas of the frontal lobes, to influence powers of perception, creativity, decision-making and reasoning.

These findings provide a model of a two-way communication system between the heart and the brain that regulates heart rate and blood pressure. The signals from the heart to the brain, and vice versa, cause the heart rate to vary with each beat. This is called the Heart Rate Variability (HRV), which is a measurement that can be used to measure neurocardiac function and the balance between the sympathetic and parasympathetic branches in the autonomic nervous system.[56]

The Autonomic Nervous System

The nervous system of the body is divided into various layered branches, beginning with the central nervous system and ending in the peripheral nervous system. The peripheral nervous system is further divided into the sensory-somatic nervous system and the autonomic nervous system. The autonomic nervous system is the part of the nervous system that regulates or coordinates the functions of various organs and systems

in the body, in an autonomous fashion. This includes the function of the cardiovascular, respiratory, immune, digestive and urinary systems, all of which happens without conscious awareness of it taking place.

Two major branches form part of the autonomic nervous system, namely the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). The sympathetic branch of the autonomic nervous system (ANS) increases the heart rate and the secretion of the stress or adrenal hormones. The parasympathetic branch of the autonomic nervous system slows the heart rate and has a relaxing function, to create balance in the autonomic nervous system. The heart rate measured at any given moment represents the net effect of the parasympathetic (vagus) nerves, which slow heart rate, and the sympathetic nerves, which accelerate it.

These changes are influenced by emotional states, repetitive thought patterns and physical exercise. Changes in heart rate also influence the ability of the brain to process information, solve problems and make decisions, while also affecting feelings. Thoughts, perceptions and emotional states are transmitted through the brain to the heart through the two branches of the autonomic nervous system and are reflected in the pattern of the heart rhythm.

Heart Rate Variability (HRV)

Heart Rate Variability (HRV) is a non-invasive measurement of naturally occurring beat-to-beat changes in the heart rate, that reflects heart-brain interactions and autonomic nervous system dynamics, which are particularly sensitive to changes in emotional states.

Heart Rate Variability (HRV) can be used to monitor and predict various physical and psychological conditions such as:

- Cardiovascular disease (including myocardial infarction, hypertension and arrhythmias)
- Diabetic autonomic neuropathy
- Aging
- Autonomically mediated hormonal responses
- Sudden death
- Major depression
- Panic disorders
- Anxiety and worry
- Mental and emotional stress

The IHM demonstrated the effects of different emotional states on HRV.[57] In the first example, the emotion of frustration or anger causes an irregular, random form in the HRV pattern (see Figure 2). In comparison, a feeling state of sincere appreciation or gratitude results in a highly ordered and coherent HRV pattern (see Figure 3).

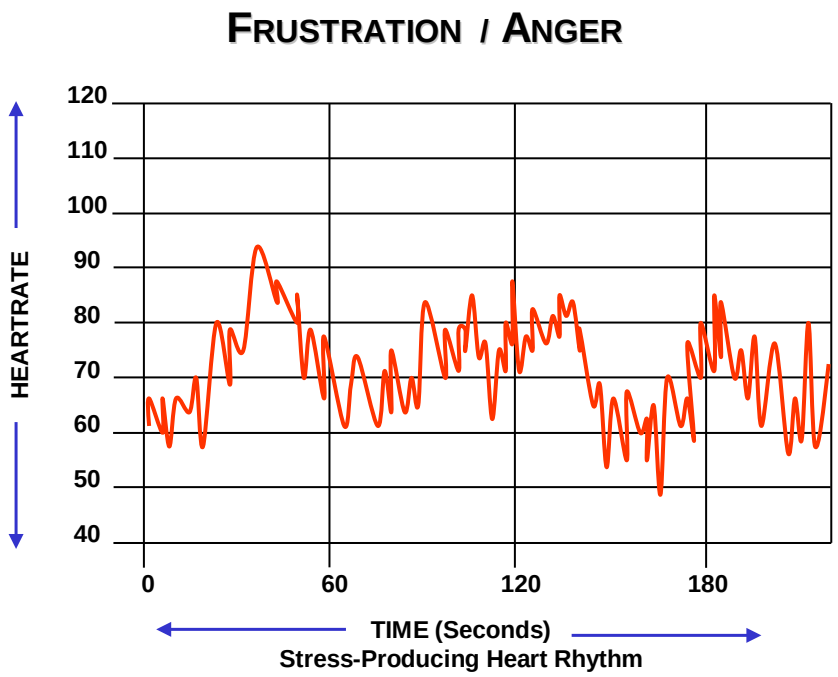


Figure 2. The effects of frustration and anger on HRV

The more stable the frequency and shape of the waveform, the higher the level of coherence. In physics, coherence can be described in terms of the frequency and shape of a sine waveform. In physiology, the degree of order and stability in the waveform reflects the rhythmic activity of a physiological system over a specified period of time, in this case the rhythm of the heart.

Positive emotional states, like love or appreciation, can be described as coherent states, while negative emotions, like anger or frustration, can be described as incoherent states.

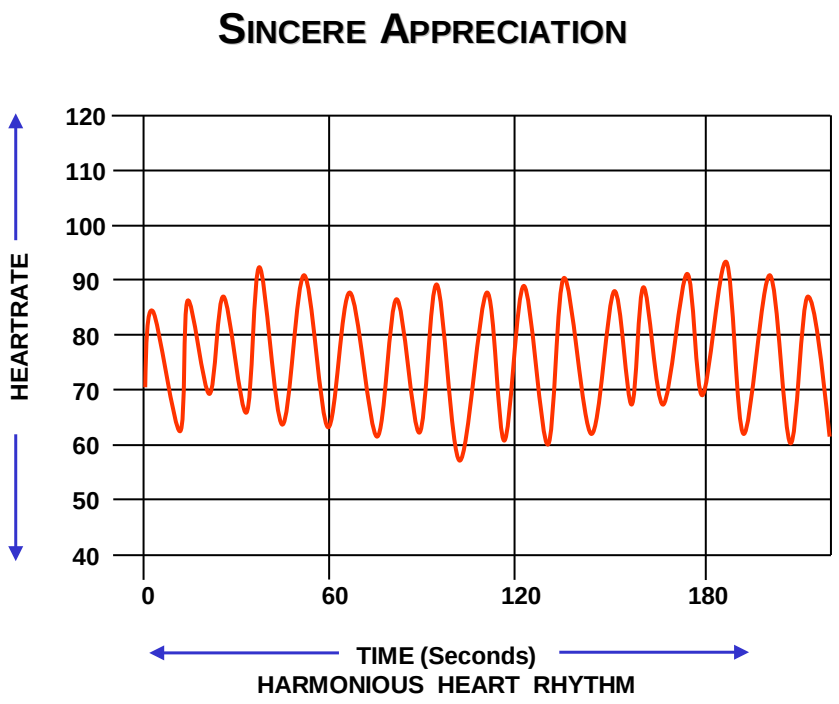


Figure 3. The effects of sincere appreciation on HRV

Physiological coherence is also described as a functional mode in which two or more of the body's oscillatory systems, such as respiration and heart rhythms, become *entrained* and oscillate at the same frequency. Entrainment is also known as *cross-coherence*. Entrainment or cross-coherence has been observed between various bodily

systems, for example between heart rhythms, respiratory rhythms and blood pressure oscillations.[58] Entrainment can also be described as being "in sync." When in a high state of coherence, the two branches of the autonomic nervous system are "in sync" or "entraining" in a state of optimal function and balance.

Physiological signs of coherence include:

- Increased synchronization between sympathetic and parasympathetic branches of the autonomic nervous system
- A shift towards increased parasympathetic activity
- Increased heart-brain synchronization
- Increased vascular resonance
- Entrainment between diverse physiological oscillatory systems
- Smooth, sine-wave like pattern in the heart rhythms (heart rhythm coherence)
- A narrow-band, high-amplitude peak in the low frequency range of the HRV power spectrum, at a frequency of about 0.1 hertz

The findings in neuroscience confirm that emotion and cognition can be seen as separate, yet interacting, systems or functions each with its own unique intelligence. Increased coherence between emotions and cognition results in greater harmony between the systems of the heart and brain, with a resultant expanded awareness that influences reasoning, feeling states, mental clarity and emotional balance. The IHM research clearly reveals that, by intervening on the emotional level, change is prompted in mental processes and patterns.[59]

Physiological coherence is characterized by a high heart rhythm coherence, increased parasympathetic activity, increased entrainment and synchronization between physiological systems and efficient and harmonious function of the cardiovascular, nervous, hormonal and immune systems.[60] In this state the bodily systems are functioning optimally, while natural regenerative processes take place. Tiller et al. have provided evidence that supports the assertion that improved cardiac coherence occurs in the

presence of sincere positive feeling states, whether obtained during controlled laboratory conditions or during real-life stressful situations.[61]

Psychophysiological coherence is characterized by sustained positive emotion, a high degree of mental and emotional stability, constructive integration of cognitive and emotional systems and increased synchronization and harmony between the cognitive, emotional and physiological systems. The heart plays a central role in creating psychophysiological coherence, by communicating information about the emotional state (reflected by patterns in the heart rate variability) through the afferent pathways to the brain. By using methods to self-generate psychophysiological coherent states, outcomes include reduced stress, anxiety and depression; decreased burnout and fatigue; enhanced hormonal balance and immune function; improved cognitive function and enhanced learning; increased organizational effectiveness and health improvements in a number of clinical populations.[62]

Rollin McCraty and Doc Childre also describe another physiological phenomenon that occurs during coherent states, namely *resonance.* Resonance is described as "an abnormally large vibration that is produced in a system in response to a stimulus whose frequency is the same as, or nearly the same as, the natural vibratory frequency of the system." Resonance in the system leads to many physiological benefits, for example, increased synchronization between the cells throughout the body that, in turn, leads to increased system-wide energy efficiency and metabolic energy savings.

Psychological and physiological measurements, such as heart rate variability (HRV), DHEA and cortisol are used to measure the states of coherence and resonance within the cardiovascular and autonomic nervous system and are a reflection of inner

emotional states and stress. Negative emotions lead to disorder or less coherence in heart rhythms, with less synchronization between the sympathetic and parasympathetic branches of the autonomic nervous system. This imbalance in the autonomic nervous system leads to impaired flow to the rest of the body. Positive emotional states lead to increased harmony and coherence in heart rhythms, with a balancing effect on the two branches of the autonomic nervous system. This results in a shift towards parasympathetic activity, with resultant entrainment of other bodily systems with increased coherence within each system as well as between multiple oscillating systems. The research also shows shifts in perception and the ability to reduce stress, with increased psychophysiological coherence that leads to mental clarity, emotional balance and personal effectiveness.

Power Spectral Density (PSD)

The Power Spectral Density (PSD) is a mathematical transformation of HRV data as a non-invasive test of integrated neurocardiac function and is used to discriminate and quantify sympathetic and parasympathetic influences on the heart rate. The power spectrum is divided into three main frequency ranges. The very low frequency (LF) (0.01 to 0.05 Hz) represents slower changes in heart rate, as an index of sympathetic activity. The medium frequency range (MF) (0.05 to 0.15 Hz) is referred to as the baroreceptor band, because it reflects the blood pressure feedback signals sent from the heart to the brain, which also affects the HRV waveform. The MF band is a mixture of sympathetic and parasympathetic activity. The high frequency range (HF) (0.15 to 0.4 Hz) represents quicker changes in the heart rate, primarily due to parasympathetic activity.

In a state of cross-coherence between the heart rhythm, respiratory rhythm and blood pressure oscillations, these subsystems all vibrate at a resonant frequency of 0.1 hertz. This is the frequency that has been shown to be the resonant frequency of the human cardiovascular system and is equivalent to a 10-second rhythm. This resonant frequency is displayed during sleep, states of deep relaxation and when a person is experiencing positive emotions, such as appreciation. In the power spectrum of the heart rhythm display of the Freeze Framer® 2.0 this state will be indicated by an unusually large peak of around 0.1 hertz. McCraty et al. found that different emotions affect the autonomic nervous system function and balance in different measurable ways. Anger would produce a sympathetically dominated power spectrum, while appreciation would produce a shift toward increased parasympathetic activity.[63]

With practice it is possible to shift into coherence at will, even in difficult situations that previously would have caused stress and drained emotional energy. By learning to induce positive emotional states, such as heart-felt love and appreciation, heart rhythms become more regular, smoother and sine wave-like. Unlike simple heart rate measures, heart rhythm patterns reflect how stress and different emotions are affecting the autonomic nervous system. With a coherent heart rhythm the body's physiology is in an optimal state of efficiency that improves physical, emotional and mental well-being. A state of coherence can be compared to what athletes describe as "being in the zone," a state of optimal functioning and performance.

The feeling heart is also described as the "heartspace" by McCormick & Freeman and it describes more than the physical organ.[64] It is in this "heartspace" that emotional connection takes place with others. In relationships a high degree of self-awareness is

necessary about the importance of the heart space that is created by the engendered emotional state. Positive emotions contribute to meaningful connection with others, while negative or hostile emotions will have a negative influence on the connection with others, that can be demonstrated by the electromagnetic communication between people, as found by the IHM.

Positive Emotional States

> In a few hundred years, when the history of our time is written from a long-term perspective, it is likely that the most important event those historians will see is not technology, not the Internet, not e-commerce; It is an unprecedented change in the human condition. For the first time – literally –substantial and rapidly growing numbers of people have choices, for the first time they will have to manage themselves. *And society is totally unprepared for it*.[65]

One of the key issues in mind-body medicine research is self-awareness and the ability to respond to life's challenges in a flexible, balanced way, rather than simply out of habit. Development of mind-body awareness increases self-awareness and leads to the ability to listen to the body's signals and respond appropriately. The body can be seen as a finely tuned musical instrument that needs attention on a daily basis, to stay in good shape, especially when facing challenging situations that are part of one's daily life.

According to Abraham Maslow, "what is necessary to change a person is to change his awareness of himself." Awareness can also be defined as the ability "to pay attention."

The concept of awareness has been addressed through various traditions and philosophies. In the Toltec tradition, an ancient approach to spiritual knowledge and practices, the first mastery required to become a Toltec is described as the Mastery of Awareness.[66] This is the ability to become aware of who you really are, including all the

possibilities that are available, to assist you on the journey of transformation and self-realization.

From a holistic perspective Christine Page describes different levels of awareness.[67] The first level is termed as *Linear Awareness*, where thoughts lead to action that, in turn, leads to a result. Life is seen as predictable, uncomplicated and repetitive, and there is not much opportunity to extend beyond this comfort zone. The next level is that of *Cyclical Awareness*, where cycles or patterns in nature and in human existence is recognized, where an innate rhythm is present. On this level of awareness there is more of an appreciation for the richness of life, which is an expansion beyond the three-dimensional reality and linear time. The third level of awareness is validated by EEG (electro-encephalograph) and MEG (magneto-encephalograph) recordings, which measure a steady stream of energy passing across the brain at approximately 40 hertz. Page refers to this as a *Quantum Hologram* that is a reflection of the interconnectedness to all dimensions and associated with subtle energies that extend beyond the physical reality. These different levels of awareness describe a reality of possibilities that is available to every person who functions as a multi-sensory being. One level is not more important than the other, but they rather complement each other, to provide a whole range of experiences.

Sandra King and Dave Nicol emphasize the importance that "only through the awareness of Self can individuals become truly actualized and find meaning and purpose in their work and in their lives."[68] In mind-body awareness it is important to be attentive to signals from the physical body in response to emotions and thoughts. Daily life is filled with challenges and unresolved emotions, and inflexible ways of coping with life can

become the source of chronic low-grade stress. Jean-Philippe Gouin et al. demonstrated the effect of unresolved anger on wound healing on a sample of 98 community-dwelling participants, who each received a standardized blister wound on their non-dominant forearm. After blistering, the wounds were monitored on a daily basis for 8 days, to assess speed of repair. Logistic regression was used to distinguish fast and slow healers, based on their anger expression pattern. Participants with lower levels of anger control exhibited higher cortisol secretion during the blistering procedure, and their wounds took longer to heal. These findings suggest that the ability to regulate the expression of one's anger has a clinically relevant impact on wound healing.[69]

The result of chronic stress in the long-term is the secretion of various neuro-peptides and stress-hormones, such as adrenalin and cortisol, both of which suppress immune system functioning and regulation. The neuro-peptides, which are described as "messenger molecules" by Pert, carry information through the whole body in response to emotions.[70] When the body is kept in this unbalanced state for a prolonged period of time it may not necessarily cause disease, but, given the right genetics, a weakened physical condition, or an existing illness, it might be disastrous to that body's well-being and health.

Self-awareness is one of the first steps to combat chronic stress and is described by Hughes et al. as "the ability to understand what we are feeling and why, as well as to understand what caused those feelings."[71] Emotional competence or intelligence is recognized as equally important as physical wellness. The development of theory and assessment that addresses the subject of emotional competence has, of late, found acceptance in the business world, specifically over the past decade. Cooper describes the

link between energy and emotions that are related to the world of the executive, as four primary human energy states namely *tense-energy, tense-tiredness, calm-energy and calm-tiredness.*[72]

- *Tense-energy* (high tension and high energy) is a stress driven mood that is characterized by an almost pleasant sense of excitement and power. Physical energy feels high but there might be a tendency to ignore own needs, eventually leading to the possibility of burnout and exhaustion.
- *Calm-Energy* (low tension and high energy) is a mood state characterized by a feeling of being serene and under control. It replaces tense-energy with an alert, more optimistic presence of mind, peaceful and pleasurable body feelings, and a deep sense of physical stamina and wellbeing.
- *Tense-Tiredness* (high tension and low energy) is a mood state that is characterized by feeling tired all over. It is not a pleasant state, with associated feelings of low self-esteem and of life being a burden. This mood state might well lead to depression, random negative thoughts and different types of dysfunctional behavior, including the use of mind-altering substances.
- *Calm-Tiredness* (low tension and low energy) is generally a pleasant state that is characterized by the sensation of letting go and winding down. This can be a healthy state after a busy day, winding down while still feeling good.

The results of the ever-expanding body of research on those aspects reveal that balanced mental and emotional states are of the utmost importance in the prevention of disease and the enhancement of general well-being. This includes health enhancing personality traits, which can be consciously developed, to boost the body's ability to resist disease, reduce stress levels, and increase over-all energy levels, while improving performance criteria, such as decision-making and problem solving abilities.

Mental and Emotional Coherence

> In a way, we each live at our own center of the World Wide Web, and in order to make all the connections in our network as secure and beneficial as possible, we have to be very skillful in the way we generate and manage our energetic balance – too much and people avoid us or set up defenses that block communication; too little and they take advantage of us or we never break through barriers to intimacy or develop enough energy to achieve the very dreams that give our lives meaning.[73]

Dating back to the ancient Greeks, human thinking and feeling, or intellect and emotion, have been considered separate functions. Those contrasting aspects of the soul, as the Greeks called them, have often been portrayed as being engaged in a constant battle for control of the human psyche. In Plato's view, emotions were like wild horses that had to be reined in by the intellect.

Of course, emotions are not always negative and do not always serve as antagonists to rational thought. Modern neurologists now stress the rationality of emotion and emphasize the importance of emotions in decision making. For example, it is now known that a person cannot function effectively in the day-to-day world, if the brain is damaged in the areas that integrate the emotional and cognitive systems, even though their mental abilities might be perfectly normal.

The latest research in neuroscience is confirming that emotion and cognition can best be thought of as separate but interacting functions or systems, each with its own unique type of intelligence. Studies at the HeartMath Research Center reveal that the key to the successful integration of the mind and emotions lies in increasing the coherence (ordered, harmonious function) in both systems and bringing them into phase with one another. Within the wiring of the brain, the neural connections from the emotional system to the cognitive systems are stronger and more numerous than the connections from the cognitive to the emotional system. Once an emotion is experienced, it becomes a powerful motivator of future behaviors, affecting moment-to-moment actions, attitudes and long-term achievements. Emotions can easily bump mundane events out of conscious awareness, but non-emotional events (such as thoughts) do not easily displace emotions from awareness.

The degree of coherence between the mind and emotions can vary considerably. When they are out-of-phase overall awareness is reduced. Conversely, when they are in-phase, awareness is expanded. This interaction has an effect on a number of levels, for example, listening abilities, reaction times, mental clarity, feeling states and sensitivities are all influenced by the degree of mental and emotional coherence that are experienced at any given moment. Rollin McCraty and Doc Childre describe the effect of positive emotions and optimal functioning as "a deep sense of peace and internal balance – you are at harmony with yourself, with others, and with your larger environment, you experience increased buoyancy and vitality. Your senses are enlivened – every aspect of your perceptual experience seems richer, more textured. Surprisingly, you feel invigorated even when you would usually have felt tired and drained."[74]

The heart plays a central role in emotional states. Emotions such as anger, frustration or anxiety lead to erratic heart rhythms, with less synchronization between the parasympathetic and sympathetic branches of the autonomic nervous system (ANS). In contrast, positive emotional states such as appreciation, love or compassion, are associated with coherent patterns in the heart rhythms and greater synchronization between the two branches of the autonomic nervous system.

Longstanding negative emotional states can lead to chronic stress and suppress the immune system. Research has shown that positive emotional states contribute to lower stress levels and prevention of disease. The heart also plays a role in emotional balance and has been placed in a central position by the research done at The HeartMath Institute. "Our research findings have led us to support a systems-orientated model of emotion that includes the heart, brain, and the nervous and hormonal systems as fundamental components of a dynamic, interactive network that underlies the emergence of emotional experience."[75]

Unmanaged emotions can cause a leak in the energetic system and put stress on the whole body, with resultant conditions such as fatigue, burnout and an increased susceptibility to both infectious and chronic disease.[76] Learning positive emotion-focused techniques for the purpose of creating psychophysiological coherence can create an "internal environment that is conducive to both physical and emotional regeneration."

McCraty et al. examined the effects of emotional self-management on a group of healthy adults, by introducing two self-management techniques that were designed to eliminate negative thought loops and promote sustained positive emotional states. The experimental group indicated levels of increase in the positive affect scales of caring and

vigor, with significant levels of decrease in negative affect scales of guilt, hostility, burnout, anxiety and stress effects. Physiological measures showed a 23 percent reduction in cortisol, a 100 percent increase in DHEA/DHEAS and increased coherence in heart rate variability.[77]

When experiencing positive emotional states, it has been found that people find it easier to think clearly, feel less agitated and irritated, while their creativity seems to flow freely. Heart rhythm coherence increased as well as the ratio of synchronization between the heart and alpha brain rhythms, when subjects used a positive emotion-focused technique. Associated feelings characteristic of a positive emotional state include a sense of gratitude and appreciation for self and others and a deep sense of fulfillment. McCraty et al. also showed increased alpha-ECG synchronization measured in the left temporal lobe in subjects who generated positive emotional states while listening to music that enhanced positive emotions.[78]

Recent research has examined the physiological and psychological effects of music that integrates particular rhythmic patterns, tone textures, chord progressions and harmonic resonances specifically designed to help reduce stress, facilitate the experience of sustained positive emotional states and enhance the benefits of stress management interventions. Used regularly in conjunction with an emotional self-management program, scientifically designed music has been found to increase DHEA, reduce cortisol, improve autonomic balance and increase coherence in the ANS, while facilitating the entrainment of physiological systems. In addition, scientifically designed music has been demonstrated to help reduce stress and negative emotion and increase

positive emotion in individuals with clinical conditions such as anxiety, depression, panic, arrhythmias, diabetes and chronic fatigue.[79]

The Nature of Sound

Music hath charms to soothe the savage breast,
To soften rocks, or bend a knotted oak
William Congreve

In many creation myths sound is described as the creative force that created the universe. From the ancient Egyptians who believed that their god Thoth created the world by his voice alone, to the Hopi Indians who told the story of Spider Woman, who sang the Song of Creation, almost all the wisdom traditions have a creation story related to sound. In the Gospel of John, it is written: "In the beginning was the Word, and the Word was with God, and the Word was God." In the traditions of the mystery schools of Greece, India, Rome, Egypt, China and Tibet, sound was used a powerful therapeutic tool.

Our current scientific understanding of sound and the healing possibilities it offers through its vibrations has lead to an ever-expanding body of knowledge, to find innovative ways to heal and balance the body. Andrew Weil states that "music is one of life's greatest pleasures, and it can also serve as a powerful force for healing."[80] Laura Cooper and Irene Foster demonstrated that music was shown to have clear benefits in an oncology department, while patients were waiting to receive radiotherapy. There were personal preferences to the kind of music that had the most positive effect, but overall music helped to lower anxiety in patients.[81] Patrick Gomez and Brigitta Danuser found that internal structure of the music played a primary role in the induction of the emotions,

particularly the rhythmic aspects of music, namely, tempo, accentuation, and rhythmic articulation that correlated most strongly with physiological measures.[82]

Frequency

Sound is a waveform that is measured in *hertz* (Hz), or cycles per second. This measurement is termed as the frequency of a wave. One cycle per second is 1 Hz. The human ear is able to hear frequencies ranging from 16 Hz to 16,000 Hz. Some children have the ability to hear sounds up to 20,000 Hz. Sounds below the threshold of hearing are called *infrasound*, while those above the audible hearing range are referred to as *ultrasound*.[83] Every object, atom and electron has a frequency, a vibration, a sound. The whole of creation is a symphony of sound, some audible and many not audible to the human ear. Sound is used in traditional medical and complementary therapies to heal, alleviate pain and relieve stress. Ultrasound for instance, is used to scan the unborn fetus, destroy kidney stones or enhance healing of soft tissue and bones. Certain frequencies are also investigated to be used to destroy cancer cells, without any damage to nearby tissue. This is possible because sound frequency is measurable according to sound mathematical principles. Each note on the musical scale can be measured as a frequency. In a way, sound provides access to the vibratory make-up that is very direct and simplistic if we know how to apply this knowledge in a therapeutic sense. In the most fundamental sense, the body is pure sound, which consists of various frequencies.

Amplitude

Amplitude is measured in decibels (db) and is the measure of loudness of sound, an indication of the level of sonic energy inherent in a specific sound. The well-known experiment of shattering a glass with a resonant frequency occurs not only because of the

resonance but also because a high enough amplitude or sound intensity is present in that moment. Therefore, caution is necessary when sounds are applied to the human body, taking into consideration what it can do to glass. In the case of the human body it is proposed that less is better.

Resonance

Resonance is the natural vibration of an object and is the specific frequency at which the object vibrates. Every object has a resonant frequency. The same is true for the various organs, tissues, bones and systems in the body, which each has its own resonant frequency. Together these various frequencies create a composite harmonic, which is the personal resonance or vibratory rate inherent within each individual. The principle of resonance is used when sound is applied in a therapeutic setting, providing resonant frequencies that can heal and balance the body. Because each person has a unique vibratory rate, the challenge is to find sound formulae that can be used for everyone, to the same effect. When taking the unique vibratory rate into consideration it can be expected that not all people will resonate equally well with the same piece of music. Just as certain medication will have side-effects in certain people and not in others, a similar situation is found with regard to sound formulae. Goldman states that "we simply can't make the assumption that any particular sound or music is going to affect everyone in the same way. Not only are we all unique vibratory beings, but the circumstances and conditions under which we listen to these sounds will be quite distinct."[84]

Entrainment

Entrainment occurs when the vibrations from one object influence a second object in such a way that the second object synchronizes with the first object. An example in the

body is when the heart rhythm, breathing rhythm and brainwave patterns all entrain with one another. Sonic entrainment, a term first used by Jonathan Goldman in the 1980s, refers to technology that can be used to affect brainwave frequencies. The principle of sonic entrainment uses one frequency and puts it in one ear, and another frequency which, simultaneously, is put it in the other ear. The brain will resonate to a new frequency, which is the difference between the first two frequencies. For example, a frequency of 130Hz in one ear and 120Hz in the other ear will cause an entrainment frequency of 10Hz in the brain (130-120=10). Any two frequencies can be used as long as they are within the range of brainwave activity (0.5Hz to 20Hz). What is important to note is that not all people will respond to brainwave entrainment in exactly the same way. Some people might manifest brainwave activity that will match the entrainment frequency, or be close to it, while others will show no effect. This variance is important to take into consideration when providing the same sound frequencies to a group of people. Robert Monroe and the Monroe Institute did much pioneering work in this field, to provide products that can reduce stress, improve relaxation and sleep, increase consciousness, or be used as part of a meditation practice.[85]

When sound is used as a healing aid, it is important to note that the sounds that are produced might not always be melodic. Therefore, there is a difference between music and sound. 'Music' would be the correct term to use when you listen to tunes produced by an artist or an orchestra. On the other hand, when sound is used to affect the brainwaves or molecular structure of the body or other objects, the frequency is what is important and not necessarily what it sounds like to the human ear. Sound then becomes a vibrational remedy to address the energetic needs of a patient or client in a highly specific

way, using it to assist the healing process in the body or recreating balance in the energetic system.

Sound-healing pioneer, Jonathan Goldman, emphasizes the importance of combining intent with frequency to enhance healing. He created the formula *Frequency + Intent = Healing* to point out that frequency on its own is often not enough, but that the intention of the person that is using the sound frequency can enhance the effects of the frequency on the body and brain.[86] This is supported by the IHM that found that certain music can aid in sustaining positive emotional states.

Alfred Tomatis, a French Ear, Nose and Throat specialist, studied the effects of sound on the ear and the nervous system, investigating the effects of sound and vibration on the unborn fetus.[87] In his extended research Tomatis postulated "that high-frequency sounds (3,000 to 8,000 Hz) generally resonate in the brain and affect cognitive function like thinking, spatial perception and memory; middle frequency sounds (750 to 3,000 Hz) tend to stimulate the heart, lungs and emotions; while low frequency sounds (125 to 750 Hz) affect physical movement."[88] His research demonstrates the specific effects of different sound frequencies on different organs in the body.

The Signature Frequency

Every object in creation has a distinctive frequency, whether it is a rock, a tree, flowers, a human organ, cells or atomic and subatomic particles. William Tiller states that "each individual, organism or material, radiates and absorbs energy via a unique wave field which exhibits certain geometrical frequency and radiation-type characteristics. This is an extended force field that exists around all forms of matter whether animate or inanimate."[89] Guy Manners, an osteopath and Cymatic sound therapist, confirms this

view of the human body: “Experimentation indicates that human beings, as all objects, are radiating sound waves, therefore their fields are sonic fields. Each individual has his own different pattern, or collection of tones, just as each individual has a unique shape.”[90]

Early research done on the links between sound, form and living systems was done by Hans Jenny who expanded on the work of Ernst Chladni, an 18th-century German physicist, who demonstrated that sound waves can move and shape matter. Jenny, the inventor of Cymatics, a general systems study of sound, placed drops of water, sand, organic or inorganic powder on special metal plates that vibrated with the use of specialized sound transducers. His findings were that certain sound frequencies produced symmetrical patterns that resembled living cells and even complex organisms.[91] Jenny postulated that each human cell has its own frequency and that every organ is a harmonic of its composite cells. Richard Gerber emphasizes that the research of Jenny revealed that sound can be applied therapeutically to change vibratory and physical structures. Cymatic sound patterns assist us in visualizing the behavior of energy patterns in sand, water or plastic when a new tone is introduced to the substance. The Cymatic patterns can help us to postulate what might happen to the living cells and organs within the body, when new frequencies are introduced to the body. Based on the research of Jenny, one can assume that new tones or vibrations introduced to the body can change the whole system. Sound frequencies can be viewed as sound nutrients that provide the body with frequencies that it might lack. The challenge is to find the correct sonic frequencies that will balance the vibratory systems of the body, within the unique signature frequency of each individual.

The Human Voice

The human voice is a composite, sonic and energetic projection of the signature frequency of each individual. From an integrative perspective, the body, mind, emotions and soul cannot be separated, but rather function as an integrated system. Within such a system the "whole" is contained in every "part" and every system therefore influences every other system. The voice is the most audible vibratory expression of the human body and can be viewed as a holographic representation of the human body. The voice seems to be a complex, chaotic conglomeration of sounds, which is called *phonation*. Each word is made up of individual sound units, called phonemes. Human BioAcoustics examines the frequencies, the coherence patterns and the architecture of the phonemes to develop a computerized mathematical matrix that acts as a representation of the vibratory make-up of the body.

Voice Analysis

Human Bioacoustic Vocal Profiling, pioneered by Sharry Edwards, is an emerging research modality, with the potential to provide pre-diagnostic assessments using a predictive mathematical matrix of frequency-based protocols.[92] Human Bioacoustic Vocal Profiling uses the idea that the voice is a holographic representation of the health and wellness of the body, by profiling the frequencies and architecture of human vocalizations. Through this method the innate mathematical templates of the body are quantified, organized, interpreted and defined. Vocal profiling can be used to identify the stressed frequencies of the voice, which are seen as a representation of the intricate frequencies of the body. Some of the uses include:

- Monitoring of nutrients and food requirements for optimal cellular health
- Evaluation of weak and strong muscles to optimize physical strength and stamina
- Pre-screening for indication of disease, stress or trauma
- Determining the presence of toxic substances

Vocalization is made possible by the oscillations of the vocal chords, located in the larynx or voice box. The muscles of the larynx are innervated by the branches of the laryngeal nerve, which is a branch of the vagus nerve. The vagus nerve is part of the parasympathetic nervous system. With entrainment of the vocal chords with the vagus nerve a direct pathway is created between the vocal chords and the brain. Human Bioacoustic Vocal Profiling perceives the voice as the direct frequency representation of the sympathetic and parasympathetic expressions of the body. Biofeedback is used to determine appropriate frequency combinations for the body and which are then applied through low frequency sounds, to correct imbalances.

Sound therapy is applied on the basis that sound frequency influences brainwave frequencies, which in turn are delivered to the body through nerve pathways. These frequency impulses play a role in maintaining the structural integrity of cells, tissues and organs, while maintaining emotional balance. When these patterns are interrupted, imbalances occur that present as symptoms of stress and of disease in the body. In a radio interview with Wayne Perry, Sharry Edwards stated that "each individual has a distinctive signature sound that is evident in their speaking voice, and vocally missing tones correspond to the individual's physiological and psychological status...providing the missing frequencies provides the body with the means to repair itself."[93]

The signature frequencies of a person can be determined by using a microphone and musical instrument tuner or with a computer program designed to reveal vocal

frequency patterns. One such a computer program is Voicebio Analysis™ developed by Kae Thompson-Liu, a naturopath and health researcher.[94] The Voicebio Analysis system measures the sound frequencies present in the human voice to provide a composite graph or VIBEprint™. The VIBEprint™ portrays twelve keynote frequencies in the body that correspond to various bodily organs and systems, emotional patterns and Chinese acupuncture meridians. The twelve frequencies are identified by linking them with the notes of the chromatic musical scale (see Appendix P).

The VIBEprint™ used □as a qualitative measure gives an indication of the overall energetic balance in the body, as revealed by the shape of the sine-wave on the VIBEprint™ Graph. VIBE is an abbreviation for Vibrational Image of Body Energy and is a visual reflection of the signature frequency The VIBEprint™ reveals what tonal frequencies are either heavy (overworked or exhausted) or weak (stagnant or not working). An assessment of the heavy and weak areas of a VIBEprint™ gives an indication of the physical-emotional energetic imbalances that are present for that person at that moment in time. The closer the pattern of the twelve frequencies is to the shape of a sine-wave, the more energetic balance is present between all the systems in the body. Other examples of this technology include Edward's BioAcoustics, Sound Wave Energy and Biowaves.[95]

The use of the voice for healing is called toning. Toning is done by repetition of elongated vowels, such as 'ah' or 'om', and although little research has been done on this, it is proposed that self-created sounds help the body to release neurochemicals like dopamine, oxytocin, serotonin and endorphins that can relieve pain and increase states of well-being.[96] When a part of the body starts vibrating out of its normal healthy resonance,

vocal sound can be used to return that part of the body to its natural healthy and balanced state. Toning with the voice is one way of providing the body with the required frequency and is the most accessible source of healing. Healing sounds and frequencies can also be provided through synthesizers, musical instruments and music compilations.

Harmonics are described as the color in sound. Every sound in nature is a composite of multiple frequencies, called harmonics or overtones. Musical instruments create harmonics as well as the human voice. This provides the richness in sound and also defines the tone quality of the human voice. Early research findings mentioned by Wayne Perry, have shown that by simply listening to vocal harmonics and overtones one can reduce stress, enhance memory, stimulate the immune system, slow down heartbeat, respiration and brainwave activity, regenerate body systems and expand consciousness.[97]

The Musical Scale

In Western music different sounds a musical instrument can make are related to the octave, which is the distance between one frequency and another that vibrates at twice the rate of the first. The octave is divided into twelve segments which is called a scale, namely: C, C#, D, D#, E, F, F#, G, G#, A, A#, B. The octave can be divided using different methods depending on the particular tuning system that is used. Usually, the note A on a piano is assigned the frequency of 440 Hz, but actually the note A can resonate from approximately 432 Hz up to 448 Hz, depending on the tuning system used.

Studies have indicated that certain frequencies or notes correspond to specific organs or body systems. For example, the lymph circulation will resonate at the frequency of the note C, or the heart will resonate at the frequency of the note A#. Various sound therapies use the chromatic musical scale as a reference to provide

correlations between various organs and frequencies. No single chart is comprehensive to provide all the possible correlations and even different charts vary.

Since the discovery of the neuro-chemical model of communication between various bodily systems in the fields of neuroscience and pyschoneuroimmunology, there is a general acceptance of a broader understanding of higher brain function, including memory, attention, concentration, problem solving, insight and extra-sensory perception. According to Jeffrey Thompson, “sonic brainwave entrainment has been shown to cause a remarkable shift in neuro-peptides, forming a link between the biochemistry of higher brain function and the ability of sound to enhance this function.”[98] The response of the brain to sonic brainwave entrainment frequencies is measured with brainwave monitoring equipment, called an "Electroencephalograph" (EEG).

The four basic categories include Beta, Alpha, Theta and Delta brainwaves.

Beta brainwaves are present during normal waking consciousness, when there is attention to the external environment, during problem solving as well as during arousal and excitement. EEG patterns of the brain's electrical activity are shown as rhythmic waves at these times, revealing rapid, rhythmic discharges of electrical activity from the neurons of the brain. The frequency or cycles per second (Hertz) is between 13-30 Hz.

Alpha brainwaves appear on the EEG during a more reflective or meditative state. The electrical activity slows down and becomes larger in amplitude with a frequency ranging between 7-30 Hz. This is still a mental state but more aligned with non-linear thinking and inner-direction. McCraty and Atkinson proved that alpha wave synchronization to the activity of the heart significantly increases during states of high heart rhythm coherence.[99]

Jeffrey Thomson describes the beta / alpha bridge he has observed in his work, as "the first stage of sleep when the eyes close and the beta function collapses and the alpha function expands. Brainwave activity, heart rate, respiration, blood pressure and the body's general metabolism slow down as external, linear, mental activity gives way to internal non-linear mental activity." In this state the mind is perfectly poised between the inner and outer worlds, highly creative and focused on the problem or task at hand.

Theta brainwaves appear in the dreamstate, with frequencies ranging between 5-7 Hz. There are a number of unique things that take place at this moment in the brain, central nervous system and body. The body becomes basically paralyzed due to the activation of the Reticular Activating System (RAS) which closes off muscular control signals from the brain to the body. During this period Rapid Eye Movement Sleep (REM sleep) is present. During the theta portion of sleep the emotional body gets a chance to recuperate and balance itself. The theta state is also associated with increased creativity, problem solving and visualization capacity in the waking state. At the alpha/theta bridge there is absolute balance between emotional and mental aspects.

When frequencies drop below 3, 5 Hz, the sleep cycle reaches the delta state. This is the phase of sleep where the body is in an optimal state of rest and relaxation and where the body gets a chance to recuperate. At this point, blood pressure, respiration, heart rate, metabolism and body temperature all measure at their lowest levels.

Apart from the four classic brainwave states, recent new research indicates the existence of another brainwave state, with frequencies around 40 Hz. This state has been named the gamma brainwave state and is apparently involved with the function of the

brain which holographically synthesizes all the bits of individual data from various areas of the brain and fuses them all together in a higher point of view.

HyperGamma, Lamda and Epsilon frequencies have also been recorded with very high frequencies reaching 100-200 Hz. These high frequencies are associated with high levels of self- awareness, higher levels of insight and information, psychic abilities, out of body experiences etc.[100] Apart from the effect of sound frequency on brainwave patterns, it seems as if music creates a balancing and healing environment for the body and various bodily systems. Brainwave entrainment is used to reach different states of consciousness, improve states of emotional and mental balance, while creating a healing environment for the body. Apart from the fact that music has been shown to influence brainwaves, it has a direct effect on the whole body, affecting cellular communication through the psychosomatic network, as shown through various studies.

Le Roux et al. demonstrated the positive effects of Bach's *Magnificat* on emotions, immune and endocrine parameters during physiotherapy treatment of patients with infectious lung conditions. The intervention of music combined with physiotherapy demonstrated positive changes in the POMS-scale, CD4+:CD8+ ratios, cortisol, and the cortisol:DHEA ratio.[101] The effect of music listening paired with progressive muscle relaxation on the anxiety levels and sleep patterns of abused women in shelters by Eugenia Hernández-Ruiz, showed reduction of anxiety as measured by the STAI as well as sleep quality.[102] A meta-analytic review of 22 research articles, using music to decrease arousal due to stress, was conducted by Cori L. Pelletier.[103] Results demonstrated that music alone and music assisted relaxation techniques significantly decreased arousal. Further analysis of each study revealed that the level of stress

reduction was significantly different when considering age, type of stress, music assisted relaxation technique, musical preference, previous music experience, and type of intervention. Burns et al. evaluated the effects of different types of music on perceived and physiological measures of stress on sixty undergraduate psychology students.[104] Participants were randomly assigned to listen to different types of music or silence while skin temperature, frontalis muscle activity, and heart rate were recorded. Participants rated their relaxation and anxiety levels after listening to music or silence and results suggested that music may have an effect on the cognitive component of the stress response. Dawn Kuhn showed that active participation in musical activity had a greater increase on salivary IgA than passive participation in a music exercise.[105]Apart from demonstrating that active participation delivered better results, the positive effect of music on the immune system was confirmed. Wendy Knight and Nikki Rickard exposed 87 undergraduate students to a cognitive stressor that involved preparation for an oral presentation, either in the presence of Pachelbel's Canon in D major, or in silence.[106] Measures of subjective anxiety, heart rate, blood pressure, cortisol, and salivary IgA were obtained during rest and after presentation of the stressor. The stressor caused significant increases in subjective anxiety, heart rate, and systolic blood pressure in male and female controls. These stress-induced increases were each prevented by exposure to the music, and this effect was independent of gender. Music also enhanced baseline salivary IgA levels in the absence of any stress-induced effects. These findings provide experimental support for claims that music is an effective anxiolytic treatment, the robustness of which is demonstrated by retention of the effect in the presence of a range of potentially mediating variables. Carola Maack and Paul Nolan explored the main changes gained

from Guided Imagery and Music (GIM) therapy as described by former clients.[107] Results showed that the main gains reported by former clients of GIM therapy include getting more in touch with one's emotions, gaining insights into some problems, spiritual growth, increased relaxation and discovering new parts of oneself. Results also showed that GIM therapy might be helpful for clients with symptoms of anxiety and/or fear, and for clients who want to increase their self-esteem.

McCraty et al. showed that music enhances the effect of positive emotional states on salivary IgA.[108] The designer music that had this effect was composed to create mental and emotional balance. It was found that different types of music had different effects on immune functioning. The immune-enhancing effect was not observed with New Age or rock music. Entrainment is the process that happens when bodily systems such as respiration, heart rate and brainwaves synchronize with frequencies that are heard. This principle is widely used by sound therapists to heal the body with frequencies of sound, supporting the body to balance and heal itself. Candace Pert refers to this process as when "your cells resonate with the internal chemicals your body makes, the external drugs that you take both legally and illegally, and with the emotions you feel. They also resonate with the sounds you hear."[109] The most recent findings in cellular communication indicate that music, which is a patterned vibration, can bypass the ligand and directly resonate with the receptors on the cell. In this case the sound or music acts like a peptide, a drug or even an emotion that stimulate cellular activities.[110] It is postulated that brainwaves oscillate at the same frequencies as ion channels, receptor binding and the harmonics of music.

Within organizations seeking for solutions to improve the wellness of their employees, the value of music was demonstrated by Robert Krout, who reviewed the favorable endocrine and hormonal responses to music as part of a wellness program. Krout also made recommendations about the kind of music that will benefit wellness and relaxation regimes.[111]

These findings have major implications to encourage the development of even more refined sound formulas, as energetic support for individuals within organizations that can be applied as part of wellness or stress management interventions.

CHAPTER 3:
RESEARCH METHODS

In Chapter 3 descriptions of the context of this research study, the participants, the dependent variables and the procedures followed while executing this study are presented.

The General Perspective

This study embodies both quantitative and qualitative research perspectives, and is based on an experimental design applying pre-tests and post-tests of repeated measurements of dependent variables within the experimental and control groups. A matched pair design was applied, to create a compatible profile between the experimental and control groups, using the parameters of age, gender and stress levels as determined with the Holmes-Rahe Social Readjustment Rating.

The Context of this Research

This study was conducted in the Medium Business banking division, a sub segment within the Business Banking Services section of a large Corporate and Business bank, which, for the purpose of confidentiality, will remain unnamed. The Medium Business banking division is divided into various branches, or cells, that are set up throughout the areas where the needs of prospective clients are serviced. The business banking environment is characterized by high demands on the staff and the stress level among the employees is high. The banker-client relationship is based on trust, respect and confidentiality and the business banker within the banking service acts as the single point of entry for the client into the banking group. In any medium sized business, the business

banker becomes a partner who assists in growing the business and seeing to its financial needs. The value proposition of Medium Business is based on their highly professional and knowledgeable staff, which provides innovative and creative solutions to address their customer's needs.

To find a minimum of 60 participants for the purpose of this study, consent and approval for the research process was sought from and provided by the managers of two cells within the Medium Business service division, during meetings arranged with both of them. For the purpose of this study, the two groups will be referred to as Cell A and Cell B. With this research project being the first of its kind within that setting, both managers were excited about the possibility of addressing the needs of their staff with regard to stress management.

A decision was made to conduct the testing and experimental part of this research directly within the working environment. Consequently, the testing procedures were scheduled to be conducted during office hours only, on the premises /in the office blocks where Cell A and Cell B both work. In each case, a separate room was allocated to the researcher in which the testing took place. In that room there were at least two chairs, one for the researcher and one for the participant, and a table on which the equipment was set up.

The Research Participants

A group of 60 healthy males and females were chosen for the purposes of this study. All of them were, at that time, experiencing high stress levels in their work environment. The participants were drawn from business bankers and administrative support staff who worked in close association with each other and the group consisted of

24 males and 36 females. They ranged between 22-60 years in age, with an average age of 39 years.

Instruments used in Data Collection

Several instruments and measurements were used in the data collection process.

Stress levels were determined by the Holmes-Rahe Social Readjustment Rating. Demographical information included age and gender.

Pre- and post-testing measurements of the dependable variables included the Profile of Mood States (POMS); the Freeze Framer® 2.0 measuring the Heart Rate, Coherence Ratio and Power Spectrum Density (PSD); and Voicebio Analysis™ which measures the sound frequencies present in the human voice to provide a composite graph or VIBEprint™.

At the post-test session the experimental group also completed a Post-test Survey that was compiled by the researcher.

The Holmes Rahe Social Readjustment Rating Scale (SRRS)

The Holmes-Rahe Social Readjustment Rating Scale (SRRS) was first published by T.H Holmes and R.H Rahe in 1967.[112] Social readjustment includes the level and duration of change in one's accustomed pattern of life resulting from various life events. As defined, social readjustment measures the intensity and length of time necessary to accommodate to a life event, regardless of the desirability of this event. Life events, whether experienced as positive or negative, can increase stress levels and give an indication of the probability of developing physical or mental illness according to the prediction model applied in the test. In the test questions to elicit information about changes in 43 life events that have taken place over the previous 12 months are posed.

Those events pertain to major areas of dynamic significance in social life and include family constellation, marriage, occupation, economics, residence, group and peer relationships, education, religion, recreation and health. Each item has been constructed to include life events, the advent of which is either indicative of or requires a significant change in the ongoing life pattern of the individual. The emphasis is on change from the existing steady state and not on psychological meaning, emotion or social desirability.

A prediction model that applies three different scales is used as an indication of susceptibility of developing disease, and uses the total score derived from the SRRS questionnaire:

- 150 points or less (Low) indicate a low level of life change and low susceptibility of stress-induced health breakdown
- 150-300 points (Medium) indicate a 50% chance of a major health breakdown within the next 2 years
- 300 points or more (High) raise the odds of developing physical or mental problems in the next 2 years to 80%

Judith A. Scully et al. evaluated the SRRS in 2000 to assess its relativity as a stress assessment tool. They examined the differential prediction of desirable relative to undesirable life events, controllable relative to uncontrollable life events, and contaminated relative to uncontaminated life event items. In general, the authors found that the SRRS to be a useful tool for stress researchers and practitioners to apply.[113]

The Profile of Mood States (POMS)

Since its release in 1971, the POMS assessment has proven itself to be an excellent measure of affective mood state fluctuations in a wide variety of populations,

which include psychiatric outpatients, medical patients, and in sports psychology.[114] The POMS identifies and assesses transient, fluctuating affective mood states and is particularly useful to assess patient responses to short-term therapeutic interventions. The POMS was chosen as an appropriate measure of emotional fluctuations over the 14 day intervention research process.

The Profile of Mood States measures Total Mood State Disturbance (TMD) by applying a list of 65 adjectives. The items on the scale were derived from a list of 100 different adjective scales using repeated factor analysis. The POMS is available as the POMS Standard (POMS), the POMS Brief (POMS-B) and the POMS-Bipolar (POMS-Bi). The POMS Standard uses a 65-item, 5-point adjective rating scale, while the POMS Brief is based on 30 questions. For the purposes of this study the POMS Standard was used.

The six identifiable POMS mood or affective states are Tension-Anxiety (T), Depression-Dejection (D), Anger-Hostility (A), Vigor-Activity (V), Fatigue-Inertia (F), and Confusion-Bewilderment (C).

Tension-Anxiety (Factor T) is defined by adjective scales descriptive of heightened musculoskeletal tension. The defining scales include reports of somatic tension which may not be overtly observable (Tense, On edge), as well as observable psychomotor manifestations (Shaky, Restless). Adjectives which refer to vague, diffuse anxiety states (Anxious, Uneasy) tend to have slightly lower loadings. Other descriptions include Panicky, Relaxed, and Nervous.

Depression-Dejection (Factor D) represents a mood of depression accompanied by a sense of personal inadequacy. It includes scales to indicate feelings of personal

worthlessness (Unworthy), futility regarding the struggle to adjust (Hopeless, Desperate), a sense of emotional isolation from others (Blue, Lonely, Helpless, Miserable), sadness (Sad, Unhappy) and guilt (Guilty, Sorry for things done). Other descriptions include Discouraged, Gloomy, and Terrified.

Anger-Hostility (Factor A) represents a mood of anger and antipathy towards others. The principle defining scales (Angry, Furious, Ready to fight) describe feelings of intense, overt anger, milder feelings of hostility are described by (Grouchy, Annoyed), while (Resentful, Spiteful, Deceived, Bitter) describe milder feelings of hostility. Other descriptions include Peeved, Rebellious, and Bad-tempered.

Vigor-Activity (Factor V) is defined by adjectives suggesting a mood of vigorousness, ebullience and high energy. Descriptions include Lively, Active, Energetic, Cheerful, Alert, Full of Pep, Carefree, and Vigorous.

Fatigue-Inertia (Factor F) represents a mood of weariness, inertia and low energy. Descriptions include Worn-out, Listless, Fatigued, Exhausted, Sluggish, Weary, and Bushed.

Confusion-Bewilderment (Factor C) is characterized by bewilderment and muddleheadedness. Factor C represents a self-report of cognitive efficiency as a byproduct of anxiety or other emotional states. Descriptions include Worn-out, Listless, Fatigued, Exhausted, Sluggish, Weary, and Bushed.

The **Total Mood Disturbance Score** (TMD) is derived by the sum of the scores across all six factors (weighting Vigor-Activity of Factor V negatively). The TMD Score provides a single global estimate of affective state.

QuikScore™ Forms are individual self-rating forms designed for convenient administration, scoring and profiling. The answers given by participants transfer through to concealed scoring pages and are scored by referring to the QuikScore™ Guide. Each QuikScore™ Form provides the option of three rating periods for assessing mood: The Past Week, Right Now, or some other specified rating period indicated by filling in a blank. The option chosen for this study was described as: "Circle the number that best describes how you have been feeling during the past week or two, including today". The 5-point scale provides the following options:

0 = Not at all
1 = A little
2 = Moderately
3 = Quite a bit
4 = Extremely

Four sets of norms – psychiatric outpatients, adults, college students and geriatric adults – are available for interpretation of Standard POMS scores. *T* – score profile sheets based on normative data from these groups are integrated into the QuikScore™ Form and the respondent's six mood factor scores as well as the TMD score can be plotted on the profile sheets. The respondent's raw factor scores are converted to *T*- scores, which are based on a standard score distribution transformed to have a mean of 50 and a standard deviation of 10. Given a normal distribution, approximately 67% of *T*-scores fall between 40 and 60; about 7% exceed 65, and about 7% are below 35.

The *T*-score profiling norm for adults was used for this study.

A complete POMS bibliography can be found at http://www.mhs.com

The Freeze Framer®2.0 interactive software

The Freeze-Framerâ software is an interactive learning system with a heart rhythm monitor that has been developed by Doc Childre of the HeartMath Institute to help individuals within organizations to develop higher states of coherence, improve self-management, and increase mental clarity and emotional balance to maximize productivity and performance.[115]

For purposes of this study three measurements of the Freeze Framer® 2.0 were used to measure psychophysiological balance, namely the average Heart Rate, the Coherence Ratio and the Power Spectrum Density (PSD).

The sensor hardware consists of a black triangular sensor pod, a USB extension cable for connecting the pod to the USB computer port and a finger sensor with strap. An optional ear sensor can be used and that was chosen as the option to be used for this study. A Dell Latitude D505 notebook was used.

Heart Rate: The Freeze-Framer®2.0 calculates and displays the average heart rate by detecting the pulse from the finger or earlobe with an electronic sensor. It plots the speeding and slowing of the heart rate, and analyzes the heart rhythm pattern. The direct physiological function being measured is the pulse rate as viewed through the finger or earlobe through a pulse plethysmograph. A small LED (light emitting diode) shines light into the skin of the finger and a photo-sensor records the changes in the reflected light as each pulse travels through the finger. Freeze-Framer®2.0 measures the interval between each pulse and computes the heart rate after every new pulse.

Coherence Ratio: The Freeze-Framer®2.0 monitors heart rhythms and levels of coherence between the heart and the autonomic nervous system, an optimal physiological

state. In the resting state the rhythm of the heart differs by a few milliseconds between beats. This is called the Heart Rate Variability (HRV). In general, a smoother resting heart rhythm pattern indicates a more synchronized autonomic nervous system (ANS) and a more balanced or coherent emotional and mental state. A more irregular, jagged resting pattern indicates a less synchronized nervous system and a more stressed or incoherent emotional and mental state. The Freeze-Framer®2.0 analyzes the degree of smoothness or jaggedness of the heart rhythm and, based on a patented mathematical algorithm, assigns an accumulated coherence score, which is portrayed as the Coherence Ratio. The Coherence Ratio is divided into Low, Medium and High Coherence portrayed as a percentage of 100. A coherent state is characterized by lower scores on Low Coherence and higher scores on Medium and High Coherence.

Power Spectrum Density graph: The Power Spectral Analysis (PSD) is a mathematical transformation of HRV data as a non-invasive test of integrated neurocardiac function and is used to discriminate and quantify sympathetic and parasympathetic influences on the heart rate. The power spectrum graph is divided into three main frequency ranges. The very low frequency (LF) (0.01 to 0.05 Hz) represents slower changes in heart rate as an index of sympathetic activity. The medium frequency range (MF) (0.05 to 0.15 Hz) is referred to as the baroreceptor band, because it reflects the blood pressure feedback signals sent from the heart to the brain which also affects the HRV waveform. The MF band is a mixture of sympathetic and parasympathetic activity. The high frequency range (HF) (0.15 to 0.4 Hz) represents quicker changes in the heart rate, primarily due to parasympathetic activity. A peak on the PSD graph close to 0.1 Hz

(MF) indicates balance between the sympathetic and parasympathetic branches of the autonomic nervous system.

Voicebio Analysis™

The Voicebio Analysis system was developed in the 1990s by Kae Thompson-Liu, a naturopath and health researcher.[116] The Voicebio Analysis system is a software program that can be installed on a notebook and is, therefore, portable and easy to use. The system can be used as a diagnostic instrument in a health care setting. For purposes of this study, it was used as an energetic assessment tool to provide an indication of the energetic balance within the vibrational make-up of each participant.

The Voicebio equipment includes a notebook with the Voicebio Analysis software installed, a VoicebioVIBE unit and a microphone. The front of the VIBE unit has an on/off switch, a socket for the microphone and a socket for the AC charger. The VIBE unit contains a battery system that needs to be charged before use. The back of the VIBE machine has a socket for the connector cable that is connected to the com port of the computer. The connector is a 9-pin serial plug that can be connected directly to the computer or indirectly, by using a USB adaptor. When taking a VIBEprint™ the on/off switch should be in the upwards or 'on' position, the microphone switched on and the Voice Input screen opened on the Voicebio Analysis program. A Dell Latitude D505 notebook was used to conduct the recordings.

The Voicebio Analysis system measures the sound frequencies present in the human voice to provide a composite graph or VIBEprint™ VIBE is an abbreviation for "Vibrational Image of Body Energy." The VIBEprint™ portrays twelve keynote frequencies in the body that correspond to various bodily organs and systems, emotional

patterns and Chinese acupuncture meridians. The twelve frequencies are identified by linking them with the notes of the chromatic musical scale.

The VIBEprint™ used as a qualitative measure gives an indication of the overall energetic balance in the body, as revealed by the shape of the sine-wave on the VIBEprint™ Graph. The closer the pattern of the twelve frequencies is to the shape of a sine-wave, the more energetic balance is present between all the systems in the body. The VIBEprint™ reveals what tonal frequencies are either heavy (overworked or exhausted) or weak (stagnant or not working). An assessment of the heavy and weak areas of a VIBEprint™ gives an indication of the physical-emotional energetic imbalances that are present for that person at that moment. For purposes of this study, four notes of the VIBEprint™ were chosen to determine changes in the energetic balance in the body, namely:

D# or VB1: Energetic balance in the adrenal glands which produce the stress hormones adrenalin, noradrenalin and cortisol. Low energy indicates overworked or exhausted adrenal gland energy, while higher energy indicates adequate adrenal gland function. D# tends to have little energy when an individual is experiencing stress.

F# or VB2: Energetic balance in the sympathetic nervous system. High energy in F# can be an indication of mental exhaustion or depression.

VB3 and VB4: The two lowest notes in each VIBEprint™ representing the areas in the body that carry the highest emotional stress. The two lowest notes would be different for each participant.

The over-all energetic balance was evaluated in terms of the changes in the shape of the sine-wave on the Graph section of the VIBEprint™. The balance was described then as Less, Equal or More.

Procedures Used

The researcher was primarily responsible for finding an appropriate group of participants to involve in this research. This was done by contacting the manager of the Wellness division of the Corporate and Business bank, who made certain suggestions about possible candidates. After the two cells within the Medium business bank division that eventually participated in this research were identified, meetings were set up with both managers. The background and reason for the research proposal was discussed with them. Both managers decided to let their teams take part in the research, viewing the exercise as an opportunity to introduce self-management techniques to reduce stress to the employees. Dates and time schedules were discussed and were confirmed by the researcher as soon as the research process was ready to be implemented.

All the measurement instruments that would be necessary for this study were then ordered from the relevant suppliers. The headsets were provided at cost price by a local company that specializes in headset solutions for stereo sets and computers. CD copies were made of the original Program 1 Deep Relaxation, from the AlphaRelaxationSystem by Jeffrey Thompson (see Appendix H).

After that the next step was to schedule information sessions with the participants in both Cell A and Cell B, during which a context for this research proposal was explained. An invitation letter (see Appendix A) was sent to all the participants to request they attend the information session.

A one-hour information session was conducted for the participants in both groups, to establish the context for this study; which was self-management through the use of sound and a state of appreciation or gratitude to induce a positive emotional state within the business banking environment where they were employed. All the participants were introduced to this process through an information letter sent through e-mail (see Appendix A). They were invited to attend the one-hour information session at their place of work. The one-hour information session for Cell A and Cell B were scheduled in the same week. During that information session the researcher provided background information; which included an introduction to and background information about the researcher, scientific information about stress, energy medicine, the role of sound and positive emotional states, and the possible benefit for them participating in this research (see Appendix B). During the information session each participant received a consent form they were required to complete, a copy of which they were given to keep (see Appendix C). After the researcher received the completed consent forms, each participant was asked to complete the Holmes-Rahe Social Readjustment Rating Scale (SRRS) (see Appendix I).

The next step was to arrange the pre-test sessions, which were coordinated by the researcher and the personal assistants of the managers of Cell A and Cell B. This process filled three full working days. Two days of testing were scheduled for Cell A, which had more participants, and one day of testing was scheduled for Cell B. Each day of testing was divided into fifteen minute sessions, making an appointment with each participant for his or her individual testing session. These testing sessions were scheduled during

normal working hours, between 08:00am and 17:00pm. During the fifteen minute session the following testing procedure was followed:

1. Completion of the Profile of Mood States (POMS): a 67-point questionnaire to determine their mood or feeling state for that moment as well as the previous week. Time necessary for completion was five minutes (see Appendix J).
2. A Freeze Framer ® 2.0 recording was made to measure the Heart Rate, Coherence Ratio and Power Spectrum Density (PSD) (see Appendix N).

Recording a session:

A three minute recording was made as part of the pre-test and post-test sessions using the default challenge level 2.The participant was asked to put the ear sensor on the left earlobe, while sitting back in a comfortable position and trying to relax while keeping their eyes closed. They were not able to see the computer screen and the feedback sound was turned off, preventing the participants from being aware of their heart rate and HRV. The Heart Rhythm Display window was opened and the recording started by clicking on the Start icon on the toolbar. A progress bar first showed the calibration of the Automatic Gain Control and took a few seconds to complete. After 20 seconds the various measurements on the Heart Rhythm Display screen started recording the heart rate and pulse wave, the accumulated coherence score and the coherence ratio. The Power Spectrum Density (PSD) graph could be viewed by clicking on the View HRV Power Spectrum icon. The recording session was ended after three minutes by clicking on the Stop icon. The session for each participant was saved by clicking on the Save Data icon.

3. A VIBEprint™ recording was made to measure the sound frequencies present in the voice. The participant was asked to provide the answers to three basic

questions by speaking into a microphone that was connected to the researcher's computer notebook. Time necessary for completion of this task was three to five minutes.

Recording a session:

The participant was asked to sit comfortably, with the back well supported, legs uncrossed and both feet on the ground. An explanation was given about the three questions that had to be answered when speaking into the microphone. The participant was reassured that the microphone was unidirectional and did not record what was said. Directions were given on how to hold the microphone and what distance it had to be from the mouth. The on/off switch was in the 'on' position, the microphone switched on and the Voice Input screen opened on the Voicebio Analysis program. The microphone was then handed to the participant.

The researcher asked the three questions, which included a base question, a stress question and a future question. The base question was asked to get a description of something neutral, for instance giving a description of their house, the garden etc. The stress question was asked to provide an opportunity for the participant to describe something that was reason for concern or causing stress in their lives. In answering the future question the participant had to describe something that made him or her feel really excited about the future, which may have been a dream they held for the future, a place they would like to visit, etc.

VIBEprint™ data:

- On the Voice Input screen a base chart, a stress chart, a future chart and a composite chart were recorded. During each question 75-80 hits were recorded to

give a total count of between 210 and 240 for the VIBEprint™. When recording a session the amount of hits on the screen give an indication of the amount of frequency that is being recorded during that session. This ensures that enough frequency is recorded to provide an accurate measurement.

- Each VIBEprint™ can be viewed either as a Graph or a Grid (see Appendix O). The Graph should, ideally, resemble the shape of a normal sine wave as closely as possible. The Grid portion of the VIBEprint™ provides a picture of the body energy as a continual spiral. The VIBEprint™ takes a "snapshot" of that energy at the point of the physical and emotional body. If seen in 3D, the voiceprint would be a continual spiral itself. By highlighting the physical bodyline one is able to find the actual location of the body *within* the spiral, which continues up through different dimensions of physical energy, into mental and emotional energy and beyond; and continues down through physical deterioration. In assessing the VIBEprint™ it is necessary to know what octave(s) represents the physical body of the client, to then distinguish those hits that are emotional and those hits which are physical. It is important to note that not all people will have their physical bodies to be found within the same octave. Generally, they will start in one octave and drop down to finish in the next lower octave. To determine the physical bodyline you will always start with the Note of C and continue to the right. The goal is to highlight the octave with the highest number of hits, *until the bodyline drops into a lower octave*. Once the bodyline drops, the line will continue in the lower octave until the end. Hits above the physical bodyline represent emotions that are causing stress for the participant. The higher the number of hits, the

higher the amount of emotional stress experienced. Hits below the physical bodyline are considered physical deterioration and are of significance when symptoms of physical disease are present.

After completion of the pre-tests, participants were quasi-randomly assigned to the experimental or control group by applying a matched pair design, which referred to age, gender and the total score of the Holmes-Rahe Social Readjustment Rating.

The participants from both Cell A and Cell B were divided into two groups of equal numbers, for experimental and control purposes. Initially there were forty two participants in Cell A and twenty-four participants in Cell B, making a total of sixty-six participants. Due to unforeseen circumstances (participants taking leave or not being available for the post-testing phase due to work commitments) the number of participants that completed all the elements and tests included in this study was reduced to a total of sixty participants. In Cell A there were thirty-eight participants, with eighteen participants in the experimental group and twenty participants in the control group. In Cell B there were twenty-two participants, with twelve participants in the experimental group and ten participants in the control group. The total group of participants was, therefore, divided into an equal number of thirty participants for both the experimental and control groups.

A follow-up date and time was confirmed with the personal assistants of the managers of the two cells, during which each participant received further instructions. The members of the experimental group received a CD, a stereo headset and written instructions on how to proceed further with the experiment (see Appendix D). The members of the control group received a letter to thank them for their willingness to

participate in this experiment (see Appendix E). The contact details of the researcher were provided in each case, to facilitate the addressing of any questions or difficulties experienced during the fourteen day period of this study.

The participants in the experimental group in Cell A were instructed to implement the intervention on a specific date, while the experimental group of Cell B was instructed to implement the intervention on the following day. This required of them to listen to the soundtrack for thirty minutes each day for fourteen consecutive days, at a time that suited them best. During this time they also had to induce the positive emotional state for which they had received written instructions. These instructions included the following:

1. Shift your attention to your chest or heart area. If it helps you can put your hand on your chest.
2. Focus on your breathing and take deep inhalations while exhaling slowly. Just focus on the gentle moving of your chest as it moves up and down.
3. Remember a person or situation which makes you feel deeply happy, uplifted and fulfilled and imagine yourself being with this person or in this situation again.
4. Become aware of the deep appreciation or gratitude you feel when you think about this person or situation and hold that feeling while listening to the music.
5. If your attention drifts, just bring it back to your chest area, focusing on the feeling of gratitude.

The participants of the experimental group in Cell A and Cell B started on two consecutive days to ensure enough time for the post-testing session of each participant that was scheduled to occur at the end of the 14th day after the start of the intervention. Again, three full working days were necessary for completing the post-testing phase.

During the experimental phase the researcher did not communicate with the participants of either group, unless they requested that. It can be recorded that, during this particular study, no problems were experienced/reported by the participants of the experimental group and that the instructions provided were clear enough. No problems with the CDs or the headsets were reported.

In participating in the post-testing session, each participant was required to complete a repeat of the same measurements as applied during the pre-test session, which, again, took fifteen minutes to complete. The participants of the experimental group were also asked to complete a Post-test Survey, to measure the extent of their adherence to the instructions provided for this intervention (see Appendix F).

The experimental phase of the research took between three and four weeks to complete, and was conducted during April and May 2008.

Data Analysis

As mentioned before, the researcher used a matched-pairs design to quasi-randomly assign participants between the experimental and control groups. Each participant was assigned a research number. The participants of each cell were ordered into alphabetical order and each assigned a case number. Hard copies of the consent forms, completed surveys and test results were filed under each participant's own research number.

An MS Excel spreadsheet was created in which with a separate line was allocated to each participant, to which all the scores were transferred after each test session. Age, gender and the total score of the Holmes-Rahe Social Readjustment Rating were entered

immediately after the participants had been divided into their experimental or control group.

The answers of the participants on the QuikScore™ POMS Standard Forms were scored by referring to the QuikScore™ Guide. Raw scores for factors T, D, A, V, F and C were obtained by adding the numbers in each column and entering the sum in the box at the bottom of the column. The raw score for the Total Mood Disturbance (TMD) score was calculated by using the following formula:

$$(T+D+A+F+C) - V = TMD$$

Both the raw scores of the factors and the raw score for TMD were entered into an MS Excel spreadsheet. Both pre- and post-test scores were entered (see Appendix K).

Hard copies were made of the Freeze Framer® 2.0 results as well as the VIBEprints™ and filed. The pre-test and post-test results of these tests were also transferred to the MS Excel spreadsheet (see Appendix L and Appendix M).

The results of the Post-test Survey (see Appendix F) were entered for the experimental groups.

The data was statistically analyzed by making use of the SPSS 15 statistical analysis software and MS Excel.[117]

Ethical Considerations

All the information gathered during the pre-tests and post-tests were handled as confidential. The findings on those tests were not discussed with either the participants or their manager.

Although diagnostic information may be obtained from the VIBEprint, because of the context of experiment, that particular information was also not conveyed to the

participants. The participants were also assured that the content of their answers was not recorded, but only the level of frequency in their voices.

After the completion of the post-test session with the participants, a two week period was necessary to compile the data for statistical analysis. The results of the quantitative and qualitative results are presented in the next chapter.

CHAPTER 4:
RESEARCH FINDINGS

As stated in Chapter 1, the study reported here examined the effects of sound frequency on the energetic and psychophysiological balance in employees experiencing moderate to high stress levels in a business banking environment. This chapter is organized in terms of the results obtained from the pre-tests and post-tests of the dependant variables used as part of the research design. Both quantitative and qualitative descriptions are used for the Profile of Mood States (POMS), the Freeze Framer 2.0® and Voicebio Analysis™ results. A discussion of the results will follow in Chapter 5.

Within this chapter detailed results will be reported by comparing two groups of participants, namely a control group (N=30) and an experimental group (N=30), who were chosen from two divisions in the business bank. For purposes of this discussion the two divisions will be referred to as cell A (63%; *n*=38) and cell B (37%; *n*=22). The total group consisted of female (*n*=36) and male (*n*=24) participants. Their ages ranged from 22 to 60 years of age with an average age of 39. The participants were quasi-randomly divided into the control and experimental groups by using a matched-pair design, referring to age, gender and the Holmes-Rahe Social Readjustment Rating Scale (SRRS) scores.

Quantitative Findings

The SRRS scores ranged from 50 to 466 with an average score of 208 (see Table 1). Only 28% (*n* = 17) participants had low scores on the SRRS, 57% (*n* = 34) had medium scores and 15% (*n* = 9) had high scores.

Table 1. Age and SRRS scores

	N	Minimum	Maximum	Mean	Std. Deviation
Age	60	22	60	39.22	10.593
SRRS: Holmes-Rahe Social Readjustment Rating Scale	60	50	466	207.67	89.762
Valid N (listwise)	60				

The equivalence of the control and experimental groups in terms of gender and cell distribution was confirmed by a chi-squared test of independence and Fisher's exact test with p=0.789 for cell distribution and p=1.0 for gender.

The groups were furthermore designed to be equivalent in terms of age distribution as well as SRRS scores. The results from an independent samples t-test confirmed the equivalence of the control group (M=39.80, SD=11.451) and experimental group (M=38.63, SD=9.821) in terms of age (p=0.673 >0.05; t=0.242; df = 58) and SRRS scores (p=0.982 > 0.05; t=0.023; df = 58) (see Table 2).

Table 2. Group equivalence according to age and SRRS

	Group	N	Mean	Std. Deviation	Std. Error Mean
Age	C	30	39.80	11.451	2.091
	E	30	38.63	9.821	1.793
SRRS: Holmes-Rahe Social Readjustment Rating Scale	C	30	207.93	87.896	16.047
	E	30	207.40	93.094	16.997

The control and experimental groups were tested for equivalence in terms of pre-test scores using an independent samples t-test. The results from the independent samples t-test confirmed the equivalence of the control group (M=4.13, SD=2.86) and the experimental group (M=2.50, SD=2.25) for all the dependant variables, with the exception of VB3 (p=0.017; t=2.45; df = 58) and VB3% (p=0.005; t=2.94; df = 58). The Mann-Whitney test confirmed the equivalence of the pre-test scores, with the exception

of dependant variables VB3 (Z= -2.22, p=0.027); VB3% (Z= -2.8, p=0.005) and VB4% (Z= - 1.98, p=0.047). These results were coincidental and not part of the research design criteria. The implications of these findings will be discussed in Chapter 5.

The control and experimental groups were also tested for equivalence in terms of post-test scores using an independent samples t-test. The results from the independent samples t-test confirmed the equivalence of the control group (M=29.67, SD=19.52) and the experimental group (M=18.80, SD=13.84) for all the dependant variables, with the exception of VB4% (p=0.016; t=2.49; df = 58.). The Mann-Whitney test confirmed the equivalence in terms of post-test scores, with the exception of dependant variable VB4% (Z= -2.26, p=0.024).

The results of a dependent samples t-test was used to demonstrate meaningful differences between the pre-test and post-test scores of the dependant variables within the control and experimental groups. The dependant variables included the Profile of Mood States (POMS), the Freeze Framer 2.0®, specifically the Heart Rate, Coherence Ratio and Power Spectrum Density (PSD) as well as Voicebio Analysis™ referring to VB1(adrenal energy); VB2 (mental energy); VB3 (lowest frequency); VB4 (second lowest frequency) and VBPost (energetic balance, reported as Less, Equal or More).

The Profile of Mood States (POMS)

The Profile of Mood States was used to determine changes in mood in the control and experimental groups. The six identifiable POMS mood or affective states are Tension-Anxiety (T), Depression-Dejection (D), Anger-Hostility (A), Vigor-Activity (V), Fatigue-Inertia (F), and Confusion-Bewilderment (C).

In the case of the control group statistically significant differences in the Profile of Mood States (POMS) were shown for Tension-Anxiety (p=0.01, t= 2.74); Depression-Dejection (p=0.1, t=1.69); Anger-Hostility (p=0.001, t=3.80); Fatigue-Inertia (p=0.01, t=2.16); Total Mood Disturbance (p=0.002, t=3.39) and T-scores(p=0.001, t=3.81) (see Table 3).

Table 3. Profile of Mood States results for control group

Group	Pre and Post		Mean	N	Std. Deviation	Std. Error Mean	*Mean	*N	*Std. Deviation	*Std. Error Mean
Control	Pair 1	Tension - Anxiety	11.97	30	5.997	1.095	9.40	30	6.179	1.128
	Pair 2	Depression - Dejection	7.73	30	7.625	1.392	6.27	30	7.144	1.304
	Pair 3	Anger - Hostility	10.73	30	8.944	1.633	6.30	30	5.609	1.024
	Pair 4	Fatigue - Inertia	9.37	30	6.003	1.096	7.50	30	5.841	1.066
	Pair 5	Confusion Bewilderment	8.17	30	3.343	0.610	6.93	30	3.759	0.686
	Pair 6	Vigor - Activity	16.03	30	6.117	1.117	15.67	30	5.422	0.990
	Pair 7	TMD	31.93	30	27.928	5.099	20.73	30	24.310	4.438
	Pair 8	TMD T-score	54.40	30	8.431	1.539	50.80	30	7.289	1.331

* Post-test results

In the case of the experimental group statistically significant differences in the Profile of Mood States (POMS) were shown for Tension-Anxiety (p=0.018, t=2.51) and Fatigue-Inertia (p=0.013, t=2.63) (see Table 4).

Table 4. Profile of Mood States results for experimental group

Group	Pre and Post		Mean	N	Std. Deviation	Std. Error Mean	*Mean	*N	*Std. Deviation	*Std. Error Mean
Experi-mental	Pair 1	Tension - Anxiety	12.47	30	7.995	1.460	8.93	30	6.638	1.212
	Pair 2	Depression - Dejection	10.00	30	11.295	2.062	8.23	30	10.109	1.846
	Pair 3	Anger - Hostility	10.93	30	10.372	1.894	7.53	30	8.283	1.512
	Pair 4	Fatigue - Inertia	8.67	30	6.227	1.137	6.27	30	6.136	1.120
	Pair 5	Confusion Bewilderment	7.70	30	4.219	0.770	7.07	30	4.402	0.804
	Pair 6	Vigor - Activity	15.47	30	5.008	0.914	16.17	30	5.226	0.954
	Pair 7	TMD	34.30	30	38.790	7.082	21.87	30	34.666	6.329
	Pair 8	TMD T-score	54.70	30	11.018	2.012	51.30	30	10.350	1.890

* Post-test results

Freeze Framer 2.0®

Three variables were used to determine psychophysiological balance, namely Heart Rate, Coherence Ratio and Power Spectrum Density (PSD).

Heart Rate

The results of a dependent samples t-test demonstrated statistically significant differences between the pre-test and post-test scores of the dependant variables for Heart Rate within the control group (p=0.034, t= - 2.23) and experimental group (p=0.031, t= - 2.27) (see Table 5).

Table 5. Heart Rate results

Group	Heart Rate Pre and Post		Mean	N	Std. Deviation	Std. Error Mean	*Mean	*N	*Std. Deviation	*Std. Error Mean
C	Pair 1	Heart Rate (beats/minute)	70.73	30	9.805	1.790	73.37	30	9.669	1.765
E	Pair 1	Heart Rate (beats/minute)	71.83	30	9.113	1.664	76.10	30	10.499	1.917

*Post-test results

Coherence Ratio

The results of a dependent samples t-test demonstrated no statistically significant differences between the pre-test and post-test scores of the dependant variables for the Coherence Ratio within the control and experimental groups (see Table 6). The Coherence Ratio was reported as Low, Medium or High. The results of the paired samples test for the Coherence Ratio in the control group were Low (p=0.51, t= -0.66); Medium (p=0.72, t=0.35) and High (p=0.38, t=0.89). The results of the paired samples test for the Coherence Ratio in the experimental group were Low (p=0.89, t= -0.14); Medium (p=0.59, t=0.55) and High (p=0.33, t=0.99).

Table 6. Coherence Ratio results

Group	Coherence Ratio Pre and Post		Mean	N	Std. Deviation	Std. Error Mean	*Mean	*N	*Std. Deviation	*Std. Error Mean
C	Pair 1	LOW	67.13	30	25.550	4.665	70.47	30	24.886	4.543
	Pair 2	MED	28.53	30	20.257	3.698	26.83	30	22.152	4.044
	Pair 3	HIGH	4.37	30	10.659	1.946	2.67	30	5.585	1.020
E	Pair 1	LOW	61.53	30	26.013	4.749	62.33	30	30.802	5.624
	Pair 2	MED	31.37	30	22.035	4.023	28.37	30	22.005	4.018
	Pair 3	HIGH	7.13	30	13.544	2.473	9.30	30	20.396	3.724

* Post-test results

Low Coherence levels increased more in the control group than in the experimental group, Medium Coherence decreased in the control group as well as in the experimental group, while there was an increase in High Coherence in the experimental group compared to a decrease in the control group.

A chi-squared test of independence indicated no significant changes in the Coherence Ratio, with 50% of participants who improved in the control group versus 46.7% of participants in the experimental group. The Phi coefficient was -0.033 which indicated a very small effect.

Power Spectrum Density (PSD)

A chi-squared analysis test demonstrated that 36.7% participants in the control group were in the HF range in the pre-tests and 30% during the post-tests. Furthermore, 36.7% participants were in the LF range in the pre-tests, compared to 53.3% in the post-tests. Lastly, 26.7% of participants in the control group were in the MF range in the pre-tests versus16.7% of participants in the post-tests. In the experimental group 30% of participants were in HF during the pre-tests, compared to 10% in the post-tests. The results for the LF range demonstrated that 40% of participants were in LF during the pre-tests versus 66.7% in the post-tests. Furthermore, 30% of participants were in the MF range during the pre-tests versus 23.3% during the post-tests. The Phi coefficient was 0.071 for the pre-tests, indicating a very small change versus 0.251 in the post-test, also indicating a small effect (see Table 7).

Table 7. Power Spectrum Density results

			PDS pre				PDS post			
			HF	LF	MF	Total	HF	LF	MF	Total
Group	Control	Count	11	11	8	30	9	16	5	30
		% within Group	36.7%	36.7%	26.7%	100.0%	30.0%	53.3%	16.7%	100.0%
	Experimental	Count	9	12	9	30	3	20	7	30
		% within Group	30.0%	40.0%	30.0%	100.0%	10.0%	66.7%	23.3%	100.0%
Total		Count	20	23	17	60	12	36	12	60
		% within Group	33.3%	38.3%	28.3%	100.0%	20.0%	60.0%	20.0%	100.0%

The Power Spectrum Density (PSD) results in the post-tests demonstrated that more participants of the experimental group were in the preferable MF range that is an indication of a more balanced state between the sympathetic and parasympathetic nervous systems (see Figure 4).

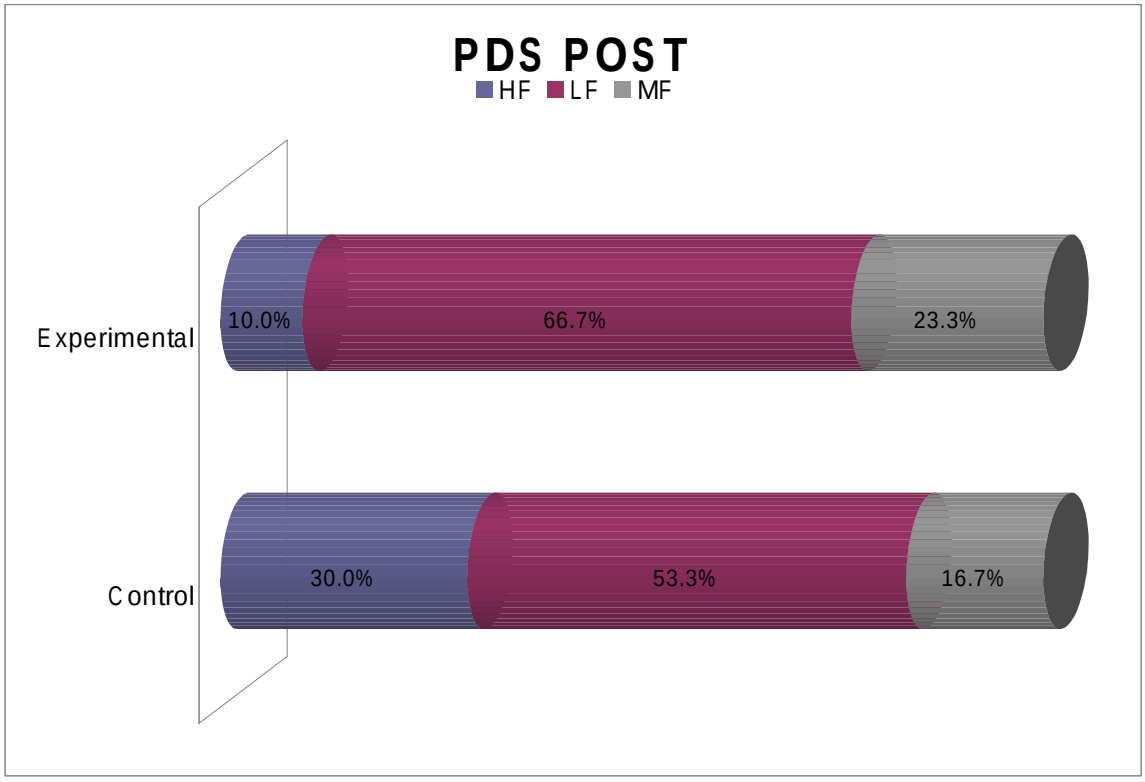


Figure 4. Power Spectrum Density (PSD) post-test results

Voicebio Analysis™

Four keynote frequencies, also referred to as notes on the VIBEprint™ were chosen as parameters of energetic balance, namely VB1 (D#), VB2 (F#), VB3 (low note 1) and VB4 (low note 2). The amount of physical hits were calculated from the Grid part of the VIBEprint™ (VB1, VB2, VB3, VB4) and the percentage of frequency for each note from the Graph part (VB1%,VB2%,VB3%,VB4%)(see Appendix O). The over-all changes in energetic balance between the pre-test and post-tests were described in terms of the changes in the shape of the sine-wave on the Graph section of the VIBEprint™. The changes were reported as Less, Equal or More Balance.

The results of a dependent samples t-test demonstrated significant differences between the pre-test and post-test scores of the dependant variables for Voicebio Analysis™ within the control group, specifically VB2% (p=0.033, t= -2.24), VB3(p=0.001, t= -5.27, VB3% (p=0.001, t= -4.73), VB4 (p=0.001, t= -5.52), and VB4% (p=0.001, t= -5.29)(see Table 8).

Table 8. VIBEprint™ results for control group

Group	VIBEprint™ Pre and Post		Mean	N	Std. Deviation	Std. Error Mean	*Mean	*N	*Std. Deviation	*Std. Error Mean
C	Pair 1	VB1	11.43	30	9.989	1.824	12.13	30	7.646	1.396
	Pair 2	VB1%	27.00	30	25.563	4.667	32.00	30	23.804	4.346
	Pair 3	VB2	24.17	30	13.491	2.463	23.27	30	9.362	1.709
	Pair 4	VB2%	54.80	30	30.821	5.627	64.93	30	26.811	4.895
	Pair 5	VB3	4.13	30	2.862	0.522	8.23	30	4.321	0.789
	Pair 6	VB3%	9.80	30	8.779	1.603	23.60	30	17.031	3.109
	Pair 7	VB4	5.47	30	2.636	0.481	10.47	30	5.224	0.954
	Pair 8	VB4%	12.33	30	8.790	1.605	29.67	30	19.519	3.564

*Post-test results

The results of a dependent samples t-test demonstrated significant differences between the pre-test and post-test scores of the dependant variables for Voicebio Analysis™ within the experimental group, specifically VB3(p=0.001, t= -6.31, VB3% (p=0.001, t= -7.40), VB4 (p=0.001, t= -5.20), and VB4% (p=0.001, t= -6.08) (see Table 9).

Table 9. VIBEprint™ results for experimental group

Group	VIBEprint™ Pre and Post		Mean	N	Std. Deviation	Std. Error Mean	*Mean	*N	*Std. Deviation	*Std. Error Mean
E	Pair 1	VB1	10.40	30	10.197	1.862	10.20	30	9.057	1.654
	Pair 2	VB1%	22.00	30	24.506	4.474	25.60	30	24.025	4.386
	Pair 3	VB2	28.43	30	15.502	2.830	25.83	30	13.787	2.517
	Pair 4	VB2%	55.27	30	30.758	5.616	64.13	30	34.067	6.220
	Pair 5	VB3	2.50	30	2.255	0.412	7.37	30	4.429	0.809
	Pair 6	VB3%	4.33	30	5.148	0.940	16.40	30	11.147	2.035
	Pair 7	VB4	4.13	30	2.623	0.479	8.23	30	4.869	0.889
	Pair 8	VB4%	8.47	30	8.199	1.497	18.80	30	13.842	2.527

*Post-test results

Overall, there was a notable change over time (i.e. from pre- to post-test) in VB3, VB3%, VB4 and VB4% for both groups, but there was not a significant statistical difference between the groups in terms of those frequencies(p=0.00).

Repeated measures as well as a chi squared tests were performed on VB1, VB2, VB3 and VB4 with the following results:

VB1 changes

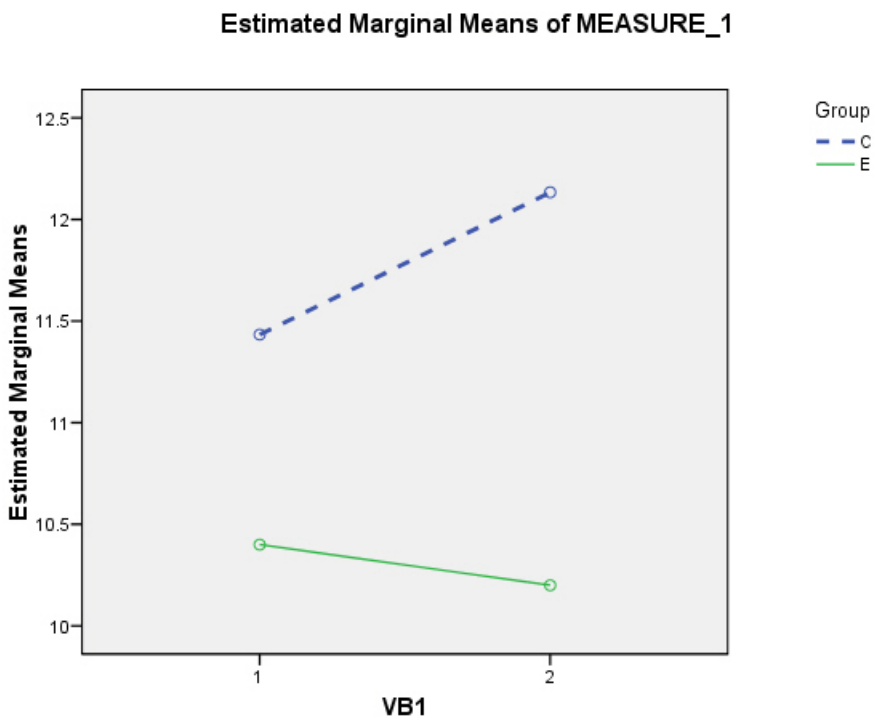


Figure 5. VB1 results

The graphic representation of the estimated marginal means derived from repeated measures, demonstrated a decrease in the experimental group in VB1 from a pre-test value of 10.40 to a post-test value of 10.20. The estimated marginal means in the control group demonstrated an increase from a pre-test value of 11.43 to a post-test value of 12.13 (see Figure 5).

A chi-squared test revealed that there was a larger likelihood for the control group to deteriorate in terms of VB1, namely 46.7% in the control group(C) versus 36.7% in the experimental group (E). A larger percentage of the experimental group (E) remained constant, namely 13.3% versus 3.3% of the control group (C). For both groups 50% of participants improved (see Table 10). The Phi coefficient was 0.190, indicating that

group size had a small effect on the changes in VB1. The changes were not statistically significant (p=0.340), but the chi-squared approximation was not accurate since 33.3% of cells had an expected count < 5.

Table 10. VB1 changes between groups

			VB1 change			Total
			Pre > Post	Pre = Post	Pre < Post	
Group	C	Count	14	1	15	30
		% within Group	46.7%	3.3%	50.0%	100.0%
	E	Count	11	4	15	30
		% within Group	36.7%	13.3%	50.0%	100.0%
Total		Count	25	5	30	60
		% within Group	41.7%	8.3%	50.0%	100.0%

VB2 changes

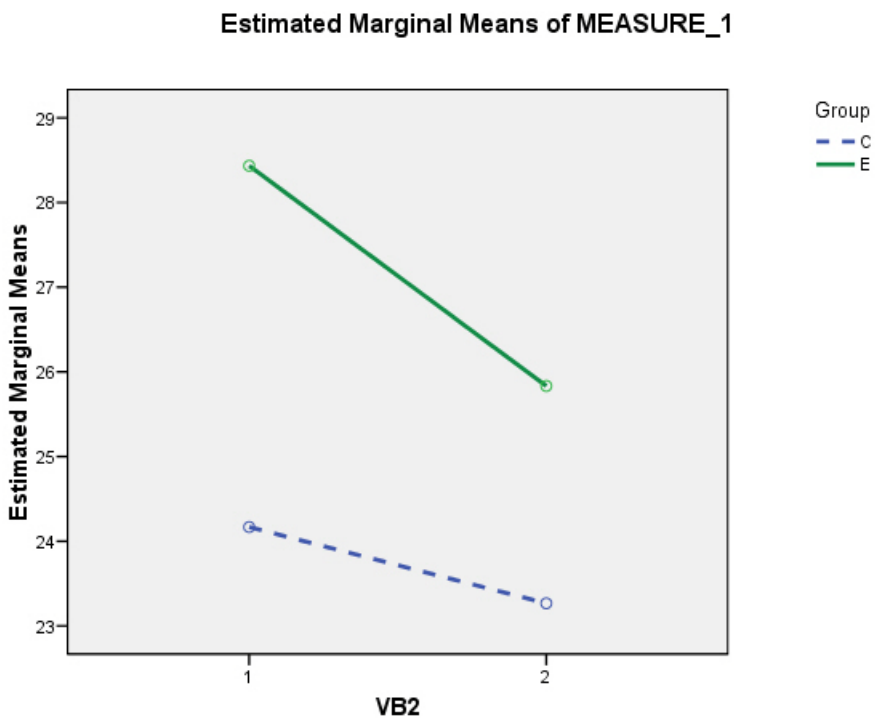


Figure 6. VB2 results

The graphic representation of the estimated marginal means demonstrated a decrease in the experimental group in VB2 from a pre-test value of 28.43 to a post-test value of 25.83. The estimated marginal means in the control group demonstrated a decrease from a pre-test value of 24.17 to a post-test value of 23.27 (see Figure 6).

A chi-squared test revealed that 63.3% of participants in the experimental group improved in comparison with 53.3% of participants in the control group. 3.3% stayed the same in both groups, while 43.3% in the control group deteriorated versus 33.3% in the experimental group (Table 11). The Phi coefficient was 0.104, indicating that group size had a small effect on the change in VB2. The changes were not statistically significant (p=0.723), but the chi-squared approximation was not accurate since 33.3% of cells had an expected count <5.

Table 11. VB2 changes between groups

			VB2 change			Total
			Pre > Post	Pre = Post	Pre < Post	
Group	C	Count	16	1	13	30
		% within Group	53.3%	3.3%	43.3%	100.0%
	E	Count	19	1	10	30
		% within Group	63.3%	3.3%	33.3%	100.0%
Total		Count	35	2	23	60
		% within Group	58.3%	3.3%	38.3%	100.0%

VB3 changes

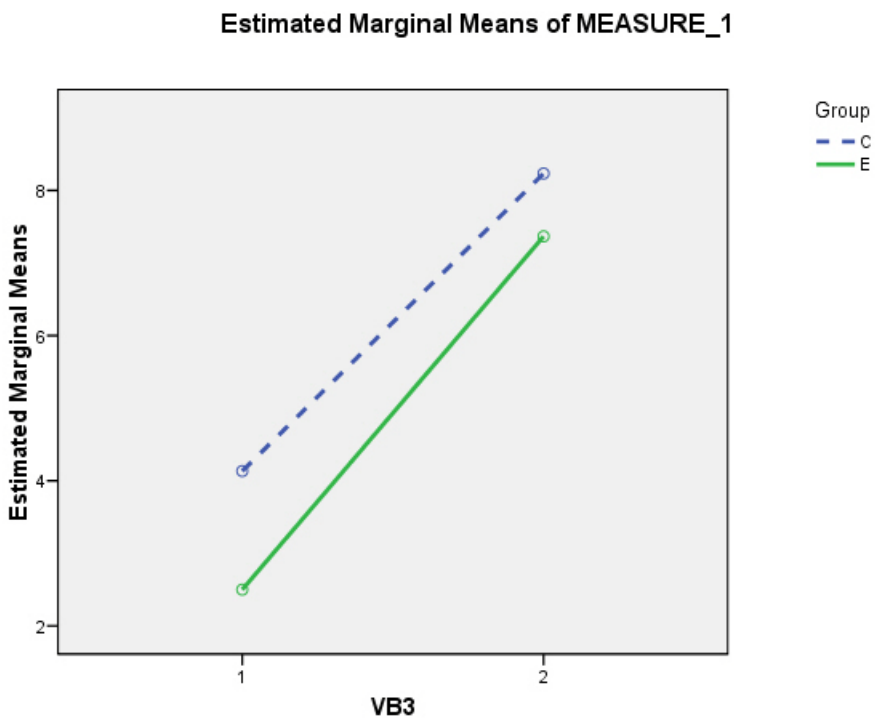


Figure 7. VB3 results

The graphic representation of the estimated marginal means demonstrates an increase in the experimental group in VB3 from a pre-test value of 2.50 to a post-test value of 7.37. The estimated marginal means in the control group demonstrates an increase from a pre-test value of 4.13 to a post-test value of 8.23 (see Figure 7).

A chi-squared test for VB3 revealed that 93.3% of participants in the experimental group improved in comparison with only 76.7% participants in the control group. 6.7% stayed the same in the experimental group versus 13.3% in the control group (see Table 12). The Phi coefficient was 0.263, indicating that group size had a small to moderate effect on the changes in VB3. The changes were not statistically significant ($p=0.125$), but the chi-squared approximation was not accurate since 66.7% of cells had an expected count < 5.

Table 12. VB3 changes between groups

			VB3 change			Total
			Pre > Post	Pre = Post	Pre < Post	
Group	C	Count	3	4	23	30
		% within Group	10.0%	13.3%	76.7%	100.0%
	E	Count	0	2	28	30
		% within Group	0.0%	6.7%	93.3%	100.0%
Total		Count	3	6	51	60
		% within Group	5.0%	10.0%	85.0%	100.0%

VB4 changes

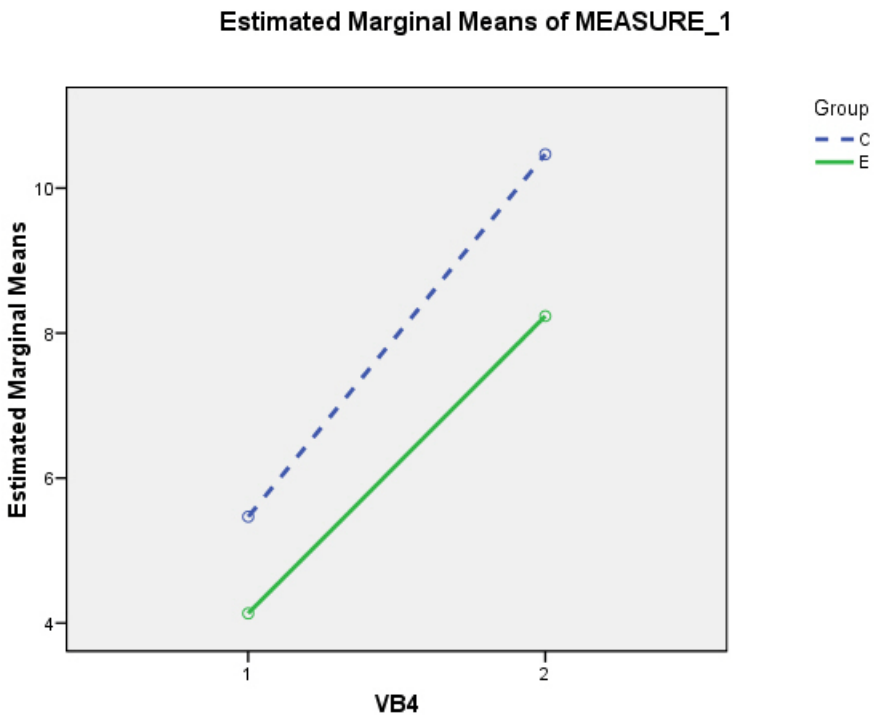


Figure 8. VB4 results

The graphic representation of the estimated marginal means demonstrated an increase in the experimental group in VB4 from a pre-test value of 4.13 to a post-test value of 8.23. The estimated marginal means in the control group demonstrated an increase from a pre-test value of 5.47 to a post-test value of 10.47 (see Figure 8).

According to the chi-squared test there was a larger likelihood for the control group to deteriorate in terms of VB4, namely 20% (C) versus 3.3% (E). A larger percentage of the experimental group (E) remained constant, namely 10% versus 0% in the control group (C). Results of the post-tests demonstrated that 80% of participants in the control group improved in comparison to 86.7% in the experimental group (see Table 13). The Phi coefficient was 0.333, indicating that group size had a small to moderate effect on the changes in VB4. The changes were not statistically significant (p=0.36), but the chi-squared approximation was not accurate since 66.7% of cells had an expected count <5.

Table 13. VB4 changes between groups

			VB4 change			Total
			Pre > Post	Pre = Post	Pre < Post	
Group	C	Count	6	0	24	30
		% within Group	20.0%	0.0%	80.0%	100.0%
	E	Count	1	3	26	30
		% within Group	3.3%	10.0%	86.7%	100.0%
Total		Count	7	3	50	60
		% within Group	11.7%	5.0%	83.3%	100.0%

VBPost or overall energetic balance results

A chi-squared test of independence was performed on the shifts in energetic balance (VB post) according to the shape of the sine-wave of the VIBEprint™ Graph (see Table 14). The changes were reported as Less, Equal or More energetic balance.

Table 14. Energetic changes in control and experimental groups

			VB post			Total
			Equal	Less	More	
Group	Control	Count	11	10	9	30
		% within Group	36.7%	33.3%	30.0%	100.0%
	Experimental	Count	10	4	16	30
		% within Group	33.3%	13.3%	53.3%	100.0%
Total		Count	21	14	25	60
		% within Group	35.0%	23.3%	41.7%	100.0%

According to the results 53.3% of the experimental group (E) demonstrated more energetic balance versus 30.0% of the control group (C). The energetic balance stayed the same in 33.3% of the experimental group versus 36.7% of the control group, while 33.3% of the control group demonstrated less energetic balance than 13.3% of the experimental group during the post-tests. The Phi coefficient was 0.276, indicating that group size had a small effect on the changes in over-all energetic balance (VBPost).

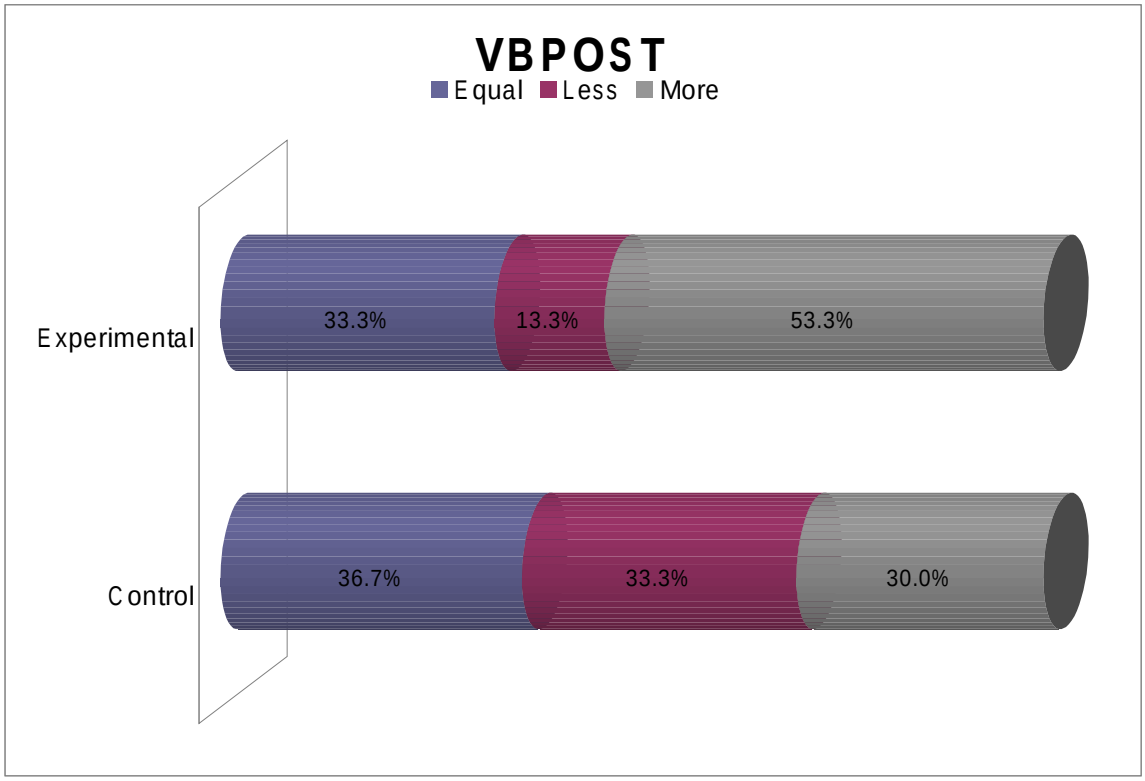


Figure 9. Energetic balance in the control and experimental groups

Qualitative Findings

This section reports on the level of compliance of the participants of the experimental group, as well as oral feedback given to the researcher by the participants of both the control and experimental groups about their experience during the research process.

Compliance

The level of compliance within the experimental group was determined by a Post-test Survey (see Appendix F).

Table 15. Levels of compliance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A few times (7 or less)	5	8.3	16.7	16.7
	Most of the time (more than 7)	11	18.3	36.7	53.3
	Every day	14	23.3	46.7	100.0
	Total	30	50.0	100.0	
Missing	System	30	50.0		
Total		60	100.0		

Five participants (8.3%) of the experimental group used the research tools a few times, indicating seven times or less. Eleven participants (18.3%) used the research tools more than seven times during the fourteen day period while fourteen participants (23.3%) used the tools every day (see Table 15).

Feedback from participants

Each participant had a chance to give feedback on their experience during the fourteen day period. The experience of the members of the experimental group varied.

Positive comments included:

- Sleeping patterns improved
- Felt calmer and more relaxed
- Felt more even-tempered
- Felt more joyful
- Experienced a 'buzz' in the office with overall more positive energy
- Found inner peace
- Mentally more focused and clear headed
- The music was very relaxing
- Experienced higher energy levels, especially during the afternoon
- Felt a physical change in heartbeat and in the chest area
- Felt completely "different"

Negative comments included:

- Found it difficult to integrate the experiment in daily schedule
- Music was monotonous
- Thirty minutes were too long, suggested only twenty minutes

- Irritating sounds in music were bothering
- Feeling too relaxed and almost inefficient
- Would have liked a selection of music rather than repeating the same CD for 14 days
- Music was scary
- Didn’t feel any different while or after listening to the music

Different people listened to the music at different times during the day. Some used it at the beginning of their day which helped them to set the tone for the day. Somebody else listened to it during lunchtime which helped to increase energy levels during the afternoon. Some found time to listen to the CD at the end of the day, which helped them to switch of completely and very often sleep very well.

Feedback from the participants in the control group ranged from non-chalance about not being part of the experimental group to disappointed that they were not chosen to make use of the research tools. Most of them viewed the fact that they were not included in the experimental group as a positive indicator about their own stress levels. Although the information conveyed during the information session emphasized that there would be participants in both groups with higher and lower stress levels, the perception remained that the members of the control group must have been less stressed. The possible effects of this perception will be discussed in the final chapter.

CHAPTER 5:
CONCLUSIONS, DISCUSSION, AND SUGGESTIONS

This final chapter revisits the research problem and the methodology followed during the research project. The major section includes a discussion of the results according to the hypotheses stated in Chapter 1 and concludes with suggestions for future research.

Restatement of the Research Problem and Hypothesis

According to the principles of a living system that are echoed in the views of energy medicine, and the shift in organizations from a mechanistic view to a more fluid, organic structure, where organizations are viewed as whole systems the role of the individual is considered paramount in creating a healthy work environment. The current view in the new sciences is that all living beings and living systems are surrounded by subtle energy, a dynamic, ever-changing aspect of all living matter. When this subtle energy becomes blocked or stagnant in any part of a system, whether in the human body or in the "body" of the organization, imbalances occur that can lead to disease or illness. Any factor that causes stress on a system will interfere with the normal functioning of that system, and when the situation is prolonged, irreversible damage might be caused. On the other hand, any intervention that strives to better the health or wellness of an individual within an organization will improve the overall energy within that organization in positive and uplifting ways.

As stated in Chapter 1, heightened awareness about the important role subtle energy plays within an organization amplifies a need to implement integrative, energy-based and practical solutions, to support employees in their effort to manage their personal energy.

Colin Hall describes the role of energy as "the ability to create high energy effective teams of high energy effective individuals in high energy effective relationships on a sustainable basis."[118]

One of the challenges is to measure organizational and personal energy, followed by interventions that focus specifically on the energy of employees as well as the energy of the organization. This research study focused on the role of personal energy, more specifically how it can be measured and, in addition to that, what possible methods can be implemented to directly influence personal energy.

The research question that resulted from these previous statements and the current knowledge available of the electromagnetic fields that surround the body was to enquire whether the management of personal energy within an organization can be approached from an electromagnetic perspective, by using sound frequencies and positive emotional states to create balance or coherence on energetic and psychophysiological levels.

The research question led to the following hypotheses:

1) Scientifically designed music can improve energetic and psychophysiological balance within individuals who are experiencing high stress levels.

2) Positive emotional states can improve energetic and psychophysiological balance within individuals who are experiencing high stress levels.

3) Positive changes on an energetic level can influence the over-all climate or energy of an organization.

4) It is possible to measure these energetic changes within the "real-life" working environment.

Review of Methodology

This study focused on the application of two methods to address the use of personal energy from an electromagnetic perspective, namely sound frequency and positive emotional states. The purpose of conducting this study was to measure personal energy in employees who are experiencing high stress levels and to introduce energy-based solutions, namely sound frequency and positive emotional states to improve their energetic and psychophysiological balance. This research study was conducted in the working environment of the employees, to test the hypothesis that stress can be measured and addressed, from an electromagnetic perspective, in practical ways and in a "real-life" setting. Furthermore, these methods provided an opportunity to explore the relevance of a balanced energetic state and the influence it has on the overall energy within an organization.

This study took place in the Medium Business banking division, a sub segment within the Business Banking Services of a large Corporate and Business bank, which will, for the purpose of confidentiality, remain unnamed. The Medium Business banking division is divided into various branches, or cells, that are set up throughout the areas servicing prospective clients. Two cells were chosen to be part of this research project, Cell A (N=38) and Cell B (N=22), together consisting of sixty healthy males and females who were experiencing high stress levels in their work environment. The participants were quasi-randomly assigned to either the experimental or control group, by making use of a matched-pair design that referred to age, gender and stress levels as determined by the Holmes-Rahe Social Readjustment Rating (SRRS) (see Appendix I). Pre-tests and post-tests were used by repeated measurements of dependent variables in the

experimental and control groups. These included the Profile of Mood States (POMS) (see Appendix J); the Freeze Framer® 2.0 measuring the Heart Rate, Coherence Ratio and Power Spectrum Density (PSD) (see Appendix N); and Voicebio Analysis™ which measured the sound frequencies present in the human voice to provide a composite graph or VIBEprint™ (see Appendix O). The experimental group also completed a Post-test Survey (see Appendix F) to determine the level of compliance to the intervention.

The working environment of the participants was chosen to do both the testing and experimental part of the research. During the experimental phase the experimental group was provided with a stereo headset and a copy of scientifically designed music, namely the AlphaRelaxationSystem of Jeffrey Thompson (see Appendix H). This soundtrack has been composed in such a way to induce deep states of relaxation and was chosen for that particular reason to be used by the participants in the experimental group. They were instructed to listen to the soundtrack for thirty minutes each day, while inducing a positive emotional state. To this effect they received oral and written instructions. The control group, on the other hand, received no intervention. After fourteen days post-tests were conducted on both the control and experimental groups, by repeating the measurement of the dependent variables.

Review of Results

The complete results of the research findings are presented in Chapter 4 and will be reviewed in this section, arranged according to the dependent variables applied.

As previously mentioned, sixty participants were chosen from two divisions (Cell A and Cell B) in the business bank and divided into a control group (N=30) and an experimental group (N=30), with the following representation according to cells: Cell A

(63%; *n*=38) and Cell B (37%; *n*=22). The group consisted of healthy female (*n*=36) and male (*n*=24) participants. They ranged from 22 to 60 years in age, with an average age of 39 years. The participants were randomly divided into the control and experimental groups using a matched-pair design, and were equivalent in terms of age, gender and the Holmes-Rahe Social Readjustment Rating Scale (SRRS) scores (see Table 1).

The results of the Holmes-Rahe Social Readjustment Rating Scale (SRRS) scores demonstrated that the majority of the participants (57%) had SRRS scores that fell in the range between 150 and 300, which indicated a 50% chance of a major health breakdown in the majority of those participants within the period of the next two years. Additionally, 15% demonstrated high SRRS scores, which indicated an 80% chance of a major physical or mental breakdown over the next two years. Only 17% of participants had low SRRS scores, which indicated that they had low susceptibility of a stress-related health breakdown. It was therefore evident, from their SRRS results, that the population chosen for this research study was experiencing medium to high levels of stress, with major implications for their future health and well-being.

These results will, furthermore, be reviewed according to the dependent variables that were applied during this research study.

The Profile of Mood States (POMS)

The Profile of Mood States was used to determine changes in mood in the control and experimental groups over a fourteen day period. The six identifiable POMS mood or affective states were Tension-Anxiety (T), Depression-Dejection (D), Anger-Hostility (A), Vigor-Activity (V), Fatigue-Inertia (F), and Confusion-Bewilderment (C).

In the case of the control group statistically significant differences in the Profile of Mood States (POMS) were shown for Tension-Anxiety (p=0.01, t= 2.74), Depression-Dejection (p=0.1, t=1.69); Anger-Hostility (p=0.001, t=3.80); Fatigue-Inertia (p=0.01, t=2.16) and Total Mood Disturbance (p=0.002, t=3.39) (see Table 3).

In the case of the experimental group statistically significant differences were shown for Tension-Anxiety (p=0.018, t=2.51) and Fatigue-Inertia (p=0.013, t=2.63) (see Table 4). There were also positive changes in Depression-Dejection, Anger-Hostility and Total Mood Disturbance in the experimental group, although they were not statistically significant.

The Freeze Framer 2.0®

For purposes of this study three measurements of the Freeze Framer® 2.0 were used to measure psychophysiological balance, namely, the average Heart Rate, the Coherence Ratio and the Power Spectrum Density (PSD).

Heart Rate

In both the control and experimental groups significant differences between the pre-test and post-test scores of the average Heart Rate were found. Interestingly enough, the Heart Rate increased in both groups between 3-5 beats/minute (see Table 5).

Coherence Ratio

The Coherence Ratio is divided into three categories: Low, Medium or High Coherence. A coherent state is characterized by lower scores on Low Coherence and higher scores on Medium and High Coherence.

During the post-test session the control group indicated a shift towards the Low Coherence level that was higher in number than a similar increase in the experimental

group. (This was an indication of greater sympathetic activity within the control group than in the experimental group). The post-test results indicated a Medium Coherence level decrease in both the control group and the experimental group. However, the research results indicated an increase in the High Coherence level in the experimental group but a decrease in the High Coherence level in the control group. (This was an indication of greater parasympathetic activity within the experimental group than in the control group). However, over-all a positive change in the Coherence Ratio for both groups was indicated, although the difference in change was not statistically significant, with 50% of the participants in the control group indicating an improved coherence score, versus 46.7% of the participants in the experimental group (see Table 6).

Power Spectrum Density (PSD)

The Power Spectral Density (PSD) is a mathematical transformation of HRV data as a non-invasive test of integrated neurocardiac function and is used to discriminate and quantify sympathetic and parasympathetic influences on the heart rate. The power spectrum graph is divided into three main frequency ranges.

The very low frequency (LF) (0.01 to 0.05 Hz) represents slower changes in heart rate as an index of sympathetic activity. In the control group 36.7% of the participants were in the LF range in the pre-tests, compared to 53.3% in the post-tests. Likewise, in the experimental group 40% of the participants were in LF during the pre-tests, versus 66.7% in the post-tests. This suggests an increase in sympathetic activity in both groups.

The medium frequency range (MF) (0.05 to 0.15 Hz) is a mixture of sympathetic and parasympathetic activity and it gives an indication of the balance between the sympathetic and parasympathetic nervous systems. In the control group 26.7% of the

participants were in the MF range in the pre-tests, compared to 16.7% in the post-tests. Likewise, 30% of participants in the experimental group were in the MF range during the pre-tests, versus 23.3% during the post-tests. In both groups there seemed to be less balance between the sympathetic and parasympathetic nervous systems.

Furthermore, test results demonstrated that 36.7% of the participants in the control group were in the HF range (0.15 to 0.4 Hz) in the pre-tests and 30% during the post-tests. In the experimental group 30% of participants were in HF during the pre-tests, compared to 10% in the post-test. In both groups this indicates a decrease in parasympathetic activity (see Table 7).

The results of the Power Spectrum Density (PSD) were too small to be statistically significant.

Voicebio Analysis™

Four keynote frequencies, also referred to as notes on the VIBEprint™ were chosen as parameters of energetic balance, namely VB1 (D#), VB2 (F#), VB3 (low note 1) and VB4 (low note 2). The number of physical hits were calculated from the Grid part of the VIBEprint™ (VB1, VB2, VB3, VB4) and the percentage of frequency for each note from the Graph part (VB1%,VB2%,VB3%,VB4%) (see Appendix O). The over-all changes in energetic balance (VBPost) between the pre-test and post-test results were described in terms of the changes in the shape of the sine-wave on the Graph section of the VIBEprint™. The changes were reported as Less, Equal or More Balance.

Overall, there was a significant change over the 2-week time period (i.e. from pre- to post-test) in VB3, VB3%, VB4 and VB4% for both groups, but there was not a

significant statistical difference between the groups in terms of those frequencies (p=0.00).

VB1

VB1 is linked to the energy of the adrenal gland, which produces the stress hormones. Low frequency in VB1 indicates low adrenal energy due to prolonged stress or exhaustion, while a higher amount of frequency in this area indicates a positive change in the VIBEPrint™. There was a larger likelihood for the control group to deteriorate in terms of VB1, namely 46.7% in the control group(C) versus 36.7% in the experimental group (E). A larger percentage of the experimental group (E) remained constant, namely 13.3% versus 3.3% of the control group (C). For both groups 50% of participants improved in VB1 (see Table 10).

VB2

VB2 gives an indication of mental energy; a high frequency reading indicates a state of being overworked or exhausted. Lower frequencies in this area of the VIBEprint™ are associated with a shift from sympathetic to parasympathetic activity in the autonomic nervous system. An improvement of 63.3% was noted in the participants in the experimental group, in comparison with 53.3% of the participants in the control group. In both groups 3.3% remained constant, while 43.3% in the control group deteriorated versus 33.3% in the experimental group (see Table 11).

VB3

The note with the lowest frequency level was identified for each participant and pre- and post-test results were compared. VB3 could be any of the twelve notes on the VIBEprint™. The lowest frequency improved in 93.3% of participants in the

experimental group in comparison with only 76.7% participants in the control group. In the experimental group 6.7% remained constant versus 13.3% in the control group (see Table 12).

VB4

The second lowest note or frequency was identified for each participant and compared before and after the intervention. Again, this frequency was different for each participant and could be any one of the twelve notes on the VIBEprint™. The findings indicated a larger likelihood for the control group to deteriorate in terms of VB4, demonstrated by less frequency in VB4 for 20% of the control group(C), versus 3.3% of the experimental group (E). A larger percentage of the experimental group (E) remained constant, namely 10%, versus 0% in the control group (C). In the experimental group 86.7% improved demonstrated by more frequency in VB4, compared to 80% of participants in the control group (see Table 13).

VB Balance (VBPost)

The energetic balance was evaluated according to the changes in the shape of the sine-wave of the VIBEprint™ Graph (see Figure 9). These changes were reported as demonstrating Less, Equal or More energetic balance.

According to the results, 53.3% of the experimental group (E) demonstrated more energetic balance, versus 30.0% of the control group (C). The energetic balance remained constant in 33.3% of the experimental group, versus 36.7% of the control group; while during the post-tests, 33.3% of the control group demonstrated less energetic balance compared to 13.3% of the experimental group (see Table 14).

The level of compliance within the experimental group was determined by a Post-test Survey (see Appendix F). Five of the participants (8.3%) of the experimental group used the research tools a few times, indicating seven times or less. Eleven of the participants (18.3%) used the research tools more than seven times during the fourteen day period, while fourteen of the participants (23.3%) used it every day.

Discussion

The conclusions of the research findings will be discussed according to the original research question and the four hypotheses that emanated from that. The results of the Holmes-Rahe Social Readjustment Rating (SRRS) indicated that this research population demonstrated medium to high stress levels, with significant implications for their future health and well-being.

Research Hypothesis #1

Scientifically designed music can improve energetic and psychophysiological balance within individuals experiencing high stress levels.

Previous research has shown the physiological and psychological benefits of scientifically designed music, when part of an emotional self-management program with the object of reducing stress among employees. Much of this research was done by the Institute of HeartMath (IHM), which demonstrated through various studies that music aids in the reduction of stress and negative emotion while increasing positive emotion, in both healthy populations and in individuals with clinical conditions, such as anxiety, depression, panic, arrhythmias, diabetes and chronic fatigue.[119]

In this research study, the participants of the experimental group were required to listen to Jeffrey Thompson's *AlphaRelaxationSystem*, which makes use of binaural beat

technology and sounds from nature to enhance mental and emotional balance, while consciously relaxing their body. Previous research done by Thompson, has demonstrated the benefits of music using binaural beat technology to induce brainwave entrainment. Applying sound in this way has been shown to make a profound change in brainwave patterns, which is observable on brainwave mapping equipment (EEG), as well as positive changes in the physical body, measurable through the application of blood tests, bio-feedback equipment and other sophisticated procedures. His findings also concluded that scientifically designed music can alter the balance and functioning of the brain and central nervous system as a whole.[120]

The most meaningful energetic shifts in the current study were detected by the results of the Voicebio Analysis™ measurements, more specifically the increase of frequency or energy in the two lowest notes, VB3 and VB4 (p=0.001). The notes in a VIBEprint™ with the lowest frequencies are usually associated with the areas in the body that are most affected by emotional stress in the body. Those two notes could be any two of the twelve notes on the VIBEprint™ and were unique for each participant. In some participants these areas were so low in energy that it could not be detected by the voice recording (see Appendix O).

In addition to these findings, the changes in VB1 (D#), representing the energy of the adrenal gland, showed an improvement of 50% in both groups, while the control group had a larger likelihood for deterioration (see Table 10). As adrenal energy is closely linked to the levels of stress experienced, it is interesting to note that there seemed to be a lowering of stress levels in both the experimental and the control groups. As discussed in more detail in the summary, the improvement in the control group might

have been due to the fact that many of the participants in the control group assumed they were experiencing lower stress levels than the participants of the experimental group.

In the case of VB2 (F#), which is a measurement of mental energy, 63.3% of the participants in the experimental group improved, in contrast to 53.3% of the participants in the control group. These changes indicated lowered activity in the sympathetic nervous system and increased parasympathetic activity in the autonomic nervous system. Although not statistically significant (p=0.723), the findings in VB2 leaned towards the tendency of improved psychophysiological balance in both groups. This measurement proved to be more sensitive than the results obtained from the Freeze Framer 2.0®.

The changes in overall energetic balance (VBPost) as measured during the post-tests demonstrated more energetic balance in the participants of the experimental group, namely 53.3%, in comparison to the 30.0% in the control group. According to the Voicebio Analysis™ results, it would seem the scientifically designed music enhanced energetic balance in the experimental group.

These findings were not supported by the Freeze Framer 2.0® results. The results of the Coherence Ratio demonstrated that 50% of participants in the experimental group improved, compared to 46.7% of the participants in the control group. The Power Spectrum Density (PSD) results were also inconclusive. In both the control and experimental groups there was a tendency of increased sympathetic activity according to the LF measurements; decreased parasympathetic activity according to the HF measurements and a decrease in the balance between the sympathetic and parasympathetic nervous systems according to the MF measurement (see Table 7).

The results of the Freeze Framer 2.0® therefore did not support the hypothesis that scientifically designed music increases psychophysiological balance, whereas the changes in the VIBEprint™ did demonstrate improved psychophysiological balance. This might be an indication that the Voicebio Analysis™ can be used to detect changes in psychophysiological balance on an energetic level at an earlier stage than the Freeze Framer 2.0®

Research Hypothesis #2

Positive emotional states can improve energetic and psychophysiological balance within individuals experiencing high stress levels.

As far as psychophysiological balance is concerned, the research in this study was based on previous research done by Rollin McCraty et al. of the Institute of HeartMath, which demonstrated the positive effects of music on mental and emotional balance, vitality, learning and autonomic nervous system balance. In testing the effects of scientifically designed music in combination with positive emotional states, their findings demonstrated that the combination of the two methods increased autonomic nervous system balance to a higher degree than music on its own, while there was a marked increase in salivary IgA, which is a marker for immune system function.[121] The type of music selected was also important. In a follow-up research study, McCraty et al. examined the effects of different types of music on mental and emotional balance. Grunge rock music increased hostility, fatigue, sadness and tension and led to a reduction in caring, relaxation, mental clarity and vigor. New Age and classical music provided mixed results, while *Speed of Balance*, created by Doc Childre to facilitate mental and emotional balance, produced significant increases in all positive scales of vigor, caring,

relaxation and mental clarity. Significant decreases were also demonstrated in the negative scales of hostility, fatigue, sadness and tension.[122]

For purposes of this research study the Profile of Mood States (POMS) was chosen to measure the changes in emotion or affect during the fourteen day period of the intervention, to examine the role of positive emotional states on energetic and psychophysiological balance. The results of the Profile of Mood States (POMS) supported the Voicebio Analysis™ results, in that there seemed to be a decrease in over-all emotional stress as determined by the Total Mood Disturbance scores in both the control and experimental groups. Especially, the Tension-Anxiety and Fatigue-Inertia scores were statistically significant for both groups.

Based on the results from the current research study, both groups experienced positive changes in emotional states, although the results were statistically more significant in the control group for Depression-Dejection, Anger-Hostility and Confusion-Bewilderment.

Again, the results of the Freeze Framer 2.0®, which refers to the changes in Heart Rate, Coherence Ratio and the Power Spectrum Density (PSD) results, were inconclusive and could not support the hypothesis that positive emotional states could influence psychophysiological balance.

Research Hypothesis #3

Positive changes on an energetic level can influence the over-all climate or culture within an organization.

The research done in this study has reference to work done earlier by *Learning to Lead*, a company that focuses on the importance of energy to change the over-all climate

within organizations. Their findings from energy surveys done among more than 17,000 people in corporate, government and educational structures indicated that the lack of personal energy had a direct effect on leadership energy, team energy, organizational energy and, ultimately, customer energy. *Learning to Lead* defined certain factors as crucial to the sustaining of personal energy, namely personal balance, authentic relationships, trust, a constant exchange of high quality information and a sense of belonging, all of which would fulfill the social need to be part of a family, team or organization.[123]

The findings from this study might suggest that changes in one part of a team or a cell, as in this case, can have an uplifting or positive effect on the rest of the employees. The seemingly positive changes in energetic and emotional balance in the experimental group, according to the Voicebio Analysis™ and Profile of Mood States (POMS) results, were reflected in positive changes in the control group. There is, of course, a need for this hypothesis to be researched in more detail; however, a surprising result of this study was to notice the positive change in the control group, who did not receive any intervention.

In considering the result revealed by the control group, the research tools applied did not have a direct effect on that and it can be postulated that the positive changes discovered there was due to the Hawthorne effect. The Hawthorne effect describes a temporary change to behavior or performance in response to a change in the environmental conditions, with the response being, typically, an improvement.[124] This effect is observed when employees see themselves as part of a study group or team that is receiving greater attention than normal, which was true in the case of this research study due to the pseudo-experimental design thereof. Another reason for the changes observed

in the control group might also be due to the perception of the participants of the control group that they were initially chosen to be part of the control group because they were experiencing lower stress levels than the participants of the experimental group. This would be despite the fact that they were given clear guidelines during the information session about the process that would be used to create the control and experimental groups. During the information session all the participants were told that there would be an equal number of people with high and low stress levels in both the control and experimental groups.

What was notable, in terms of the experience of positive energy, was the comment from the manager of Cell B, who noticed a change in the atmosphere at the office, describing it as "more positive, playful and relaxed." It would seem that this research intervention stimulated quite some interest in the daily work environment of both Cell A and Cell B, with a general tendency toward a more positive emotional state in the atmosphere of both those groups.

These qualitative findings might support the hypothesis that positive changes on an energetic level can influence the over-all climate or culture within an organization

Research Hypothesis # 4

It is possible to measure energetic changes within a "real-life" working environment.

This question was posed by the researcher, who wished to discover the existence of reliable practical measurement tools and methods that address energy directly within a working environment.

In the experience of this research study, the tools chosen did fulfill their purpose in different ways. In the first place the Freeze Framer 2.0® is a customer friendly device that is non-intrusive and easy to use. The IHM has made use of this software program for many years, and it has also been tested within organizations as an effective self-management tool. The information provided by the Freeze Framer 2.0® is a quick and non-invasive measurement that can give an indication of the level of stress an individual is experiencing, as well as the level of coherence in the autonomic nervous system. The Freeze Framer 2.0® fulfills a dual function in that it can provide baseline readings before and after an intervention that specifically addresses psychophysiological coherence. Specifically used in the training of heart-focused techniques, that software program can be utilized to support individuals to reach a state of coherence within a rather short length of time, while helping them to sustain it over longer periods of time. The Freeze Framer 2.0® has recently been updated in an improved portable and handheld version called the emWave Personal Stress Reliever, to provide a convenient way to reduce stress, balance emotions and increase performance.[125]

Another factor that is important to take into account is that the participants received no formal training in using the research tools, especially with the induction of a positive emotional state. In this case the Freeze Framer 2.0® software program itself is an excellent training device in supporting users to reach higher levels of coherence and to experience the effects of positive emotional states. Although the experimental group had received instruction to use the scientifically designed music and induce a positive emotional state during the fourteen day period, they were not asked to listen to the music or induce a positive emotional state during the post-test sessions. They were only

requested to sit back and relax while the recording was taken. In this case, the Freeze Framer 2.0® was solely used as a measurement instrument and not as a training device, although, it can be noted, greater value would be derived from it by using it in both ways. In a different research design it might also prove valuable to use the Freeze Framer 2.0™ to measure the immediate short-term effects of music and positive emotional states within employees.

With regard to future research, when a requirement is for accurate readings on dependent variables, it might be preferable to obtain the measurements in a more controlled laboratory setting; similar to that of the IHM in their research study to determine the effects of emotions on short-term Power Spectrum Analysis and Heart Rate Variability.[126] In that way, the small shifts that occur in the autonomic nervous system might be more accurately assessed and documented. A more controlled environment might also provide the opportunity for more effective coordination of the implementation of the research tools. In the business bank environment there are daily challenges of changes in the financial industry as a whole, work schedules that are not predictable, demanding clients and deadlines and targets that need to be reached. This makes this particular environment difficult to control for research purposes, although it was the aim of this study to measure energetic and psychophysiological balance within the working environment.

The qualitative feedback from the participants of the experimental group proved valuable. Their personal experiences, whether positive or negative, provided another means to assess the possible effect of the research tools. For certain participants it was a challenge to incorporate the tools in their working schedule, while for others it seemed

easier. It was the impression of the researcher that the personality and the degree of personal drive and motivation of the individual participant influenced the level of ease with which each individual worked with the research tools. It also seemed that any difficulties experienced with the application of the research tools eased once participants experienced the positive effects of the research tools. Two or three of the participants, however, had negative experiences with the music, commenting that they felt scared while listening to it. This finding emphasizes the importance to take personal preferences into account when making a choice of music that is meant to enhance relaxation. This can also be explained by the understanding that each person has a unique vibrational make-up and that one sound formula cannot be the answer for everyone.

This is where the value of an instrument like Voicebio Analysis™ can be perceived, as it provides opportunity to identify specific frequencies in a person that are lacking or low. The results in this research study indicated meaningful changes in energetic balance, according to the VIBEprint™ measurements that were recorded. In future, when applying that instrument in similar research, it might prove advantageous to first determine the specific sound formulae that will be ideal for each participant. This possibility should also limit negative experiences reported with the sound formulae.

For the future, according to the findings in this study, there is enough reason reported to use both the Freeze Framer 2.0® and Voicebio Analysis™ as valuable assessment tools of personal energetic and psychophysiological balance within employees of companies.

Summary

The research setting was chosen as the day-to-day working environment of employees in a business bank. According to the results received of the Profile of Mood States (POMS) there was an over-all increase in positive emotional states in both the control and experimental groups. These findings were supported by changes on an energetic level, as demonstrated by the Voicebio Analysis results. The measurements done with the Freeze Framer 2.0® recorded the least change between pre-test and post-test results. This might suggest necessary adjustment to the design for future research. For instance, to get a clearer indication of the changes in Heart Rate it is suggested to monitor Heart Rate over a longer time domain, as demonstrated by Ken Umetani et al. who monitored Heart Rate Variability (HRV) over a period of 24 hours to determine relations between heart rate, age and gender.[127]

Another factor that might have influenced the result is that the design of this research study was pseudo-experimental in nature, as the control and experimental groups both shared the same working space while the research intervention was taking place. Yet, apart from the research results, this fact seemed to work well in influencing the over-all energy in both cells in a positive way. In this regard, the positive changes in the control group can be interpreted as a positive outcome of the research design and supports the understanding that an integrative approach can benefit the whole system.

The experimental part of the research study was implemented for only fourteen days – a relatively short period of time for measuring changes in behavior and psychophysiological balance. In other clinical settings the VIBEprints™ obtained from the Voicebio Analysis™ to measure energetic balance have proven to be most valuable

after a four week period, to measure changes in energetic balance after an intervention has taken place.

Suggestions for Future Research

It is important to take into consideration that emotions and subtle energies in the body change from moment to moment, and from day to day. This, therefore, calls for continuous monitoring over a longer period of time, and this might be a suggestion for research in the future. In this regard, a time-frame of 3-6 weeks may be a good suggestion.

For these purposes, it might also prove valuable to have formal training sessions with employees for introducing them to the self-management tools. The ideal would be to introduce these tools as techniques that employees can later incorporate in their lives to change behavior and lower stress levels. In this way, the research tools gain a wider application that might not only benefit individual employees, but also enhance the over-all energy within an organization.

In a different research design it might also prove valuable to use the Freeze Framer 2.0™ to measure the immediate short-term effect of music and positive emotional states within employees. This might be done as part of the implementation of a self-management program that addresses personal energy.

As no formal research had been done on the Voicebio Analysis™ instrument, except for the self reported research of the founder of the Voiceprints Corporation, it heightened the interest of the researcher in the testing process as it was applied in this study. The findings as reported in this research study lay a foundation for future research, that might be used to measure changes over a longer period of time, to measure

frequencies that are specific for each participant, and, to introduce specific sound formulae that are specifically focused on the energetic make-up of the individual participant. This should also limit negative experiences with sound formulae, while making it more effective. In previous work done by the researcher in working with individual clients, it was demonstrated that individualized sound formulae had a more notable affect on energetic balance within an individual. The development and implementation of individualized sound formulae to improve energetic balance will be worthwhile to explore in future research designs.

The analyses presented here should be interpreted with the following caveat: given the use of multiple t-tests as the central data analytic strategy, the problem of adequate control of the familywise error rate is raised. Further analyses and similar future studies should employ an omnibus, multivariate data analysis strategy such as the two-way mixed analysis of variance, which would eliminate the need for a great number of individual pairwise comparisons. Another alternative would be the use of a priori planned comparisons, which have built-in control of familywise error rates.

Researcher's insights

The researcher was surprised by the willingness and commitment of the participants in this research process. Overall, there was great interest in being exposed to the effects of the relaxing music, while certain participants in the control group expressed their disappointment when they ended up not being part of the experimental group.

As the pre- and post-testing was done in the real life working environment, it was a challenge to have the 15 minute session with each participant on the scheduled days.

Six participants were dropped from this study due to them taking leave or not being available for the post-test sessions.

During the post-test sessions it was notable that the participants in the experimental group, especially those who demonstrated high compliance to the instructions given, displayed changes in their composure that was reflected in their faces and body posture. Their faces looked more relaxed, almost with a “lighter” quality about them. Apart from the statistical results derived through this study that demonstrated the positive change in the experimental group, for the principal investigator- as the researcher - to have witnessed the positive effect the mere participation in this study had on the lives of certain individual participators made the effort put into this study all the more worthwhile.

Taking the thought a step further, it might be worthwhile to realize that in managing our personal focus and intention – with regard to our emotional and energetic well-being – we can contribute positively to wider society. Furthermore, by combining our personal efforts with supportive tools, such as sounds and music that are intentionally composed to support levels of coherence, we can change the vibrational make-up of the world at large, as we magnify our effect on the electromagnetic field of the world around us. The findings in this study can, therefore, be expanded to embrace a global perspective; which suggests that, as human beings, we each emit an electromagnetic field into our environment irrespective of where we are at any one moment in time, and that also has a direct influence on our planetary environment. This redefines the nature of our influence in the world we live in.

Howard Martin discusses this possibility by referring to NASA monitors which detected negative changes in the electromagnetic field of the earth after the occurrence of 9/11 and the days immediately following that event. In line with that statement, it would seem the converse should also be true, that we can exert a positive influence on the vibration of our planet by focusing our collective intent to create harmony, peace and other positive vibrations.[128] The Institute of HeartMath has recently launched their Global Coherence Project, with the aim of nurturing and sustaining the planet through global coherence, by enabling millions of people to connect with the power, wisdom and guidance of their own hearts. A key component of the Global Coherence Project is the Global Coherence Monitoring System (GCMS), an undertaking that is unique in human history; it will monitor fluctuations and resonances in the earth and ionosphere's magnetic field, a field that is influenced by human heart-rhythm patterns, brain activity, stress and emotions. Jointly HeartMath and astrophysicist/nuclear scientist Elizabeth Rauscher have devised a plan to build an elaborate system of tracking stations around the world to gather the data.[129] Researchers will then examine this data to determine whether the earth's magnetic field can be influenced by collective human emotional resonance following major events and whether the emotional energy generated by collective intuition about major future events is measurable in those fields.

This is an exciting possibility that is most certainly a gift we can give to ourselves and our world. In the discussion between Howard Martin and Deborah Rozman a shift in consciousness is addressed, which underlies "heart values" as a possibility to contribute to a world that is in need of compassion, care, love, non-judgment and appreciation.[130] As they emphasize, a critical mass of people who are able to do this might amplify these

heart-based values, to reveal a new way for people to relate to one another, as well as to the earth we inhabit.

The research study has presented a practical and meaningful means for the pursuit and implementation of strategies that can allow us to “be the change in the world we want to see,” as we are reminded by the wise words of Mahatma Gandhi.

Endnotes:

Chapter 1 Endnotes:

[1] Michael Toms, *The Soul of Business* (Carlsbad, CA: Hay House, Inc., 1997), 5-6.
[2] Fritjof Capra, *The Web of Life* (New York: Anchor Books, 1996), 29.
[3] The National Institute for Occupational Safety and Health, http://www.cdc.gov/niosh/stresswk.htlm (accessed June 14, 2008).
[4] Department of Health and Human Services, "National Institute for Occupational Safety and Health," publ .99-101 (January 7, 1999), http://www.cdc.gov/niosh/jobstres.htlm, (accessed June 14, 2008).
[5] Paul Rosch, "Stress – A New Perspective," *The Institute of HeartMath* (Boulder Creek, California, 2004): 2.
[6] Gregg Braden, *The Divine Matrix* (USA: Hay House, Inc., 2007), 10-14.
[7] Learning to Lead, http://www.ltl.co.za/public-library (accessed June 6, 2008).
[8] Doc Childre and B.Cryer, *From Chaos to Coherence*, Boston-Butterworth-Heineman, 1999.
[9] Rollin McCraty, "*Music and the Immune System*," Tenth International Montreux Congress on Stress, Montreux, Switzerland, 1999.
[10] Richard Gerber, *Vibrational Medicine Third Edition* (Rochester, Vermont: Bear & Company, 2001), 519-525.

Chapter 2 Endnotes:

[11] Paul Rosch, *Stress – A New Perspective*, The Institute of HeartMath (Boulder Creek, California, 2004), 1-6.
[12] P.M.Conway, P.Campanini, S. Sartori, R.Dotti and G.Costa, "Main and Interactive Effects of Shiftwork, Age and Work Stress on Health in an Italian Sample of Healthcare Workers," *Applied Ergonomics* 39, no. 5 (September 2008): 630-639.
[13] Herdís Sveinsdóthirand and Hólmfrióur K. Gunnarsdóttir, "Predictors of Self-Assessed Physical and Mental Health of Icelandic Nurses: Results from a National Survey," *International Journal of Nursing Studies*, doi:10.1016/j.ijn.urstu.2008.01.007 (March 2008), http://www.sciencedirect.com (accessed March 20, 2008).
[14] Katherine Pollak Eisen, George J. Allen, Mary Bollash and Linda S. Pescatello, "Stress Management in the Work-place: A Comparison of a Computer-Based and an In-Person Stress Management Intervention," *Computers in Human Behavior* 24, no. 2 (March 2008): 486-496.
[15] Kizzy M.Parks and Lisa A. Steelman, "Organizational Wellness Programs: A Meta-Analysis," *Journal of Occupational Health Psychology* 13, no. 1 (January 2008): 58-68.
[16] Maria Carla Barnes, Rhiannon Buck, Gareth Williams, Katie Webb and Mansel Aylward, "Beliefs about Common Health Problems and Work: A Qualitative Study," *Social Sciences & Medicine*, doi: 10.1016/j.socsimed.2008.05.008 (June 2008), http://www.sciencedirect.com (accessed June 2, 2008).
[17] Institute of HeartMath Research Staff, "*Science of the Heart: Exploring the Role of the Heart in Human Performance,*" http://store.heartmath.org/store/scientific-monographs/science-of-heart, downloadable e-book.
[18] Pamela A. Jacobs, Michelle Y. Tytherleigh, Christine Webb and Cary L. Cooper, "Predictors of Work Performance Among Higher Education Employees: An Example Using the ASSET Model of Stress," *International Journal of Stress Management* 14, no. 2 (May 2007): 199-210.
[19] Robert Ader, David L. Felten and N. Cohen, *Psychoneuroimmunology* 3rd *Edition Vol. 1&2*, San Diego, CA: Academic Press, 2001.
[20] Candice B. Pert, "The Psychosomatic Network: Foundations of Mind-Body Medicine," *Alternative Therapies in Health and Medicine* 4 (1998): 30-41.
[21] Michael R. Irwin, "Human Psychoneuroimmunology: 20 Years of Discovery," *Brain, Behavior and Immunity* 22, no. 2 (February 2008): 129-139.
[22] Linda Witek-Janusek, Kevin Albuquerque, Karen Rambo-Chroniak. Christopher Chroniak, Ramon Durazo-Arvizu and Herbert L. Mathews, " Mindfulness Based Stress Reduction on Immune Function, Quality of Life and Coping in Women Newly Diagnosed with Early Stage Breast Cancer," *Brain, Behavior*

and Immunity, doi:10.1016/j.bbi.2008.01.012 (March 2008): http://www.sciencedirect.com (accessed June 12, 2008).

[23] Masahivo Matsunago et al., "Associations among Central Nervous, Endocrine and Immune Activities when Positive Emotions are Elicited by Looking at a Favorite Person," *Brain, Behavior and Immunity* 22, no. 3 (March 2008): 408-417.

[24] Candace B. Pert, *Everything You Need to Know and Feel Good* (USA: Hay House Inc., 2006), 29-32.

[25] Ibid., 31.

[26] Richard Gerber, *Vibrational Medicine Third Edition* (Rochester, Vermont: Bear & Co, 2001), 464.

[27] Candace B. Pert, *Everything You Need to Know and Feel Good* (USA: Hay House Inc., 2006), 31.

[28] Doc Childre and B.Cryer, *From Chaos to Coherence.* Boston: Butterworth-Heineman, 1999.

[29] Rollin McCraty, Mike Atkinson and Raymond Trevor Bradley, "Electrophysiological Evidence of Intuition: Part 1. The Surprising Role of the Heart," *The Journal of Alternative and Complementary Medicine* 10, no 1 (2004): 33-143.

[30] Ervin Laszlo, *Science and the Akashic Field* (Rochester, Vermont: Inner Traditions, 2004), 12.

[31] Will Parfitt, *The Elements of Psychosynthesis* (UK: Element Books Ltd, 1990), 3.

[32] Rudolph Ballantine, *Radical Healing* (New York: Three Rivers Press, 1999), 5.

[33] Richard Gerber, *Vibrational Medicine Third Edition* (Rochester, Vermont: Bear & Company, 2001), 91.

[34] Donella Meadows, "Whole Earth Models and Systems," *Co-Evolution Quarterly (*1982): 98-108.

[35] The International Society for the Study of Subtle Energies & Energy Medicine (ISSSEEM), http://www.issseem.org/about.cfm (accessed June 2007).

[36] James L. Oschman, *Energy Medicine, The Scientific Basis* (London: Churchill- Livingstone, 2000), 217.

[37] Fritjof Capra, *The Web of Life* (New York: Anchor Books, 1996), 41.

[38] Margaret J.Wheatley, *Leadership and the New Science* (San Francisco: Berrett-Koehler Publishers, 1999), 125.

[39] Ibid.

[40] Ibid., 6.

[41] Ken Wilber, *A Theory of Everything* (Boston, Massachusetts: Shambala, 2000), 2.

[42] Richard Gerber, *A Practical Guide to Vibrational Medicine* (USA: HarperCollins Publishers, 2000), 10.

[43] Ken Wilber, *A Theory of Everything* (Boston, Massachusetts: Shambala, 2000), 147.

[44] Rosalyn L. Bruyere, *Wheels of Light* (New York: Fireside, 1994), 219.

[45] W. Weidenhammer, A. Strong, K. Linde, A. Hoppe and D. Melchart, "Acupuncture for Chronic Pain within the Research Program of 10 German Health Insurance Funds – Basic Results from an Observational Study," *Complementary Therapies in Medicine* 15, no. 4 (December 2007): 238-246.

[46] Charles Breaux, *Journey into Consciousness* (York Beach: Nicolas-Hays, Inc., 1989), 1.

[47] Caroline Smith, Heather Hancock, Jane Blake-Mortimer and Kerena Eckert, "A Randomized Comparative Trial of Yoga and Relaxation to Reduce Stress and Anxiety," *Complementary Therapies in Medicine* 15, no. 2 (June 2007): 77-83.

[48] Judith Anodea. *Eastern Body Western Mind*, Berkeley, CA: Celestial Arts Publishing, 1996.

[49] Caroline Myss, *Anatomy of the Spirit*, Great Britian: Bantam Books, 1996.

[50] Caroline Myss and Norman Shealy, *The Science of Medical Intuition*, Boulder Colorado: Sounds True, 2002.

[51] Richard Gerber, *Vibrational Medicine Third Edition* (Rochester, Vermont: Bear & Co, 2001), 136.

[52] Ibid., 203-239.

[53] Rollin McCraty, *The Energetic Heart ,Bioelectromagnetic Interactions Within and Between People* (USA: Institute of HeartMath, 2003), 6, e-book, http://store.heartmath.org/store/scientific-monographs/energetic-heart

[54] Rollin McCraty, *Science of the Heart* (Boulder Creek, CA: Institute of HeartMath, 2001), 4, e-book, http://store.heartmath.org/store/scientific-monographs/science-of-heart

[55] Ibid., 3.

[56] Ibid., 13.

[57] Ibid., 18.

[58] Rollin McCraty and Doc Childre, *The Appreciative Heart* (Boulder Creek, CA: Institute of HeartMath, 2003),6, e-book, http://store.heartmath.org/store/scientific-monographs/appreciative-heart

[59] Rollin McCraty and Mike Atkinson, "*Cardiac Coherence Improves Cognitive Function*," (Tarrytown, NY: Proceedings of the Annual Meeting of the Pavlovian Society, 1999).

[60] Ibid., 16.

[61] William A.Tiller, Rollin McCraty and Mike Atkinson, Institute of HeartMath, "*Alternative Therapies in Health and Medicine*," 2 no.1 (1996): 52-65.

[62] Ibid., 17.

[63] Rollin McCraty, Mike Atkinson, William A.Tiller, Glen Rein and Alan D. Watkins, "The Effects of Emotions on Short-term Power Spectral Analysis of Heart Rate Variability," *American Journal of Cardiology* 76, no.14 (1995):1089-1093.

[64] Elizabeth W. McCormick and Leisa Freeman, *Your Heart and You* (London: Judy Piatkus Publishers Ltd., 2002), 14.

[65] Peter F. Drucker, "Managing Knowledge Means Managing Oneself," *Leader to Leader* 16, (2000): 8-10.

[66] Don Miguel Ruiz, *The Four Agreements* (San Rafael, CA: Amber-Allen Publishing, 1997), 100.

[67] Christine Page, *Spiritual Alchemy*, (UK: C.W.Daniel Company Ltd., 2003), 4-8.

[68] Sandra King and Dave M.Nicol, "Organizational Enhancement through Recognition of Individual Spirituality," *Journal of Organizational Change Management* 12, no.3 (1999): 234.

[69] Jean-Philippe Gouin, Janice K.Kiecolt-Glaser, William B. Malarkey and Ronald Glaser, " The Influence of Anger Expression on Wound healing," *Brain, Behavior, and Immunity* 22, issue 5 (July 2008): 669-708.

[70] Candace Pert, *Molecules of Emotion*, New York: Simon & Schuster, 1997.

[71] Marcia M. Hughes, L. Bonita Petterson and James Bradford Terrell, *Emotional Intelligence in Action* (San Francisco: Pfeiffer, 2005), 45.

[72] Robert Cooper and Ayman Sawaf, *Executive EQ* (London: Texere, 1997), 22-24.

[73] Marcia M. Hughes, L. Bonita Petterson and James Bradford Terrell, *Emotional Intelligence in Action* (San Francisco: Pfeiffer, 2005), 16.

[74] Rollin McCraty and Doc Childre, *The Appreciative Heart: The Psychophysiology of Positive Emotions and Optimal Functioning* (Boulder Creek, CA:HeartMath Research Center, Institute of HeartMath, 2002), 2, e-book, http://store.heartmath.org/store/scientific-monographs/appreciative-heart

[75] Ibid., 4.

[76] Ibid., 15.

[77] Rollin McCraty, Bob Barrios-Choplin, Deborah Rozman, Mike Atkinson and Alan D. Watkins, "The Impact of a New Emotional Self-Management Program on Stress, Emotions, Heart Rate Variability, DHEA and Cortisol," *Integrative Physiological and Behavioral Science* 33, no.2 (April-June 1998): 151-170.

[78] Ibid.

[79] Rollin McCraty, "Music and the Immune System," *Proceedings of the Tenth International Montreux Congress on Stress* (Montreux, Switzerland) 1999.

[80] Andrew Weil, "Self Healing: Creating Natural Health for Your Body and Mind," *Sound Healing and Sound Body* 1 (February, 1998): 6-7.

[81] Laura Cooper and Irene Foster, "The Use of Music to Aid Patients' Relaxation in a Radiotherapy Waiting Room," *Radiography* 14, no. 13 (August 2008): 184-188.

[82] Patrick Gomezand and Brigitta Danuser, "Relationships between Musical Structure and Psychophysiological Measures of Emotion," *Emotion* 7, no. 2 (May 2007): 377-387.

[83] Jonathan Goldman, *The 7 Secrets of Sound Healing* (USA, Hay House, Inc., 2008), 4.

[84] Ibid., 55-56.

[85] http://www.monroeinstitute.com

[86] Jonathan Goldman, *The 7 Secrets of Sound Healing* (USA, Hay House, Inc., 2008), 32.

[87] Don Campbell, *The Mozart Effect* (New York: Avon Books, Inc., 1997), 18.

[88] Ibid., 32.

[89] Wayne Perry, *Sound Medicine – The Complete Guide to Healing with the Human Voice* (Franklin Lakes, NJ, The Career Press, Inc., 2007), 135.

[90] Ibid., 136.

[91] Richard Gerber, *Vibrational Medicine Third Edition* (Rochester, Vermont: Bear & Co, 2001), 519.

[92] Sharry Edwards, "Definite Theory of Human BioAcoustic Vocal Profiling and Sound Presentation," *Journal of BioAcoustic Biology* 5, no.11 (Oct 2005): 3-23.

[93] Wayne Perry, *Sound Medicine – The Complete Guide to Healing with the Human Voice* (Franklin Lakes, NJ, The Career Press, Inc., 2007), 140.

[94] http:// www.VoiceBio.com

[95] Jonathan Goldman, *The 7 Secrets of Sound Healing* (USA: Hay House, Inc., 2008), 119.

[96] Ibid., 92.

[97] Wayne Perry, *Sound Medicine – The Complete Guide to Healing with the Human Voice* (Franklin Lakes, NJ, The Career Press, Inc., 2007), 114.

[98] Jeffrey D. Thompson, "*The Scientific Research Behind Acoustic Brainwave Entrainment*," 1988. http://www.neuroacoustic.com/acoustic.html

[99] Rollin McCraty and Mike Atkinson, "Cardiac Coherence Increases Heart-Brain Synchronization," Annual Meeting of the Pavlovian Society, Tarrytown, New York, 1999.

[100] Jeffrey D. Thompson, "*Epsilon, Gamma, HyperGamma, Lambda Brainwave Activity and Ecstatic States of Consciousness*," 1999, http://www.neuroacoustic.com/acoustic.html

[101] Frances H. le Roux, Patrick J.D Bouic and Maria M. Bester, "The Effect of Bach's Magnificat on Emotions, Immune and Endocrine Parameters during Physiotherapy Treatment of Patients with Infectious Lung Conditions," *Journal of Music Therapy* 44, no.2 (July 2007): 156-168.

[102] Eugenia Hernandez-Ruiz, "Effect of Music Therapy on the Anxiety Levels and Sleep Patterns of Abused Women in Shelters," *Journal of Music Therapy* 42, no.2 (July 2005): 140-158.

[103] Cori L. Pelletier, "The Effect of Music on Decreasing Arousal due to Stress: A Meta-Analysis,"*Journal of Music Therapy* 41, no.3 (November 2004): 192-214.

[104] Jason L. Burns, Elise Labbé, Brooke Arke, Kirsten Capeless, Bret Cooksey, Angel Steadman, and Chris Gonzales, "The Effects of Different Types of Music on Perceived and Physiological Measures of Stress," *Journal of Music Therapy* 39, no.2 (May 2002): 101-116.

[105] Dawn Kuhn, "The Effects of Active and Passive Participation in Musical Activity on the Immune System as Measured by Salivary Immunoglobulin A," *Journal of Music Therapy* 39, no.1 (February 2002): 30-39.

[106] Wendy E.J.Knight and Nikki S. Rickard, "Relaxing Music Prevents Stress-Induced Increases in Subjective Anxiety, Systolic Blood Pressure and Heart Rate in Healthy Males and Females," *Journal of Music Therapy* 38, no.4 (December 2001): 254-272.

[107] Carola Maack and Paul Nolan, "The Effects of Guided Imagery and Music Therapy on Reported Change in Normal Adults," *Journal of Music Therapy* 36, no.1 (February 1999): 39-55.

[108] Rollin McCraty, *Science of the Heart* (Boulder Creek, CA: Institute of HeartMath, 2001), 31.e-book, http://store.heartmath.org/store/scientific-monographs/science-of-heart

[109] Candace B. Pert, *Everything You Need to Know and Feel Good* (USA: Hay House Inc., 2006), 110.

[110] Ibid., 109.

[111] Robert E. Krout, "Music Listening to Facilitate Relaxation and Promote Wellness: Integrated Aspects of our Neurophysiological Responses to Music," *The Arts in Psychotherapy* 34, no. 2 (2007): 134-141.

Chapter 3 Endnotes:

[112] Thomas H. Holmes and Richard H. Rahe, "The Social Readjustment Rating Scale," *Journal of Psychosomatic Research* 11, no.2 (Oxford, UK: Elsevier Ltd, August 1967):213-218.

[113] Judith A. Scully, Henry Tosi and Kevin Banning, "Life Event Checklists: Revisiting the Social Readjustment Rating Scale after 30 Years," *Educational and Psychological Measurement* 60, no. 6 (2000) 864-876.

[114] DM McNair, M Lorr and LF Droppleman, *The Profile of Mood States* (San Diego, CA: Educational and Industrial Testing Service, 1971).

[115] Rollin McCraty et al., Heart Rate Variability: "*An Indicator of Autonomic Function and Physiological Coherence*," Science of the Heart (Boulder, California: Institute of HeartMath, 2001).

[116] Kae Thompson-Liu, Voicebio©™, (Hardy, VA: VIBEprints Corporation, 1997). http://www.voicebio.com

[117] SPSS 15, SPSS Inc. (Chicago Illinois)

Chapter 5 Endnotes:

[118] Colin Hall, Learning to Lead, http://www.ltl.co.za/public-library/personal-energy/ (accessed June 2008).

[119] Rollin McCraty, "*Music and the Immune System*," Tenth International Montreux Congress on Stress, Montreux, Switzerland, 1999.

[120] Jeffrey D. Thompson, The Clinical Use of Sound, http://www.neuroacoustic.com/clinical_services.html (accessed 8 October 2007).

[121] Rollin McCraty, Mike Atkinson, Glen Rein and Alan D. Watkins, "Music Enhances the Effect of Positive Emotional States on Salivary IgA," *Science of the Heart* (Boulder Creek, CA: Institute of HeartMath, 2001), 31, e-book, http://store.heartmath.org/store/scientific-monographs/science-of-heart

[122] Rollin McCraty, Bob-Barrios-Choplin, Mike Atkinson and Dana Tomasino, "The Effects of Different Music on Mood, Tension and Mental Clarity," *Science of the Heart* (Boulder Creek, CA: Institute of HeartMath, 2001), 31, e-book, http://store.heartmath.org/store/scientific-monographs/science-of-heart

[123] Colin Hall, Learning to Lead, http://www.ltl.co.za/public-library (accessed June 2008).

[124] Henry A. Landsberger, The Hawthorne Effect, http://en.wikipedia.org/wiki/Hawthorne_effect (accessed June 2008).

[125] emWave Personal Stress Reliever, Institute of HeartMath, http://www.heartmath.com/index.php?option=com_content&task=view&id=18&Itemid=44 (accessed June 2008).

[126] Rollin McCraty, Mike Atkinson, William Tiller. Glen Rein and Alan D. Watkins, "The Effects of Emotions on Short-Term Power Spectral Analysis and Heart Rate Variability," *The American Journal of Cardiology* 76, no.14 (November 15, 1995): 1089-1093.

[127] Ken Umetani, Donal H. Singer, Rollin McCraty and Mike Atkinson, "Twenty-Four Hour Domain Heart Rate Variability and Heart Rate: Relations to Age and Gender over Nine Decades," *Science of the Heart* (Boulder Creek, CA: Institute of HeartMath, 2001), 62, e-book, http://store.heartmath.org/store/scientific-monographs/science-of-heart (accessed November 2007).

[128] Howard Martin, HeartMath *Research*, (Institute of Noetic Sciences) 5 min., 57 sec., Shift in Action Video Presentations, http://www.shiftinaction.com/discover/videos/howard_martin/one (accessed May 6, 2008).

[129] The Global Coherence Project, Institute of HeartMath, http://www.heartmath.org/index.php?option=com_content&task=view&id=150&Itemid (accessed June 6, 2008).

[130] Howard Martin and Deborah Rozman, *Great Shift Dialogues*, (Institute of Noetic Sciences), 30 min., 44 sec., Shift in Action Audio Presentations, http://www.shiftinaction.com/discover/audios/howard_martin_deborah_rozman/great_shift_dialogues (accessed May 6, 2008).

REFERENCES AND BIBLIOGRAPHY

Ader, Robert, David L. Felten and N. Cohen. *Psychoneuroimmunology* 3rd *Edition Vol. 1&2.* San Diego, CA: Academic Press, 2001.

Anodea, Judith. *Eastern Body Western Mind.* Berkeley, CA: Celestial Arts Publishing, 1996.

Ballantine, Rudolph. *Radical Healing.* New York: Three Rivers Press, 1999.

Barnes, Maria Carla, Rhiannon Buck, Gareth Williams, Katie Webb and Mansel Aylward. "Beliefs about Common Health Problems and Work: A Qualitative Study." *Social Sciences & Medicine*, doi: 10.1016/j.socsimed.2008.05.008 (June 2008): http://www.sciencedirect.com (accessed June 2008).

Braden, Gregg. *The Divine Matrix.* USA: Hay House, Inc., 2007.

Breaux, Charles. *Journey into Consciousness.* York Beach: Nicolas-Hays, Inc., 1989.

Bruyere, Rosalyn L. *Wheels of Light.* New York: Fireside, 1994.

Burns, Jason L., Elise Labbé, Brooke Arke, Kirsten Capeless, Bret Cooksey, Angel Steadman and Chris Gonzales. "The Effects of Different Types of Music on Perceived and Physiological Measures of Stress." *Journal of Music Therapy* 39, no.2 (May 2002): 101-116.

Campbell, Don. *The Mozart Effect*. New York: Avon Books, Inc., 1997.

Capra, Fritjof. *The Web of Life.* New York: Anchor Books, 1996.

Childre, Doc and B.Cryer. *From Chaos to Coherence*, Boston-Butterworth-Heineman, 1999.

Conway, P.M., P.Campanini, S. Sartori, R.Dotti and G.Costa. "Main and Interactive Effects of Shiftwork, Age and Work Stress on Health in an Italian Sample of Healthcare Workers." *Applied Ergonomics* 39, no. 5 (September 2008): 630-639.

Cooper, Laura and Irene Foster. "The Use of Music to Aid Patients' Relaxation in a Radiotherapy Waiting Room." *Radiography* 14, no. 13 (August 2008): 184-188.

Cooper, Robert and Ayman Sawaf. *Executive EQ.* London: Texere, 1997.

Department of Health and Human Services, "National Institute for Occupational Safety and Health," publication. 99-101 (January 7, 1999), http://www.cdc.gov/niosh/jobstres.htlm, (accessed June 14, 2008).

Drucker, Peter F. "Managing Knowledge Means Managing Oneself." *Leader to Leader* 16, (2000): 8-10.

Edwards, Sharry. "Definite Theory of Human BioAcoustic Vocal Profiling and Sound Presentation." *Journal of BioAcoustic Biology* 5, no.11 (Oct 2005): 3-23.

Eisen, Katherine Pollak, George J. Allen, Mary Bollash and Linda S. Pescatello. "Stress Management in the Work-place: A Comparison of a Computer-Based and an In-Person Stress Management Intervention." *Computers in Human Behavior* 24, no. 2 (March 2008): 486-496.

Gerber, Richard. *Vibrational Medicine Third Edition.* Rochester, Vermont: Bear & Company, 2001.

Gouin, Jean-Philippe, Janice K.Kiecolt-Glaser, William B. Malarkey and Ronald Glaser. "The Influence of Anger Expression on Wound Healing." *Brain, Behavior, and Immunity* 22, issue 5 (July 2008): 669-708.

Goldman, Jonathan. *The 7 Secrets of Sound Healing*. USA, Hay House, Inc., 2008.

Gomezand, Patrick and Brigitta Danuser. "Relationships between Musical Structure and Psychophysiological Measures of Emotion." *Emotion* 7, no. 2 (May 2007): 377-387.

Hall, Colin. *Energy and the Disengaged.* Learning to Lead, http://www.ltl.co.za/public-library (accessed June 6, 2008).

Hernandez-Ruiz, Eugenia. "Effect of Music Therapy on the Anxiety Levels and Sleep Patterns of Abused Women in Shelters." *Journal of Music Therapy* 42, no.2 (July 2005): 140-158.

Holmes Thomas H. and Rahe Richard H., "The Social Readjustment Rating Scale," *Journal of Psychosomatic Research* (Oxford, UK: Elsevier Ltd, August 1967):213-218.

Hughes, Marcia M., L. Bonita Petterson and James Bradford Terrell. *Emotional Intelligence in Action.* San Francisco: Pfeiffer, 2005.

Institute of HeartMath Research Staff. "*Science of the Heart: Exploring the Role of the Heart in Human Performance."* http://www.store.heartmath.org/store/scientificmonographs/science-of-heart, downloadable e-book.

Irwin, Michael R. "Human Psychoneuroimmunology: 20 Years of Discovery." *Brain, Behavior, and Immunity* 22, no. 2 (February 2008).

Jacobs, Pamela A., Michelle Y. Tytherleigh, Christine Webb and Cary L. Cooper. "Predictors of Work Performance among Higher Education Employees: An Example Using the ASSET Model of Stress." *International Journal of Stress Management* 14, no. 2 (May 2007): 199-210.

King, Sandra and Dave M. Nicol. "Organizational Enhancement through Recognition of Individual Spirituality." *Journal of Organizational Change Management* 12, no.3 (1999): 234.

Knight, Wendy E. J. and Nikki S. Rickard. "Relaxing Music Prevents Stress-Induced Increases in Subjective Anxiety, Systolic Blood Pressure and Heart Rate in Healthy Males and Females." *Journal of Music Therapy* 38, no.4 (December 2001): 254-272.

Krout, Robert E. "Music Listening to Facilitate Relaxation and Promote Wellness: Integrated Aspects of Our Neurophysiological Responses to Music." *The Arts in Psychotherapy* 34, no. 2 (2007): 134-141.

Kuhn, Dawn. "The Effects of Active and Passive Participation in Musical Activity on the Immune System as Measured by Salivary Immunoglobulin A." *Journal of Music Therapy* 39, no.1 (February 2002): 30-39.

Laszlo, Ervin. *Science and the Akashic Field.* Rochester, Vermont: Inner Traditions, 2004.

Le Roux, Frances H., Patrick J.D Bouic and Maria M. Bester. "The Effect of Bach's Magnificat on Emotions, Immune and Endocrine Parameters during Physiotherapy Treatment of Patients with Infectious Lung Conditions." *Journal of Music Therapy* 44, no.2 (July 2007): 156-168.

Maack, Carola and Paul Nolan. "The Effects of Guided Imagery and Music Therapy on Reported Change in Normal Adults." *Journal of Music Therapy* 36, no.1 (February, 1999): 39-55.

Matsunago Masahivo et al. "Associations among Central Nervous, Endocrine and

Immune Activities when Positive Emotions are Elicited by Looking at a Favorite Person." *Brain, Behavior and Immunity* 22, no. 3 (March 2008).

Meadows, Donella. "Whole Earth Models and Systems." *Co-Evolution Quarterly,* 1982.

McCormick, Elizabeth W. and Leisa Freeman. *Your Heart and You.* London: Judy Piatkus Publishers Ltd., 2001.

McCraty, Rollin. "*Music and the Immune System*" (lecture, Tenth International Montreux Congress on Stress, Montreux, Switzerland, 1999). http://www.heartmath.org/index.php?option=com_content&task=view&id=113&Itemid=

McCraty, Rollin. *The Energetic Heart, Bioelectromagnetic Interactions Within and Between People.* USA: Institute of HeartMath, e-book, 2003. http://store.heartmath.org/store/scientific-monographs/energetic-heart

McCraty, Rollin. *Science of the Heart.* Boulder Creek, CA: Institute of HeartMath, e-book, 2001. http://store.heartmath.org/store/scientific-monographs/science-of-heart

McCraty, Rollin, Bob Barrios-Choplin, Deborah Rozman, Mike Atkinson and Alan D. Watkins. "The Impact of a New Emotional Self-Management Program on Stress, Emotions, Heart Rate Variability, DHEA and Cortisol." *Integrative Physiological and Behavioral Science* 33, no.2 (April-June 1998): 151-170.

McCraty, Rollin and Doc Childre. *The Appreciative Heart.* Boulder Creek, CA: Institute of HeartMath, e-book, 2003. http://store.heartmath.org/store/scientific-monographs/appreciative-heart

McCraty, Rollin, Mike Atkinson, William A.Tiller, Glen Rein and Alan D. Watkins. "The Effects of Emotions on Short-term Power Spectral Analysis of Heart Rate Variability." *American Journal of Cardiology* 76, no.14 (1995):1089-1093.

McCraty, Rollin and Mike Atkinson. "*Cardiac Coherence Improves Cognitive Function.*" Tarrytown, NY: Proceedings of the Annual Meeting of the Pavlovian Society, 1999.

McCraty, Rollin and Mike Atkinson. *Cardiac Coherence Increases Heart-Brain Synchronization*. Annual Meeting of the Pavlovian Society, Tarrytown, New York, 1999.

McCraty, Rollin, Mike Atkinson and Raymond Trevor Bradley. "Electrophysiological Evidence of Intuition: Part 1. The Surprising Role of the Heart." *The Journal of Alternative and Complementary Medicine* 10, no 1 (2004): 33-143.

McNair, D.M., M Lorr, and LF Droppleman, *The Profile of Mood States*. (San Diego, CA: Educational and Industrial Testing Service, 1971).

Monroe Institute, http://monroeinstitute.com

Myss, Caroline. *Anatomy of the Spirit.* Great Britian: Bantam Books, 1996.

Myss, Caroline and Norman Shealy. *The Science of Medical Intuition.* Boulder Colorado: Sounds True, 2002.

National Institute for Occupational Safety and Health, http://www.cdc.gov/niosh/stresswk.htlm

Oschman, James L. *Energy Medicine, The Scientific Basis.* London: Churchill-Livingstone, 2000.

Page, Christine. *Spiritual Alchemy.* UK: C. W. Daniel Company Ltd., 2003.

Parks, Kizzy M.and Lisa A. Steelman. "Organizational Wellness Programs: A Meta-

Analysis." *Journal of Occupational Health Psychology* 13, no. 1 (January 2008): 58- 68.
Parfitt, Will. *The Elements of Psychosynthesis.* UK: Element Books Ltd, 1990.
Pelletier, Cori L. "The Effect of Music on Decreasing Arousal due to Stress: A Meta-Analysis." *Journal of Music Therapy* 41, no.3 (November 2004): 192-214.
Perry, Wayne. *Sound Medicine – The Complete Guide to Healing with the Human Voice*. Franklin Lakes, NJ, The Career Press, Inc., 2007.
Pert, Candace B. *Everything You Need to Know and Feel Good.* USA: Hay House Inc., 2006.
Pert Candice B. "The Psychosomatic Network: Foundations of Mind-Body Medicine," *Alternative Therapies in Health and Medicine* 4 (1998).
Rosch, Paul. "Stress – A New Perspective." *The Institute of HeartMath* (Boulder Creek, California, 2004): 2.
Ruiz, Don Miguel. *The Four Agreements.* San Rafael, CA: Amber-Allen Publishing, 1997.
Scully, Judith A., Henry Tosi and Kevin Banning, "Life Event Checklists: Revisiting the Social Readjustment Rating Scale after 30 Years." *Educational and Psychological Measurement* 60, no.6 (2000) 864-876.
Smith, Caroline, Heather Hancock, Jane Blake-Mortimer and Kerena Eckert. "A Randomized Comparative Trial of Yoga and Relaxation to Reduce Stress and Anxiety." *Complementary Therapies in Medicine* 15, no. 2 (June 2007): 77-83.
Sveinsdóthirand, Herdís and Hólmfrióur K. Gunnarsdóttir. "Predictors of Self-Assessed Physical and Mental Health of Icelandic Nurses: Results from a National Survey." *International Journal of Nursing Studies*, doi:10.1016/j.ijn.urstu.2008.01.007 http://www.sciencedirect.com (accessed March 2008).
The International Society for the Study of Subtle Energies & Energy Medicine (ISSSEEM), http://www.issseem.org/about.cfm (accessed June 2007).
Thompson, Jeffrey D. *Epsilon, Gamma, HyperGamma, Lambda Brainwave Activity and Ecstatic States of Consciousness*, 1999. http://www.neuroacoustic.com/acoustic.html (accessed June 2007).
Thompson, Jeffrey D. *The Scientific Research behind Acoustic Brainwave Entrainment*, 1988. http://www.neuroacoustic.com/acoustic.html (accessed June 2007).
Thompson-Liu, Kae. Voicebio©™, (Hardy, VA: VIBEprints Corporation, 1997). http://www.voicebio.com (accessed March 2008).
Tiller, William A., Rollin McCraty and Mike Atkinson. Institute of HeartMath, "*Alternative Therapies in Health and Medicine.*" 2, no.1 (1996): 52-65.
Toms, Michael. *The Soul of Business.* Carlsbad, CA: Hay House, Inc., 1997.
Voicebio Analysis, http://www.VoiceBio.com
Weidenhammer, W., A. Strong, K. Linde, A. Hoppe and D. Melchart. "Acupuncture for Chronic Pain within the Research Program of 10 German Health Insurance Funds – Basic Results from an Observational Study." *Complementary Therapies in Medicine* 15, no. 4 (December 2007): 238-246.
Weil, Andrew. "Self Healing: Creating Natural Health for Your Body and Mind." *Sound Healing and Sound Body* February, 1998: 1, 6-7.

Wheatley, Margaret J. *Leadership and the New Science.* San Francisco: Berrett-Koehler Publishers, 1999.

Wilber, Ken. *A Theory of Everything.* Boston, Massachusetts: Shambala Publications Inc., 2000.

Witek-Janusek, Linda, Kevin Albuquerque, Karen Rambo-Chroniak, Christopher Chroniak, Ramon Durazo-Arvizu and Herbert L. Mathews. "Mindfulness Based Stress Reduction on Immune Function, Quality of Life and Coping in Women Newly Diagnosed with Early Stage Breast Cancer." *Brain, Behavior and Immunity,* doi:10.1016/j.bbi.2008.01.012 (March 2008): http://www.sciencedirect.com (accessed June 2008).

APPENDIX A

Invitation Letter to Participants

Dear Participant

You are invited to attend an information session for a proposed research study that will be part of a team intervention.

Most people experience huge amounts of stress in our high-tech, fast-paced society. We have stress from our jobs, relationships, world events, money etc. If stress continues and gets chronic, our defense mechanisms break down and we become more susceptible to disease and illness. When we introduce methods that help us to maintain balance in our bodies and in our lives, we can prevent many of these stress-related diseases to develop.

The purpose of this research is to study the effects of sound and positive emotional states on the balance in the body. Each participant will be provided with a specific sound formula in the form of a musical CD that will help you to create balance. The musical soundtrack has been chosen from an internationally recognized expert in the field of Neuroacoustic Sound Therapy. The musical soundtrack has been created in such a way to enhance relaxation while improving performance.

You are invited to take part in this study by committing to listen to the 30 minute soundtrack once a day for 14 consecutive days. A CD copy of the soundtrack as well as a stereo headset compatible with your personal computer will be provided to you.

As an employee of the Medium Business Bank division of Business Banking, you will have the opportunity to experience a method that will help you to relax while providing you with more energy and creativity.

You will be part of a group of 60 participants, all employees of the Medium Business Bank division of Business Banking. The intervention has been approved by your manager, but you are reminded that your participation will be voluntary.

More detail will be shared with you during the information session, to give you background and scientific data you might be interested in.

I am looking forward to meet all of you.

Sincerely
Dr. Lynette Steele

APPENDIX B
Information Session

Introduction

I am very grateful for the opportunity to be here with you this morning. As you might have gathered by now, I will provide you with more information about the proposed research study that I discussed with your manager.

What I will share with you this morning is a bit of background on the science that supports my study and why I am doing what I am doing.

I will also fill you in on the testing procedures that I will use and introduce you to the process that will take place over the next 2-3 weeks.

Introduction:

1 Personal background as medical student and medical practitioner with a special interest in energy or vibrational medicine.

Sample from session:

"I finally came to realize through the research and experience of other inspiring scientists and healers that we function as whole beings and that science can explain more and more of the connections between mind, body, heart and soul. I understood that what I have been taught at medical school was only part of the story and that when we are looking for ways to heal and balance ourselves we have to step into the place where we understand the effects of thoughts, emotions and spirit on our bodies. Now we have mind-body medicine, energy medicine etc which is part of a phenomena of science which says that every 5 years we double our knowledge base. So, what has been mainstream science 5 or 10 years ago is old news today!"

Describing the role of Stress

1 We live in a society where stress related diseases like heart disease, high blood pressure, diabetes, anxiety and depression are getting worse and not better, despite modern medicine. So what we have been doing up to now is not enough, where do we find the right solutions?

2 One of the first researchers on stress was a French scientist that described the "milieu interieur" which refers to the state of balance within the body. It is also called homeostasis and that is the state our bodies try to maintain in every moment so that everything can function optimally. Anything that upsets that state will trigger other reactions throughout the body to get back to this state of harmony. For instance if you are exposed to a flu virus your immune system kicks in with a zillion reactions to protect your body from it. And then we experience the symptoms of the flu.

3 The same happens when we experience stress. What gets triggered is the “fight or flight response“that is as old as humankind. Hundreds of years ago the stressor was a leopard or a lion that wanted us for breakfast. Now we get cut off in the traffic or the boss got out on the wrong side of the bed that morning. Our bodies still respond the same. Within 5 seconds adrenalin drips into the body which is prepared to fight or to get away as quickly as possible. All the senses are on hyperalert, the pupils dilate to give us twice our normal vision, we smell and hear 3 times better. The lungs open up to allow more air to open while the heartbeat picks up and the blood flow gets directed to the big muscles. What gets cut off is the blood flow to the stomach and digestive systems, the reproductive organs and the kidneys. The blood clotting process is also triggered so that we won’t bleed to death. This response affects the body for 24 hours and needs at least 72 hours to reverse itself.

4 The way we experience stress in the 21 century is much more chronic. Little things trigger the stress response over and over again and we suffer the consequences from chronic stress which then very often turns into a disease of some sorts.

5 The challenge is to find ways to help the body to return to a state of balance or homeostasis. There are many options available and what I am offering you during this research phase is to experience one such a method.

Energy Anatomy

1 When we dissect ourselves into smaller and smaller parts, we discover that there is a place beyond the physical part of our make-up, beyond the molecules, atoms and electrons. At the minutest part of our make-up we are pure vibration, pure energy.

2 Just as we have a physical anatomy we have an energy anatomy. In this understanding science and ancient spiritual traditions are finally coming together to give us a better understanding of ourselves. For example in Chinese medicine, acupuncture has been used for many centuries, and now neuroscientists can measure the secretion of endorphins which is the body’s natural pain killers at the points where the needles are inserted during an acupuncture session.

3 Description of energy pathways and energy centers to explain the vibrational make-up.

4 An example of an energy center is the electromagnetic field that surrounds the heart. The Institute of HeartMath in California is doing a lot of research on this particular field. There findings confirm that our emotional state influences the energy we carry in this part of our bodies and has a direct influence on our heartrates. They describe the changes in this heartspace as the intelligence of the heart which is much more important than our brains in many respects. Include examples of research.

5 The heart plays a central role in emotional states. Emotions like anger, frustration or anxiety lead to erratic heart rhythms with less synchronization between the

parasympathetic and sympathetic branches of the autonomic nervous system (ANS). In contrast, positive emotional states like appreciation, love or compassion, are associated with coherent patterns in the heart rhythms and greater synchronization between the two branches of the autonomic nervous system.
Longstanding negative emotional states can lead to chronic stress and suppress the immune system.

6 The energetic space of the heart is also influenced by other vibrations, like the vibration of sound and music. And that is what makes this field so exciting, because in stead of a pill or a tablet I can suggest a sound formula that will create balance on a deeper level than the chemical formula. It is also simple and easy to use when you match the required frequency with the correct frequency through a sound formula.

That brings me to the practical part of the research. What will be asked of you during this time is to listen to a 30 min recording of music once a day while inducing a positive emotional state. I will provide you with a headset that should be compatible with your PC or stereo set. Each participant will also receive a CD copy with the selected piece of music.

While listening to the music you will induce a positive emotional state by doing the following exercise:

1. Shift your attention to your chest or heart area. If it helps you can put your hand on your chest.
2. Focus on your breathing and take deep inhalations while exhaling slowly. Just focus on the gentle moving of your chest as it moves up and down.
3. Remember a person or situation which makes you feel deeply happy, uplifted and fulfilled and imagine yourself being with this person or in this situation again.
4. Become aware of the deep appreciation you feel when you think about this and hold that feeling while listening to the music.
5. If your attention drifts, just bring it back to your chest area, focusing on the feeling of gratitude.

The benefits you might experience because of this are best described by Doc Childre, the founder of The Institute of HeartMath:

> "You feel a deep sense of peace and internal balance – you are at harmony with yourself, with others, and with your larger environment, you experience increased buoyancy and vitality. Your senses are enlivened – every aspect of your perceptual experience seems richer, more textured. Surprisingly, you feel invigorated even when you would usually have felt tired and drained."

Description of Measurements and Tools

The first step is to complete the Informed Consent Form, handed out during this session.

You will then be asked to complete the first survey that will determine your current stress levels related to the past twelve months. This questionnaire also gives and indication of the likelihood of developing disease as a result of chronic stress.

Apart from your name, it is important that you complete the section where you have to fill in your age and gender.

The results from these tests will then be used to randomly assign you to either the experimental group or the control group. A compatible profile between the two groups is necessary for research design purposes. Please note that there will be people in both groups that will have higher and lower stress levels. Information gathered from both the experimental group and the control group will be equally important and your participation is greatly appreciated.

All of the participants will take part in a 15 minute testing session which will be the post-testing phase. During this session the following will be asked of you:

POMS

Completing the POMS: a questionnaire to determine your mood or feeling state at that moment as well as the past week. This will take 5 minutes and include 67 questions where you have to choose 1 of 5 options that describe your mood state the best.

Voicebio Analysis

After that you will be asked to answer 3 basic questions asked by the researcher. You will answer these questions by speaking into a microphone that is connected to a notebook. The purpose of this recording is to measure the frequencies present in your voice to get and indication of your energetic balance. Please note that the content of your answers will not be recorded and that your answers will be handled as confidential by the researcher.

Freeze Framer

The last test that will be taken will involve you by connecting a finger or ear probe to you that is connected to the notebook of the researcher. A 3-minute recording will be taken of your heart rate, the level of balance or coherence between your heart and brain and a measurement of the tension in your autonomic nervous system.

Intervention:

If you are part of the experimental group you will be handed a CD, a stereo headset and clear instructions of what is needed from you for the following 14 days. The control group will also get a letter.

After the 14 days during which the experimental group had a chance to use the research tools, a post-testing session will take place. This session will be identical to the 15 minute pre-testing session.

After that all the results of both groups will be analyzed and used for the dissertation. A feedback session is planned for both groups during which general trends and findings of the research will be shared with participants. Dates for this will be confirmed closer to the actual time.

Allow time for any questions.

Conclude session by thanking all participants, reminding them that their participation is completely voluntary.

APPENDIX C
Informed Consent Form

Holos University Graduate Seminary supports the practice of protection for human subjects participating in research. The following information is provided to help you decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

The principal investigator, Dr. Lynette Steele is a qualified medical doctor with a special interest in the field of vibrational or energy medicine. Vibrational medicine recognizes that at the minutest part of our make-up we are pure vibration or frequency. When we address illness, introduce any form of healing or try to create balance in our lives, it would be ideal to find ways to balance and heal ourselves on a vibrational level. Healing methods provided through sound (which is also pure vibration) is one way to create balance on a vibrational level in our own bodies.

Most people experience huge amounts of stress on a daily basis in our high-tech, fast-paced society. We have stress from our jobs, relationships, world events, money etc. If stress continues and gets chronic, our defenses break down and we become more susceptible to disease and illness. When we introduce methods that help us to maintain balance in our bodies and in our lives, we can prevent many of these stress-related diseases to develop.

The purpose of this research is to provide each participant with a specific sound formula to create balance on a vibrational and psychophysiological level. The musical soundtrack has been chosen from an internationally recognized expert in the field of neuroacoustic Sound Therapy. Actual nature sounds are blended into the musical track

which enhances its relaxing properties. The sound frequencies embedded into the musical soundtrack can lead participants to a state of deep relaxation and enhanced performance.

You are invited to take part in this study by committing to listen to the 30 minute soundtrack once a day for 14 consecutive days. A CD copy of the soundtrack as well as a stereo headset compatible with your personal computer will be provided to you by the principal investigator.

As an employee of the Medium Business Bank division of Business Banking, you will have the opportunity to experience a method that will help you to relax while providing you with more energy and creativity.

You will be part of a group of 60 participants, all employees of the Medium Business Bank division of Business Banking.

The first step of your involvement will be required during a 1 hour information session where you will be provided with the background, scientific theory and an explanation of the research procedure. During this session you will be asked to give permission to be part of the research project. You will also complete a 5 minute questionnaire that will enquire about the most important stressors you have experienced over the past 12 months.

The second step is an individual session with the principal investigator. Dr. Steele. This will take 15 minutes during which 3 things will be asked from you:

Completion of another 5 minute questionnaire that will enquire about your emotional or mood state.

Measuring your energetic balance by making a voice recording. You will have to answer three questions while speaking into a microphone that is part of a software

program on the PC of the principal investigator. What is important to note is that the content of what you say will not be recorded, but rather the frequencies that are present in your voice.

To measure the balance between your heart and autonomic nervous system another software program will be used. You will be connected via a finger or ear probe to the PC. During this part of the session no questions will be asked. A 3-minute recording will be taken.

The only thing that will be asked of you before your individual session is to have nothing to eat or drink before the scheduled time, because this might influence the measurements that will be taken.

After the tests and recordings the group of participants will be divided into an experimental and control group with 30 members each. The members of the experimental group will each receive a CD copy of the music and a headset. They will have to listen to the music each day for 14 days. They will also receive written guidelines about the steps they need to take while listening to the music.

Each participant should choose 30 minutes each day, ideally at the beginning or end of the day, during which you will listen to the recording using the headphones. Ideally, you should not be disturbed while listening to the recording.

You can be in a sitting or lying position.

While listening to the music you will be in a positive emotional state by doing a simple exercise to experience a state of deep appreciation or gratitude. The instructions for this will be provided by the principal investigator.

After the 14 days the headset and CD have to be returned to the principal investigator in the same condition as received.

The control group will not listen to the music nor do the gratitude exercise during this time.

After the 14 days another 15 minute individual session will be scheduled with Dr. Steele. The same procedure will be followed as during the first session. Both experimental and control groups will be part of this.

The reason for asking only the experimental group to listen to the music, is to compare the effects of the sound formula on the balance in the body vs. not using it. Information from both groups is equally important during the research process.

This intervention is a low-risk intervention with potential benefits for you as participant. As the music provided to you induces a deep state of relaxation, you are not allowed to listen to it while driving. Sometimes when people relax deeply, it stirs up emotions that need to be released. You might experience a wide range of emotions from a deep reverie to possible sadness. All of these emotions are acceptable and should not be resisted.

The possible benefits you might experience while taking part in this project includes deep relaxation, lower stress levels, restful sleep, better performance, enhanced creativity and possible healing. You might find that you have increased energy levels while being able to maintain focus in your work.

Participation in this study will be an introduction to many possibilities as far as stress reduction and creating balance in your life is concerned.

Please note that your participation in this study and any forms generated will be held in strict confidence. We assure you that your name will not be associated in any way with the research findings. The information will be identified only by a code number. Results of the study may be reported in scientific presentations or publications, but you will not be identified. There is no financial cost to you to participate in this study. Your participation is solicited, although strictly voluntary.

Your participation is greatly appreciated. If you would like additional information concerning this study, its procedures or its purpose, before or after it is complete, please feel free to contact Dr. Steele by phone or email.

If you have concerns or questions about your rights as a research participant, you may contact the Holos University Graduate Seminary Dean of Academic Affairs through the University at (888) 272-6109, 5607 S. 222nd Road, Fair Grove, Missouri, 65648.

Sincerely,

Dr.Lynette Steele
Principal Investigator:

Dr.Lynette Steele
11 McNulty ave
Silver Lakes
0054
Tel: 0128092953
l-steele@mweb.co.za

Faculty Supervisor:

Dr. Patricia Norris, PhD
27660 Poppy Drive
Willits, CA 95490
U.S.A.
patandsteve@harborside.com
Tel: 001-707-456-9968

_____ _____

Signature of Person Agreeing to Participate Date

With my signature, I affirm that I agree to take full personal responsibility for my participation in the protocol described above.

Print Your Name Here

_____

APPENDIX D
Instructions to the Experimental Group

Dear Participant

Thank you for your willingness to take part in this research project.

You have been handed a stereo headset and a sound CD of 30 minutes. The headset is compatible with most notebooks and personal computers with a USB adaptor. It is recommended that you make use of the USB connection to provide the best sound quality.

The commitment that is asked from you is to listen to the soundtrack for 30 minutes each day, for the next 14 days, starting on _____ until _____ 2008.

Try to set aside a specific time every day for the next 14 days during which you will listen to the CD using the headset. The time you choose is not important, rather that you do it every day.

You can be in a sitting or lying position, whichever is most comfortable. Close your eyes and adjust the volume to the maximum that is comfortable for you. It should feel as if you are having a "sound bath", which allows you to experience the sound with your whole body.

While listening to the music you will induce a positive emotional state by doing the following exercise:

1. Shift your attention to your chest or heart area. If it helps you can put your hand on your chest.
2. Focus on your breathing and take deep inhalations while exhaling slowly. Just focus on the gentle moving of your chest as it moves up and down.
3. Remember a person or situation which makes you feel deeply happy, uplifted and fulfilled and imagine yourself being with this person or in this situation again.

4. Become aware of the deep appreciation you feel when you think about this person or situation and hold that feeling while listening to the music.
5. If your attention drifts, just bring it back to your chest area, focusing on the feeling of gratitude.

It is important that you should not be disturbed while listening to the sound track. If it happens that you are interrupted while listening to the soundtrack, you should start again.

You might fall asleep while listening to the music which is perfectly fine.

Please note that you are not allowed to listen to the music while you are driving.

The headset and CD need to be returned to the principal investigator after the 14 days. Please note that this equipment should not be shared with family members or colleagues who are not part of this study. It should be returned in the same condition it has been received.

Good luck and feel free to contact me if you experience any problems with the headset, CD or instructions.

Sincerely
Dr. Lynette Steele

Cell: 0836506600
l-steele@mweb.co.za

APPENDIX E
Instructions to the Control Group

Dear Participant

Thank you for your willingness to take part in this research project.

You have been selected to be part of the control group. This means that you won't have to listen to the soundtrack or induce a positive emotional state during the next 14 days, starting _____ until _____ 2008.

After the 14 day period you will undergo the same testing procedure as before. Although you won't make use of the research tools as part of the control group, the information gathered from you is equally important as the information gathered from the experimental group.

After the 14 days you will have a chance to listen to the music if you would like to make use of the opportunity. This will be to provide you with the same experience although the effects of the music will not be measured in you.

I appreciate your time. Please feel free to contact me with any enquiries you might have.

Sincerely
Dr. Lynette Steele

Cell: 0836506600
l-steele@mweb.co.za

APPENDIX F

Post-test Survey for Participants of the Experimental Group

POST-TEST SURVEY: **Name:**

Indicate which option is most applicable to you by circling a number:

Over the past 2 weeks I managed to listen to the soundtrack:

1 Not at all

2 A few times (less than 7 times)

3 Most of the time (more than 7 times)

4 Every day

APPENDIX G

Audio 45 Stereo PC headset

Product Specifications:

- Digital Signal Processing
- 5 channel 16 bit,48kHz data from USB
- 24 bit,100dB signal-to noise CODEC
- 32 bit digital audio processing

Headphone output

- 2 channel 48kHz output to headphone
- Headphone gain stage>80dB range
- 60Hz-16kHz speaker frequency response
- 28mm speaker diameter

Microphone input

- Mono, 16 bit, 48 kHz data
- Mic gain stage>50dB range
- Up to 25dB noise rejection (hypercardioid response)
- 100kz-10kHz frequency response
- Electret condenser microphone with -38dBV/Pa sensitivity

Earcushions: 4mm foam
Cable Length: 3 meters
Connection: USB

Features:

- Digitally-enhanced stereo headphones
- Inline Volume and Mute control
- 32-bit DSP enhances the audio signal for superior stereo sound and speech recognition
- Digitally-enhanced noise-canceling microphone
- USB plug & play for Windows and Mac
- Adjustable lightweight headband

Minimum system requirements
WIN98SE/ME/2000/XP
Safety regulations:
For health and safety do not exceed moderate listening levels

For further information: 0800410014

APPENDIX H
AlphaRelaxationSystem

Program 1 Deep Relaxation was chosen from the Alpha Relaxation System as the sound track to use as part of the research. This system has been developed by Jeffrey Thompson, an internationally recognized expert in the field of neuroacoustic Sound Therapy. The Alpha Relaxation System was designed to help calm the mind and relax the body. The sound frequency patterns embedded into the musical soundtrack can lead listeners to healthful states of deep relaxation, meditation, peak performance, enhanced creativity, healing and restful sleep.

In the Alpha Relaxation System audio program blends specific sound frequency pulses into a tranquil musical soundtrack to increase alpha brainwaves (8-13 Hz), through brainwave entrainment. Brainwave entrainment describes the tendency for brainwave activity to follow the lead of an external pulse or rhythm pattern.

To enhance the effects of the audio program on the listener, the soundtracks have been processed by using 3-D microphones and postproduction equipment, also called psychoacoustic 3-D sound processing.

Actual nature sounds are blended into the musical composition and included sounds of water, birds, dolphins and even sounds from outer space given to Dr. Thompson by NASA. These sounds have been electronically processed to make them recognizable to the unconscious mind.

To use the audio program most effectively it is recommended to listen to the soundtrack while using light headphones or a stereo sound pillow. Be in a comfortable

position like sitting or lying down. Wear loose clothing, especially at the neckline and take off your shoes.

About Dr. Jeffrey Thompson:

Jeffrey Thompson began experimenting with sound pulse patterns and their effects on the brain and body in his Virginia Holistic Health in 1981.In 1988, he established The Center for Neuroacoustic Research in Encinita, California. His clinical research with thousands of patients has led to groundbreaking discoveries in how sound frequency patterns built into musical soundtracks induce brainwave entrainment and improve health and well-being. Thompson has taught State of California-approved courses in Behavioural Psychoacoustics™ and Neuroacoustic Therapy, for post-graduate studies in clinical psychotherapy. His work was chosen for research at the University of Virginia Medical School, which was funded through a government program called the Center for the Study of Complementary and Alternative Therapies (CSCAT). Fortune 500 companies, healthcare professionals, clinics, hospitals, meditation groups and individuals worldwide use Thompson's high-tech musical soundscapes for deep relaxation, healing, inner exploration and meditation.

Soundtrack written and performed by Dr. Jeffrey Thompson.

Center for Neuroacoustic research
169 Saxony Road, Suite 209
Encinitas, California 92024
Phone – 760.942.6749
www.neuroacoustic.com
Brainwave Music Products available through The Relaxation Company
www.brainfitnesskit.com

APPENDIX I

Holmes Rahe Social Readjustment Rating Scale

HOLMES-RAHE SOCIAL READJUSTMENT RATING

Thomas H.Holmes and Richard H.Rahe

RANK	LIFE EVENT	RATING	Mark X
1	Death of a spouse or life partner	100	
2	Divorce	73	
3	Marital separation	65	
4	Detention in jail or other institution	63	
5	Death of close family member	63	
6	Personal injury or illness	53	
7	Marriage	50	
8	Fired at work	47	
9	Marital reconciliation	45	
10	Retirement from work	45	
11	Change in health of family member	44	
12	Pregnancy	40	
13	Sexual difficulties	39	
14	Gain of new family member	39	
15	Major business readjustment	39	
16	Change in financial state (a lot worse or better off than usual)	38	
17	Death of a close friend	37	
18	Changing to a different line of work	36	
19	Change in number of arguments with spouse or life partner	35	
20	Taking on a mortgage for home or business	31	
21	Foreclosure of mortgage or loan	30	
22	Change in responsibilities at work	29	
23	Son or daughter leaving home	29	
24	Trouble with in-laws	29	
25	Outstanding personal achievement	28	
26	Spouse/life partner begin or stop work	26	
27	Begin or end formal schooling/education	26	
28	Change in living conditions	25	
29	Revision of personal habits	24	
30	Trouble with boss	23	
31	Change in work hours or conditions	20	
32	Change in residence	20	
33	Change in schools	20	
34	Change in recreation	19	
35	Change in religious activity	19	
36	Change in social activities	18	

37	Taking on a minor loan (car, tv, fridge etc)	17	
38	Change in sleeping habits	16	
39	Change in number of family get-togethers	15	
40	Change in eating habits	15	
41	Vacation	13	
42	Christmas, or other holiday stress	12	
43	Minor violations of the law	11	

Scoring:

LOW:	150 points or less:	indicate a low amount of life changes and low susceptibility of stress-induced breakdown
MEDIUM:	150-300 points:	indicate a 50% chance of a major health breakdown in the next 2 years
HIGH:	300 points or more:	indicate a 80% chance to develop physical or mental problems in the next 2 years

Holmes Thomas H. and Rahe Richard H., “The Social Readjustment Rating Scale," *Journal of Psychosomatic Research 11, issue 2* (UK: Oxford Elsevier Ltd, 1967):213-218.

APPENDIX J
POMS Questionnaire

POMS™ Standard Form

Client ID: **Age:** **Gender: Male Female**
Birth date: **Today's Date:**

To the respondent:

Below is a list of words that describe feelings people have. Please read each word carefully. Then circle the number that best describes how you have been feeling during the past week or two, including today.

	FEELING			Not at all	A little	Moderately	Quite a bit	Extremely
1	Friendly			1	2	3	4	5
2	Tense			1	2	3	4	5
3	Angry			1	2	3	4	5
4	Worn out			1	2	3	4	5
5	Unhappy			1	2	3	4	5
6	Clear-headed			1	2	3	4	5
7	Lively			1	2	3	4	5
8	Confused			1	2	3	4	5
9	Sorry for things done			1	2	3	4	5
10	Shaky			1	2	3	4	5
11	Listless			1	2	3	4	5
12	Peeved			1	2	3	4	5
13	Considerate			1	2	3	4	5
14	Sad			1	2	3	4	5
15	Active			1	2	3	4	5
16	On edge			1	2	3	4	5
17	Grouchy			1	2	3	4	5
18	Blue			1	2	3	4	5
19	Energetic			1	2	3	4	5
20	Panicky			1	2	3	4	5
21	Hopeless			1	2	3	4	5
22	Relaxed			1	2	3	4	5
23	Unworthy			1	2	3	4	5
24	Spiteful			1	2	3	4	5
25	Sympathetic			1	2	3	4	5
26	Uneasy			1	2	3	4	5
27	Restless			1	2	3	4	5

28	Unable to concentrate			1	2	3	4	5
29	Fatigued			1	2	3	4	5
30	Helpful			1	2	3	4	5
31	Annoyed			1	2	3	4	5
32	Discouraged			1	2	3	4	5
33	Resentful			1	2	3	4	5
34	Nervous			1	2	3	4	5
35	Lonely			1	2	3	4	5
36	Miserable			1	2	3	4	5
37	Muddled			1	2	3	4	5
38	Cheerful			1	2	3	4	5
39	Bitter			1	2	3	4	5
40	Exhausted			1	2	3	4	5
41	Anxious			1	2	3	4	5
42	Ready to fight			1	2	3	4	5
43	Good-natured			1	2	3	4	5
44	Gloomy			1	2	3	4	5
45	Desperate			1	2	3	4	5
46	Sluggish			1	2	3	4	5
47	Rebellious			1	2	3	4	5
48	Helpless			1	2	3	4	5
49	Weary			1	2	3	4	5
50	Bewildered			1	2	3	4	5
51	Alert			1	2	3	4	5
52	Deceived			1	2	3	4	5
53	Furious			1	2	3	4	5
54	Efficient			1	2	3	4	5
55	Trusting			1	2	3	4	5
56	Full of pep			1	2	3	4	5
57	Bad-tempered			1	2	3	4	5
58	Worthless			1	2	3	4	5
59	Forgetful			1	2	3	4	5
60	Carefree			1	2	3	4	5
61	Terrified			1	2	3	4	5
62	Guilty			1	2	3	4	5
63	Vigorous			1	2	3	4	5
64	Uncertain about things			1	2	3	4	5
65	Bushed			1	2	3	4	5

Please ensure you have answered every item.
Thank you for completing this questionnaire.

In the USA, P.O.Box 950, North Tonawanda, NY 14121-0950, 1-800-456-3003.
In Canada, 3770 Victoria Park Ave., Toronto, ON M2H 3M6, 1-800-268-6011.
Internationally, +1-416-492-2627. Fax, +1-416-492-3343

APPENDIX K
Data Spreadsheet - POMS

Pre-test results

ID	Cell	Group	Gender	Age	SRRS	TPre	DPre	APre	FPre	CPre	VPre	TMDPre	*T*-score
1	A	E	M	46	107	5	3	8	3	6	22	3	46
2	A	E	M	55	217	7	3	4	7	4	23	2	45
3	A	E	M	54	164	7	5	6	4	4	18	8	47
4	A	E	M	50	243	22	36	30	17	18	8	115	80+
5	A	E	M	44	173	7	0	2	3	5	21	-4	43
6	A	E	M	38	226	22	20	23	12	11	16	72	66
7	A	C	M	60	134	10	3	5	0	6	11	13	49
8	A	C	M	26	198	3	6	2	4	4	18	1	45
9	A	C	M	56	265	3	2	6	5	6	18	4	46
10	A	C	M	54	243	13	6	11	6	13	29	20	51
11	A	C	M	53	190	17	10	35	11	6	27	52	60
12	A	C	M	45	174	11	14	12	11	9	13	44	59
13	A	C	M	44	102	13	3	8	11	6	16	25	52
14	A	C	M	41	316	7	6	10	5	1	17	12	48
15	A	E	F	45	203	34	40	30	28	13	3	142	80+
16	A	E	F	45	117	12	4	5	11	4	15	21	51
17	A	E	F	41	277	7	1	1	6	6	8	13	49
18	A	E	F	35	147	12	34	22	18	13	14	85	70
19	A	E	F	35	371	15	5	3	17	4	9	35	55
20	A	E	F	32	196	2	3	6	1	4	17	-1	44
21	A	E	F	37	90	9	9	11	9	12	12	38	56
22	A	E	F	26	290	9	9	2	7	6	22	11	48
23	A	E	F	27	211	13	10	8	11	12	16	38	56
24	A	E	F	26	156	5	4	2	6	9	11	15	49
25	A	E	F	22	100	6	10	4	3	9	16	16	49
26	A	E	F	44	171	6	1	0	8	8	11	12	48
27	A	C	F	54	249	9	6	7	4	6	22	10	48
28	A	C	F	48	113	3	2	1	4	4	13	1	45
29	A	C	F	47	315	13	2	13	23	14	12	53	61
30	A	C	F	30	94	15	8	11	14	6	11	43	58

ID	Cell	Group	Gender	Age	SRRS	TPre	DPre	APre	FPre	CPre	VPre	TMDPre	*T*-score
31	A	C	F	37	370	8	2	2	11	7	18	12	48
32	A	C	F	33	145	11	18	22	17	12	8	72	66
33	A	C	F	31	82	2	0	0	0	4	25	-19	39
34	A	C	F	27	273	12	7	9	13	9	6	44	58
35	A	C	F	25	224	10	0	2	0	8	10	10	48
36	A	C	F	23	202	12	12	23	7	12	11	55	61
37	A	C	F	33	77	24	38	31	21	17	21	110	78
38	A	C	F	55	165	10	8	4	12	9	19	24	52
39	B	E	M	59	245	14	1	12	1	4	14	18	50
40	B	E	M	38	183	15	2	7	7	5	18	18	50
41	B	E	M	33	317	31	14	28	11	10	13	81	69
42	B	E	M	48	201	11	5	7	4	3	16	14	49
43	B	E	M	44	128	14	6	21	5	4	20	30	54
44	B	E	M	32	50	10	5	6	5	8	19	15	49
45	B	C	M	54	353	20	15	16	14	11	17	59	63
46	B	C	M	40	283	14	13	17	7	8	16	43	58
47	B	C	M	24	291	11	7	7	9	11	16	29	53
48	B	C	M	26	62	10	0	3	4	9	24	2	45
49	B	E	F	49	466	28	33	34	20	19	14	120	80+
50	B	E	F	25	78	5	7	0	2	3	23	-6	43
51	B	E	F	38	237	8	1	5	10	6	10	20	51
52	B	E	F	36	360	12	12	22	6	7	16	43	58
53	B	E	F	29	235	7	3	1	7	6	17	7	47
54	B	E	F	26	263	19	14	18	11	8	22	48	59
55	B	C	F	46	261	22	5	8	9	7	14	37	56
56	B	C	F	37	164	13	8	13	16	8	12	46	59
61	B	C	F	49	109	3	3	3	3	8	27	-7	43
58	B	C	F	36	195	20	6	6	12	7	10	41	57
59	B	C	F	35	307	22	4	9	17	7	8	51	60
60	B	C	F	25	282	18	18	26	11	10	12	71	66

Post-test results

ID	Cell	Group	Gender	Age	TPost	DPost	APost	FPost	CPost	VPost	TMDPost	*T*-score
1	A	E	M	46	2	1	4	0	5	21	-9	42
2	A	E	M	55	15	19	19	11	10	24	50	60
3	A	E	M	54	5	1	3	3	4	19	-3	44
4	A	E	M	50	3	4	1	4	6	13	5	46
5	A	E	M	44	6	5	13	2	6	19	13	49
6	A	E	M	38	8	4	8	2	7	20	9	47
7	A	C	M	60	4	0	0	0	4	11	-3	44
8	A	C	M	26	2	3	2	4	3	18	-4	43
9	A	C	M	56	5	1	3	5	7	14	7	47
10	A	C	M	54	16	5	9	11	9	20	30	54
11	A	C	M	53	5	12	9	2	0	21	7	47
12	A	C	M	45	11	12	8	10	7	16	32	54
13	A	C	M	44	9	3	6	6	6	13	17	50
14	A	C	M	41	5	0	2	1	0	15	-7	43
15	A	E	F	45	29	36	33	24	10	9	123	80+
16	A	E	F	45	11	0	2	7	5	18	7	47
17	A	E	F	41	4	0	0	0	4	11	-3	44
18	A	E	F	35	24	31	17	22	18	10	102	76
19	A	E	F	35	13	4	7	12	8	7	37	56
20	A	E	F	32	5	4	3	4	7	13	10	48
21	A	E	F	37	10	2	3	5	8	7	21	51
22	A	E	F	26	4	10	0	4	6	20	4	46
23	A	E	F	27	14	11	3	7	13	12	36	56
24	A	E	F	26	5	0	1	12	6	12	12	48
25	A	E	F	22	13	29	20	15	19	13	83	70
26	A	E	F	44	4	0	0	5	6	21	-6	43
27	A	C	F	54	1	0	1	4	5	22	-11	41
28	A	C	F	48	3	0	0	1	5	10	-1	44
29	A	C	F	47	12	4	12	24	14	15	51	60
30	A	C	F	30	13	3	6	5	9	9	27	53

ID	Cell	Group	Gender	Age	TPost	DPost	APost	FPost	CPost	VPost	TMDPost	*T*-score
31	A	C	F	37	13	17	4	15	16	14	51	57
32	A	C	F	33	3	14	6	18	8	24	25	52
33	A	C	F	31	0	0	0	0	4	21	-17	39
34	A	C	F	27	15	5	0	15	10	8	37	56
35	A	C	F	25	20	2	5	0	6	9	24	52
36	A	C	F	23	15	10	17	6	8	11	45	58
37	A	C	F	33	18	32	22	14	14	16	84	70
38	A	C	F	55	5	3	0	6	3	18	-1	44
39	B	E	M	59	13	13	18	5	7	17	39	56
40	B	E	M	38	7	0	0	3	6	17	-1	44
41	B	E	M	33	7	1	7	7	1	19	4	46
42	B	E	M	48	1	1	2	0	0	17	-13	41
43	B	E	M	44	9	5	8	4	4	20	10	48
44	B	E	M	32	0	1	2	0	6	14	-5	43
45	B	C	M	54	19	9	11	11	8	17	41	57
46	B	C	M	40	13	14	6	10	11	17	37	56
47	B	C	M	24	4	0	2	5	6	19	-2	44
48	B	C	M	26	3	0	0	6	7	21	-5	43
49	B	E	F	49	18	24	23	14	16	12	83	70
50	B	E	F	25	3	8	4	1	4	22	-2	44
51	B	E	F	38	14	16	13	1	5	15	34	55
52	B	E	F	36	10	8	6	4	5	12	21	51
53	B	E	F	29	5	8	3	5	7	23	5	46
54	B	E	F	26	6	1	3	5	3	28	-10	42
55	B	C	F	46	11	7	7	5	4	10	24	52
56	B	C	F	37	12	14	11	9	11	8	49	60
61	B	C	F	49	4	0	13	4	4	31	-6	43
58	B	C	F	36	11	2	4	6	6	18	11	48
59	B	C	F	35	22	8	9	15	6	9	51	60
60	B	C	F	25	8	8	14	7	7	15	29	53

APPENDIX L

Data Spreadsheet - Freeze Framer 2.0®

Pre-test Results

ID	Cell	Group	Gender	Age	LOWPre	MEDPre	HIGHPre	HRPre	LFPre	MFPre	HFPre
1	A	E	M	46	42	53	6	66	0.03	0.09	0.18
2	A	E	M	55	14	19	67	62	0.01	0.06	0.15
3	A	E	M	54	89	11	0	71	0.02	0.07	0.32
4	A	E	M	50	92	8	0	78	0.04	0.11	0.17
5	A	E	M	44	86	14	0	65	0.03	0.14	0.18
6	A	E	M	38	28	58	14	71	0.04	0.11	0.18
7	A	C	M	60	53	39	8	65	0.02	0.07	0.16
8	A	C	M	26	81	19	0	52	0.03	0.1	0.18
9	A	C	M	56	100	0	0	57	0.02	0.05	0.26
10	A	C	M	54	94	6	0	77	0.02	0.13	0.18
11	A	C	M	53	67	31	3	63	0.02	0.06	0.22
12	A	C	M	45	92	8	0	91	0.02	0.09	0.37
13	A	C	M	44	69	31	0	62	0.03	0.08	0.32
14	A	C	M	41	39	33	28	73	0.03	0.11	0.24
15	A	E	F	45	39	39	22	71	0.02	0.09	0.2
16	A	E	F	45	36	61	3	54	0.02	0.08	0.23
17	A	E	F	41	100	0	0	69	0.02	0.09	0.16
18	A	E	F	35	67	14	19	69	0.03	0.06	0.18
19	A	E	F	35	56	44	0	83	0.04	0.08	0.29
20	A	E	F	32	36	64	0	73	0.02	0.14	0.16
21	A	E	F	37	86	14	0	66	0.02	0.08	0.16
22	A	E	F	26	58	42	0	87	0.02	0.12	0.23
23	A	E	F	27	81	19	0	67	0.02	0.05	0.15
24	A	E	F	26	86	14	0	66	0.02	0.06	0.27
25	A	E	F	22	64	14	22	87	0.03	0.08	0.29
26	A	E	F	44	61	25	14	71	0.03	0.08	0.18
27	A	C	F	54	69	31	0	75	0.02	0.09	0.22
28	A	C	F	48	69	31	0	66	0.02	0.14	0.2
29	A	C	F	47	53	47	0	76	0.01	0.08	0.23
30	A	C	F	30	89	11	0	69	0.03	0.14	0.18

ID	Cell	Group	Gender	Age	LOWPre	MEDPre	HIGHPre	HRPre	LFPre	MFPre	HFPre
31	A	C	F	37	83	17	0	66	0.02	0.11	0.22
32	A	C	F	33	64	31	6	70	0.04	0.13	0.23
33	A	C	F	31	25	33	42	77	0.03	0.08	0.38
34	A	C	F	27	78	22	0	79	0.03	0.15	0.27
35	A	C	F	25	100	0	0	75	0.03	0.11	0.31
36	A	C	F	23	8	58	33	89	0.02	0.13	0.17
37	A	C	F	33	64	36	0	83	0.02	0.09	0.2
38	A	C	F	55	42	58	0	64	0.02	0.12	0.2
39	B	E	M	59	36	61	3	54	0.02	0.08	0.23
40	B	E	M	38	42	58	0	70	0.02	0.09	0.23
41	B	E	M	33	83	17	0	95	0.02	0.13	0.28
42	B	E	M	48	92	8	0	69	0.01	0.09	0.3
43	B	E	M	44	17	64	19	72	0.02	0.12	0.16
44	B	E	M	32	75	25	0	86	0.01	0.12	0.22
45	B	C	M	54	83	17	0	56	0.03	0.14	0.22
46	B	C	M	40	67	33	0	73	0.02	0.11	0.18
47	B	C	M	24	83	17	0	75	0.02	0.12	0.22
48	B	C	M	26	50	50	0	49	0.01	0.1	0.24
49	B	E	F	49	31	58	11	72	0.02	0.11	0.28
50	B	E	F	25	72	19	8	80	0.03	0.09	0.26
51	B	E	F	38	44	56	0	73	0.02	0.08	0.16
52	B	E	F	36	94	6	0	69	0.02	0.13	0.3
53	B	E	F	29	97	3	0	73	0.02	0.06	0.2
54	B	E	F	26	42	53	6	66	0.03	0.09	0.18
55	B	C	F	46	22	67	11	69	0.02	0.12	0.17
56	B	C	F	37	89	11	0	74	0.03	0.09	0.39
61	B	C	F	49	86	14	0	69	0.02	0.12	0.28
58	B	C	F	36	81	19	0	75	0.03	0.08	0.3
59	B	C	F	35	17	83	0	71	0.04	0.09	0.17
60	B	C	F	25	97	3	0	82	0.03	0.09	0.24

Post-test Results

ID	Cell	Group	Gender	Age	LOWPost	MEDPost	HIGHPost	HRPost	LFPost	MFPost
1	A	E	M	46	19	67	14	64	0.02	0.07
2	A	E	M	55	0	6	94	67	0.01	0.06
3	A	E	M	54	58	42	0	76	0.02	0.09
4	A	E	M	50	67	33	0	74	0.04	0.14
5	A	E	M	44	11	75	14	76	0.03	0.08
6	A	E	M	38	28	50	22	69	0.05	0.08
7	A	C	M	60	56	22	22	65	0.02	0.05
8	A	C	M	26	89	11	0	57	0.02	0.09
9	A	C	M	56	97	3	0	60	0.02	0.13
10	A	C	M	54	86	14	0	102	0.02	0.05
11	A	C	M	53	33	67	0	66	0.04	0.07
12	A	C	M	45	47	50	3	81	0.02	0.11
13	A	C	M	44	85	10	5	71	0.02	0.09
14	A	C	M	41	81	19	0	74	0.02	0.07
15	A	E	F	45	19	67	14	61	0.02	0.09
16	A	E	F	45	100	0	0	92	0.02	0.11
17	A	E	F	41	75	25	0	66	0.02	0.09
18	A	E	F	35	58	42	0	81	0.03	0.09
19	A	E	F	35	92	8	0	86	0.02	0.11
20	A	E	F	32	94	6	0	81	0.03	0.16
21	A	E	F	37	92	8	0	84	0.02	0.09
22	A	E	F	26	39	53	8	85	0.02	0.09
23	A	E	F	27	89	11	0	82	0.02	0.11
24	A	E	F	26	75	25	0	78	0.02	0.06
25	A	E	F	22	58	42	0	77	0.03	0.08
26	A	E	F	44	31	47	22	85	0.02	0.11
27	A	C	F	54	86	14	0	78	0.03	0.11
28	A	C	F	48	83	17	0	72	0.03	0.13
29	A	C	F	47	100	0	0	80	0.02	0.09
30	A	C	F	30	69	31	0	63	0.04	0.14

ID	Cell	Group	Gender	Age	LOWPost	MEDPost	HIGHPost	HRPost	LFPost	MFPost	HFPost
31	A	C	F	37	67	33	0	75	0.02	0.07	0.24
32	A	C	F	33	92	8	0	69	0.01	0.12	0.32
33	A	C	F	31	25	67	8	76	0.02	0.09	0.32
34	A	C	F	27	89	11	0	86	0.03	0.11	0.3
35	A	C	F	25	89	11	0	82	0.02	0.08	0.33
36	A	C	F	23	19	69	11	88	0.04	0.09	0.18
37	A	C	F	33	100	0	0	81	0.03	0.07	0.38
38	A	C	F	55	36	58	6	71	0.02	0.07	0.22
39	B	E	M	59	75	25	0	60	0.02	0.08	0.29
40	B	E	M	38	50	50	0	77	0.02	0.07	0.24
41	B	E	M	33	42	39	19	97	0.02	0.14	0.23
42	B	E	M	48	97	3	0	69	0.03	0.08	0.32
43	B	E	M	44	11	28	61	75	0.02	0.11	0.21
44	B	E	M	32	100	0	0	87	0.03	0.09	0.16
45	B	C	M	54	72	25	3	64	0.02	0.09	0.32
46	B	C	M	40	28	53	19	79	0.02	0.08	0.22
47	B	C	M	24	64	33	3	72	0.03	0.08	0.23
48	B	C	M	26	97	3	0	57	0.03	0.08	0.28
49	B	E	F	49	78	11	11	64	0.02	0.09	0.18
50	B	E	F	25	81	19	0	85	0.02	0.11	0.18
51	B	E	F	38	58	42	0	77	0.03	0.08	0.26
52	B	E	F	36	81	19	0	67	0.01	0.07	0.28
53	B	E	F	29	100	0	0	89	0.02	0.1	0.34
54	B	E	F	26	92	8	0	52	0.04	0.12	0.29
55	B	C	F	46	39	61	0	64	0.02	0.09	0.18
56	B	C	F	37	83	17	0	73	0.04	0.07	0.17
61	B	C	F	49	100	0	0	67	0.02	0.07	0.29
58	B	C	F	36	61	39	0	76	0.03	0.08	0.28
59	B	C	F	35	83	17	0	75	0.02	0.09	0.2
60	B	C	F	25	58	42	0	77	0.03	0.11	0.2

APPENDIX M

Data Spreadsheet - Voicebio Analysis™

Pre-test Results

ID	Cell	Group	Gender	Age	VB1	VB1%	VB2	VB2%	VB3	VB3%	VB4	VB4%
1	A	E	M	46	10	24	16	40	6	14	8	20
2	A	E	M	55	14	48	29	100	8	2	9	30
3	A	E	M	54	1	0	39	74	1	0	3	4
4	A	E	M	50	11	18	45	76	4	6	5	8
5	A	E	M	44	6	18	11	38	6	18	10	32
6	A	E	M	38	14	36	8	20	5	12	6	14
7	A	C	M	60	4	6	36	68	2	2	4	6
8	A	C	M	26	17	50	8	22	8	22	8	22
9	A	C	M	56	4	6	19	32	2	2	4	6
10	A	C	M	54	1	2	21	44	0	0	1	2
11	A	C	M	53	8	20	17	42	5	12	5	12
12	A	C	M	45	24	70	28	82	5	14	8	22
13	A	C	M	44	16	58	11	40	10	36	11	40
14	A	C	M	41	12	26	9	20	5	10	6	12
15	A	E	F	45	0	0	35	54	0	0	1	0
16	A	E	F	45	18	40	36	80	5	10	8	16
17	A	E	F	41	3	4	1	0	0	0	0	0
18	A	E	F	35	23	36	49	80	1	0	0	0
19	A	E	F	35	26	58	24	54	5	10	6	12
20	A	E	F	32	5	12	23	58	5	12	7	16
21	A	E	F	37	3	6	17	44	3	6	4	10
22	A	E	F	26	41	100	20	92	0	0	4	8
23	A	E	F	27	8	18	5	10	3	6	5	10
24	A	E	F	26	1	0	37	2	0	0	1	0
25	A	E	F	22	8	12	43	70	1	0	2	2
26	A	E	F	44	3	2	14	16	0	0	1	0
27	A	C	F	54	6	10	28	50	2	2	6	10
28	A	C	F	48	6	12	4	8	2	4	4	8
29	A	C	F	47	9	22	31	78	5	12	8	20
30	A	C	F	30	5	12	41	100	3	6	4	8

ID	Cell	Group	Gender	Age	VB1	VB1%	VB2	VB2%	VB3	VB3%	VB4	VB4%
31	A	C	F	37	5	6	3	4	0	0	2	2
32	A	C	F	33	38	78	27	56	3	6	4	8
33	A	C	F	31	34	100	19	54	10	28	10	28
34	A	C	F	27	1	2	40	100	1	2	3	6
35	A	C	F	25	7	18	38	100	7	18	7	18
36	A	C	F	23	7	16	35	84	7	16	7	16
37	A	C	F	33	7	14	8	18	4	8	7	14
38	A	C	F	55	2	4	17	34	0	0	1	2
39	B	E	M	59	14	22	5	8	0	0	1	0
40	B	E	M	38	1	0	47	66	1	0	1	0
41	B	E	M	33	2	2	5	6	2	2	3	4
42	B	E	M	48	4	8	40	84	4	8	4	8
43	B	E	M	44	26	72	32	80	4	10	5	12
44	B	E	M	32	7	14	40	88	1	2	5	10
45	B	C	M	54	6	12	38	76	5	10	6	12
46	B	C	M	40	24	50	34	72	3	6	3	6
47	B	C	M	24	31	50	23	36	4	6	6	8
48	B	C	M	26	5	10	5	10	2	4	5	10
49	B	E	F	49	4	8	23	48	1	2	4	8
50	B	E	F	25	29	54	30	56	3	4	3	4
51	B	E	F	38	3	4	31	56	3	4	4	6
52	B	E	F	36	1	0	54	100	1	0	4	6
53	B	E	F	29	7	10	51	78	2	2	5	6
54	B	E	F	26	19	34	43	80	0	0	5	8
55	B	C	F	46	14	32	30	70	6	14	6	14
56	B	C	F	37	19	52	36	100	5	12	7	10
61	B	C	F	49	9	20	18	40	7	16	8	18
58	B	C	F	36	1	0	59	100	0	0	1	0
59	B	C	F	35	6	12	12	24	3	6	3	6
60	B	C	F	25	15	40	30	80	8	20	9	24

Post-test Results

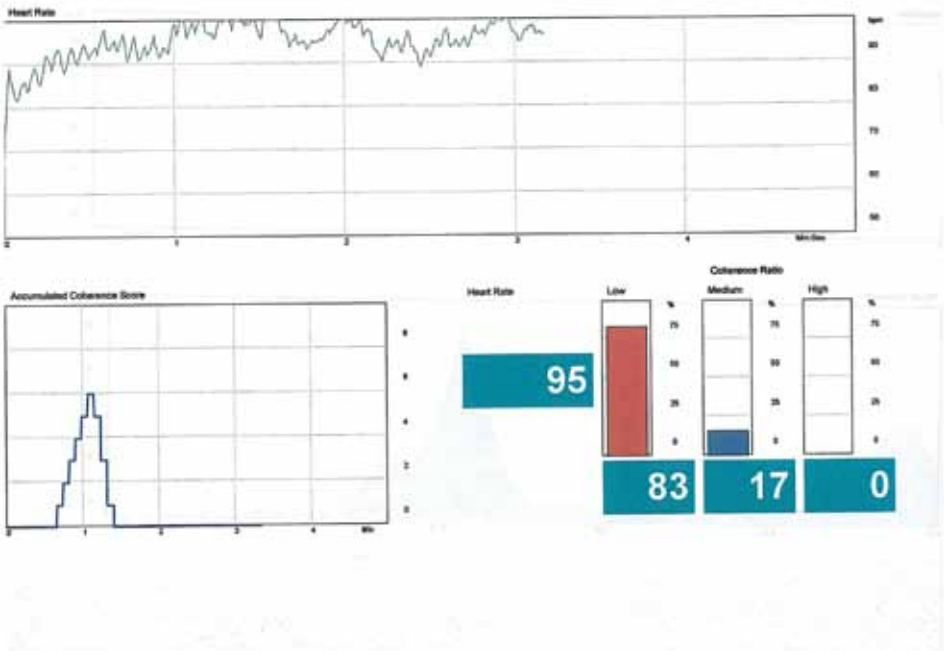
ID	Cell	Group	Gender	Age	VB1	VB1%	VB2	VB2%	VB3	VB3%	VB4	VB4%	VBpost
1	A	E	M	46	11	34	18	56	16	50	9	28	M
2	A	E	M	55	5	14	32	100	9	28	12	36	E
3	A	E	M	54	6	14	34	88	6	14	9	22	M
4	A	E	M	50	15	36	35	86	8	20	8	20	M
5	A	E	M	44	6	14	38	100	6	14	18	46	E
6	A	E	M	38	11	36	30	100	9	30	14	46	L
7	A	C	M	60	29	6	28	68	3	2	7	6	M
8	A	C	M	26	8	26	16	54	16	54	17	58	E
9	A	C	M	56	1	2	30	68	7	14	1	2	E
10	A	C	M	54	11	26	10	22	5	10	11	26	M
11	A	C	M	53	4	12	19	58	13	40	14	42	E
12	A	C	M	45	20	66	24	96	10	32	11	36	E
13	A	C	M	44	19	54	9	26	10	28	9	26	L
14	A	C	M	41	4	10	27	76	13	36	4	10	L
15	A	E	F	45	3	4	20	32	3	4	3	4	M
16	A	E	F	45	18	50	35	100	9	24	11	30	E
17	A	E	F	41	8	14	0	0	12	22	1	0	M
18	A	E	F	35	11	44	18	90	23	26	20	4	M
19	A	E	F	35	15	50	17	56	9	30	10	32	E
20	A	E	F	32	11	34	11	34	11	34	10	32	E
21	A	E	F	37	9	24	34	96	9	24	11	30	M
22	A	E	F	26	32	88	26	82	3	8	4	10	M
23	A	E	F	27	13	30	7	16	4	8	7	16	E
24	A	E	F	26	1	0	20	32	5	8	1	0	E
25	A	E	F	22	0	0	43	74	3	4	4	6	E
26	A	E	F	44	7	10	7	10	4	6	5	8	M
27	A	C	F	54	5	12	21	54	7	16	5	12	E
28	A	C	F	48	6	18	13	38	9	26	6	18	M
29	A	C	F	47	10	28	26	74	5	14	9	24	E
30	A	C	F	30	8	20	39	100	6	14	7	16	M

ID	Cell	Group	Gender	Age	VB1	VB1%	VB2	VB2%	VB3	VB3%	VB4	VB4%	VBPost
31	A	C	F	37	15	52	15	52	12	42	12	42	M
32	A	C	F	33	32	100	31	96	6	18	9	28	L
33	A	C	F	31	21	50	19	46	5	12	16	38	E
34	A	C	F	27	5	12	35	86	5	12	8	20	E
35	A	C	F	25	14	42	16	48	8	24	14	42	L
36	A	C	F	23	21	86	16	66	17	70	21	86	L
37	A	C	F	33	11	34	17	52	10	30	11	34	L
38	A	C	F	55	6	12	22	46	6	12	10	20	M
39	B	E	M	59	17	30	3	4	2	2	5	8	E
40	B	E	M	38	9	20	27	64	9	20	4	8	M
41	B	E	M	33	2	4	43	100	2	4	3	6	M
42	B	E	M	48	1	0	17	30	10	16	7	12	L
43	B	E	M	44	17	44	35	94	9	24	6	16	M
44	B	E	M	32	10	26	36	100	7	10	12	32	M
45	B	C	M	54	16	36	31	70	8	18	5	10	M
46	B	C	M	40	16	42	37	100	3	8	9	24	M
47	B	C	M	24	16	28	21	36	4	6	5	8	E
48	B	C	M	26	12	24	7	14	4	8	7	14	E
49	B	E	F	49	3	6	7	14	6	12	11	24	M
50	B	E	F	25	43	100	20	46	4	8	5	10	E
51	B	E	F	38	6	14	24	60	6	14	17	42	M
52	B	E	F	36	5	10	36	80	5	10	10	22	M
53	B	E	F	29	4	6	50	80	9	14	7	10	L
54	B	E	F	26	7	12	52	100	3	4	3	4	L
55	B	C	F	46	2	4	37	100	4	10	21	50	L
56	B	C	F	37	16	52	30	100	16	52	14	46	L
61	B	C	F	49	15	50	29	96	4	12	10	32	L
58	B	C	F	36	10	26	38	100	9	22	10	26	M
59	B	C	F	35	5	12	9	24	5	12	8	20	E
60	B	C	F	25	6	18	26	82	17	54	23	74	L

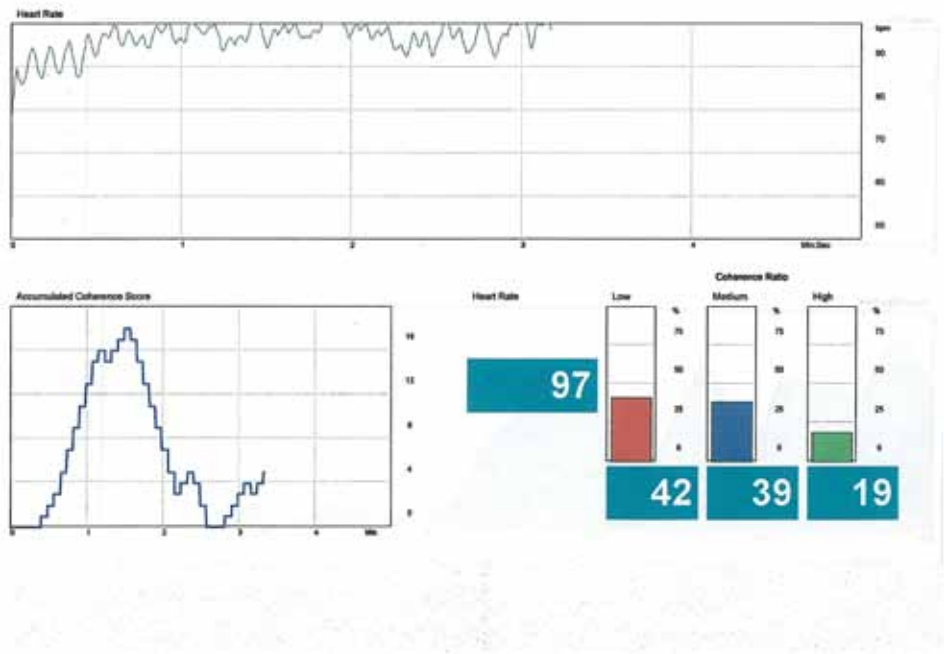
APPENDIX N
Examples of Freeze Framer 2.0® Results

Heart Rate and Coherence Ratio

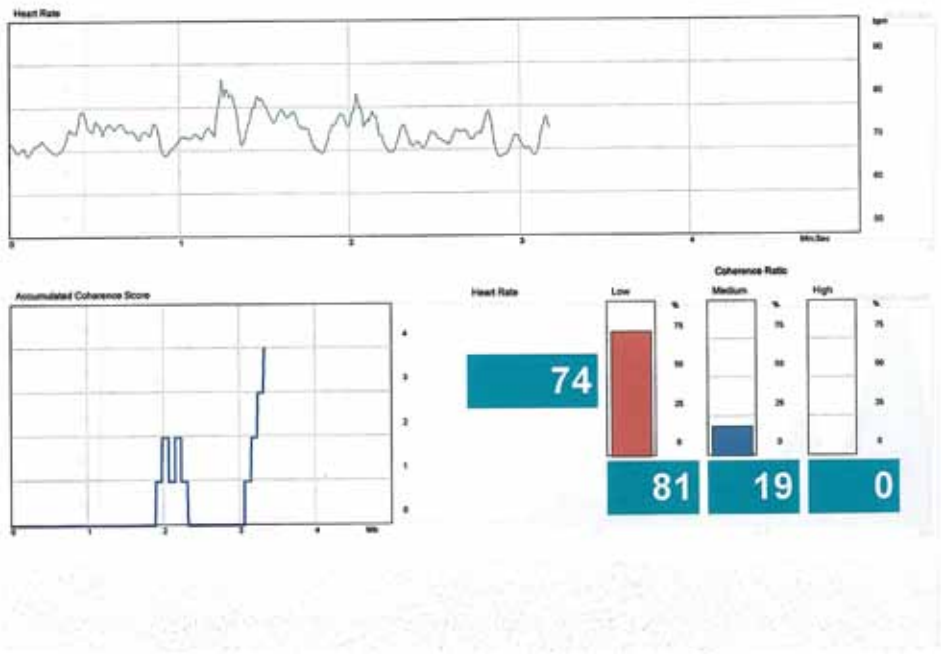
Example 1a: Pre-test results



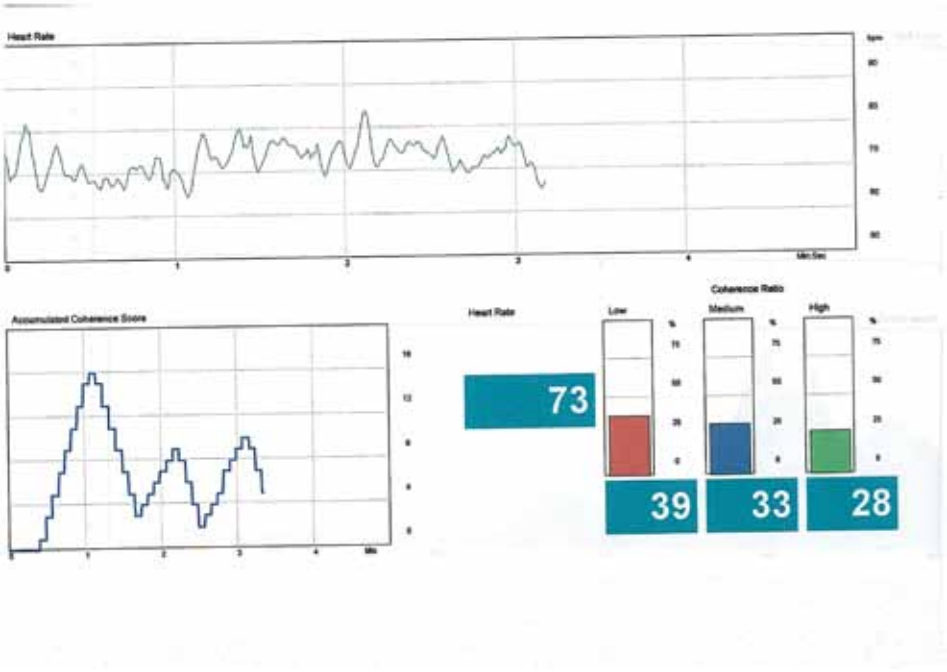
Example 1b: Post-test results demonstrating improvement in Coherence Ratio



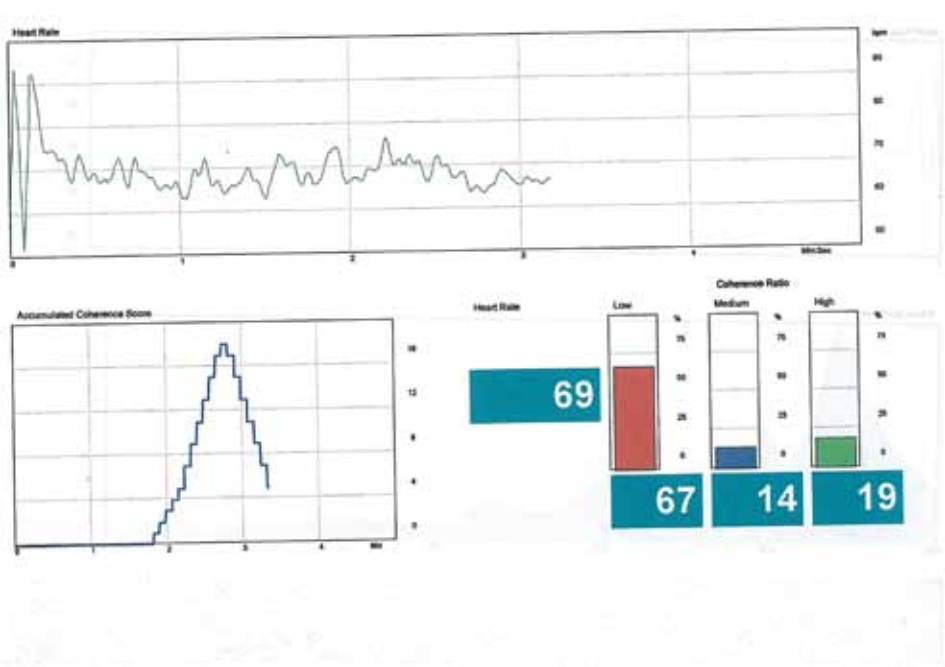
Example 2a: Pre-test results



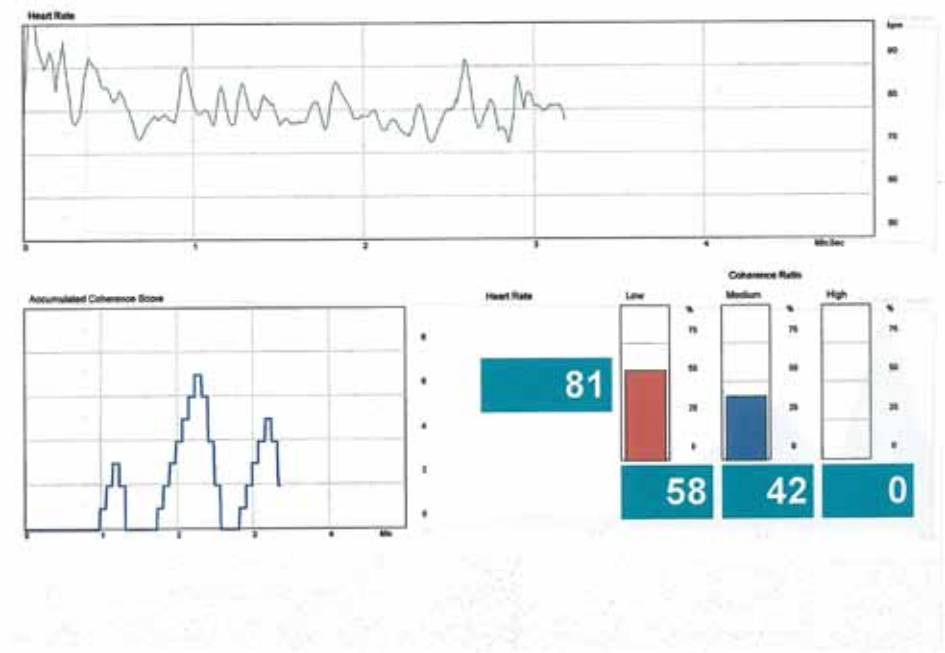
Example 2b: Post-test results demonstrating improvement in Coherence Ratio



Example 3a: Pre-test results

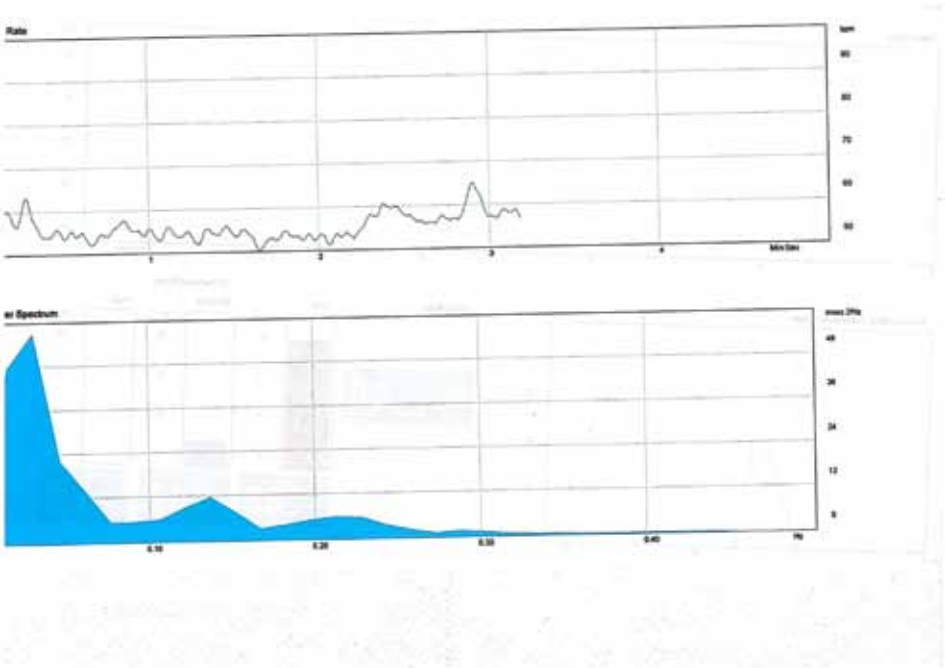


Example 3b: Post-test results demonstrating decreases in Coherence Ratio

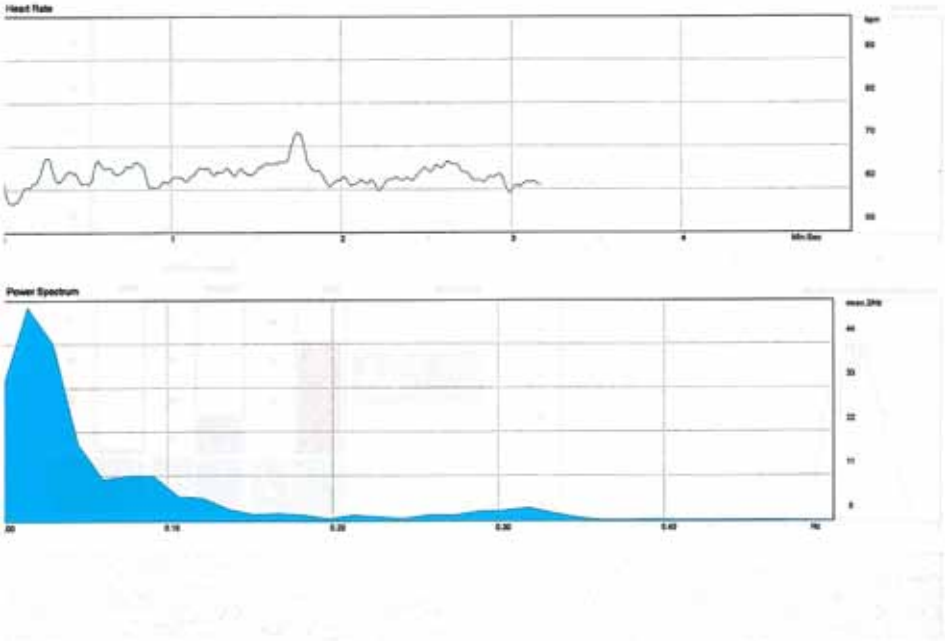


Power Spectrum Density (PSD) graphs

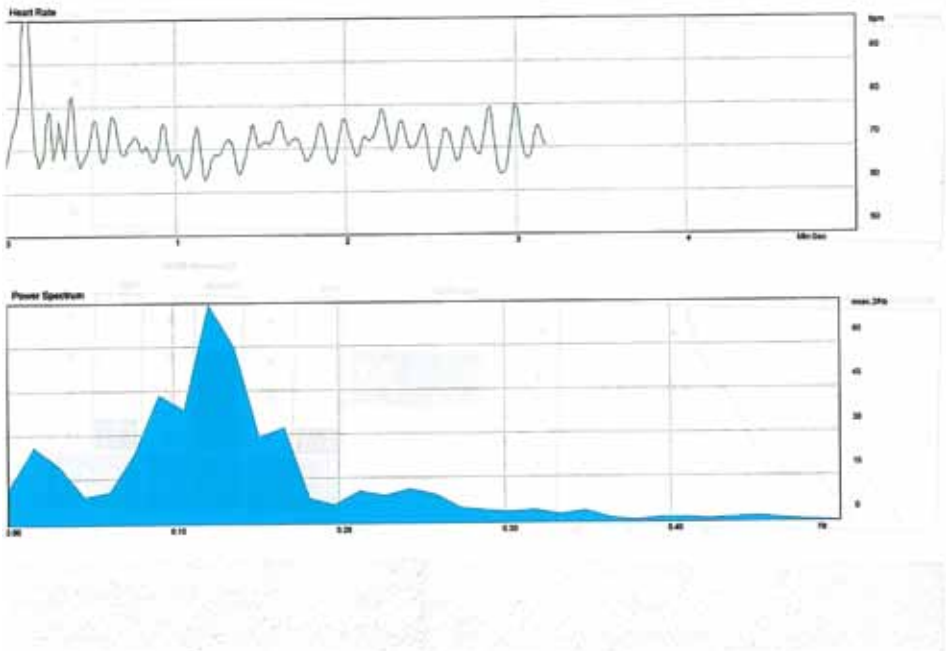
Example 1a: Pre-test results with peak in LF (dominant sympathetic activity)



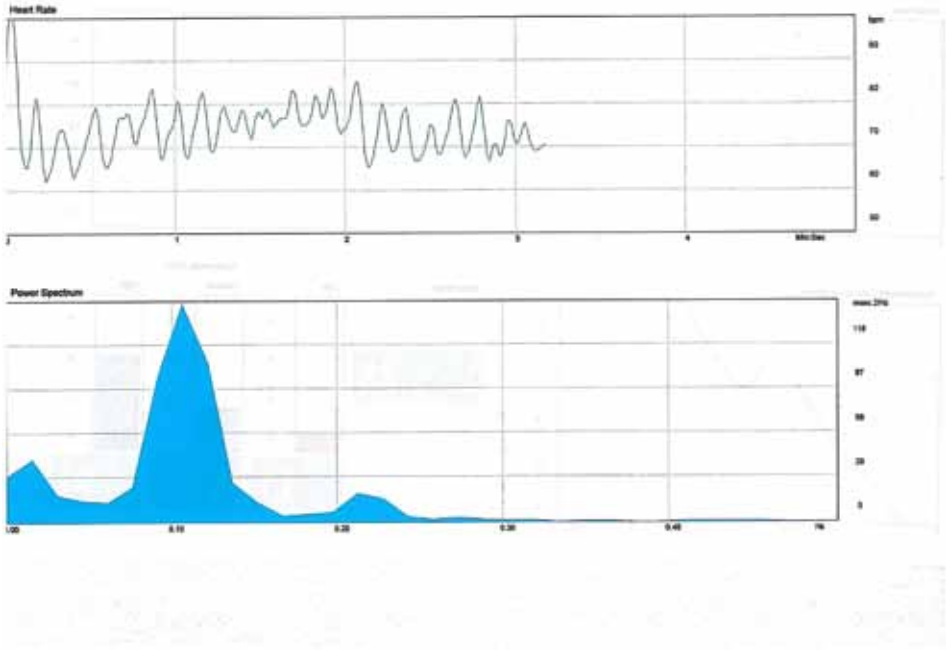
Example 1b: Post-test with peak still in LF (dominant sympathetic activity)



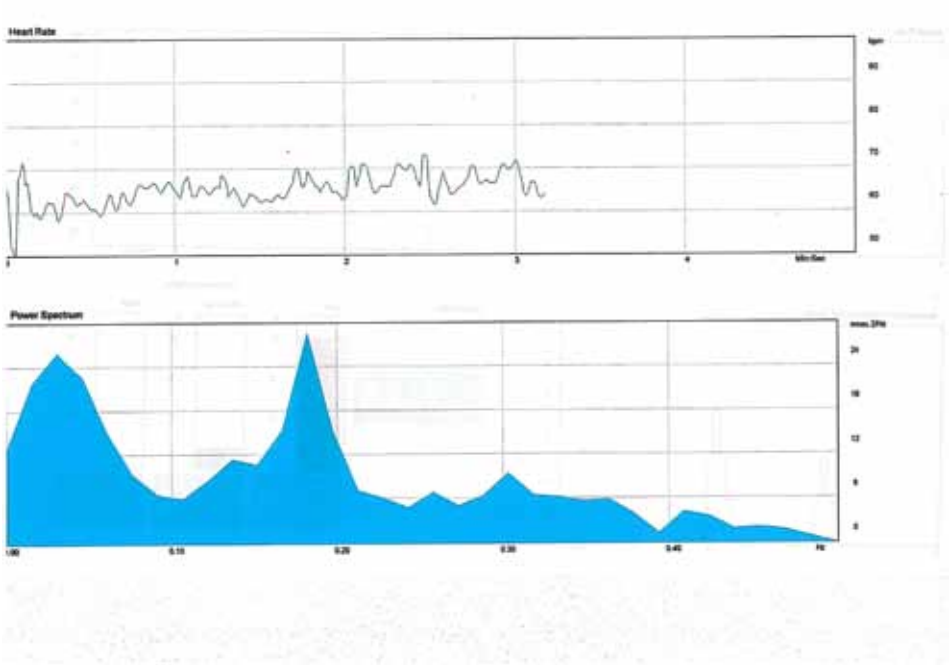
Example 2a: Pre-test result with peak in MF (mixed sympathetic/parasympathetic)



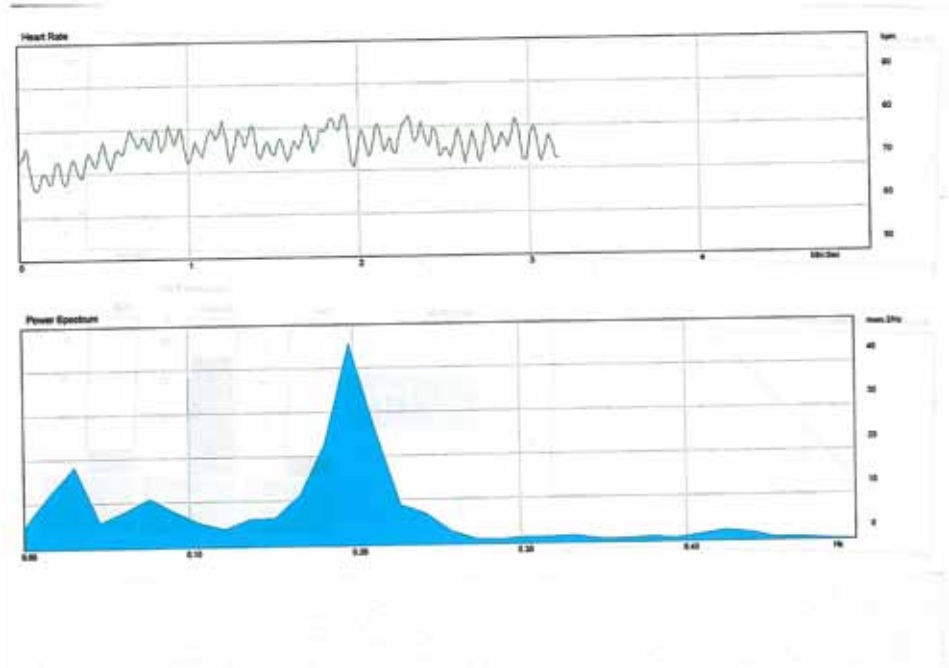
Example 2b: Post-test result with peak close to 0.1 Hz in MF (high level of coherence)



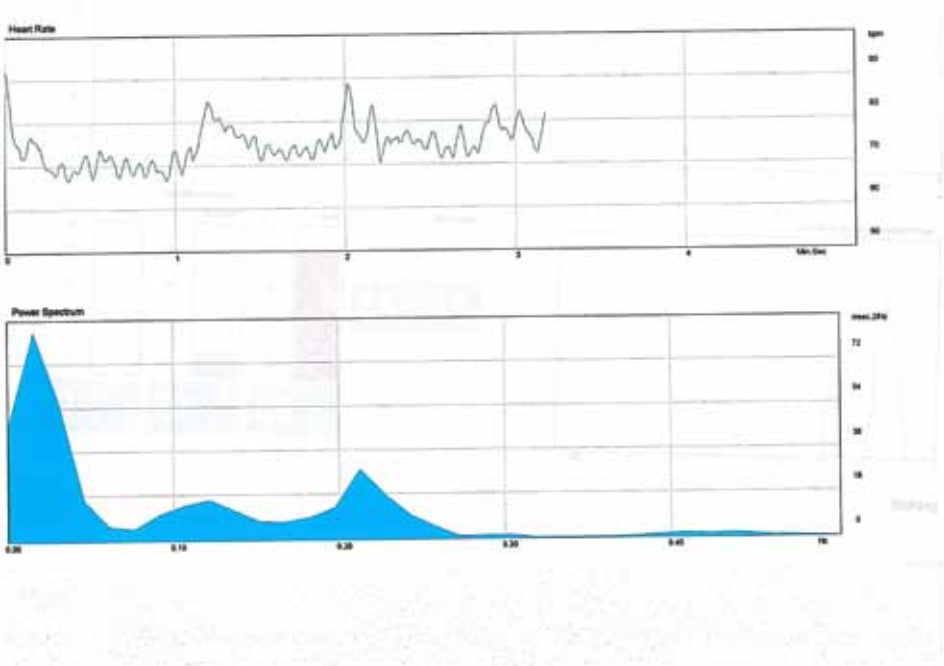
Example 3a: Pre-test results with peak in HF (parasympathetic activity)



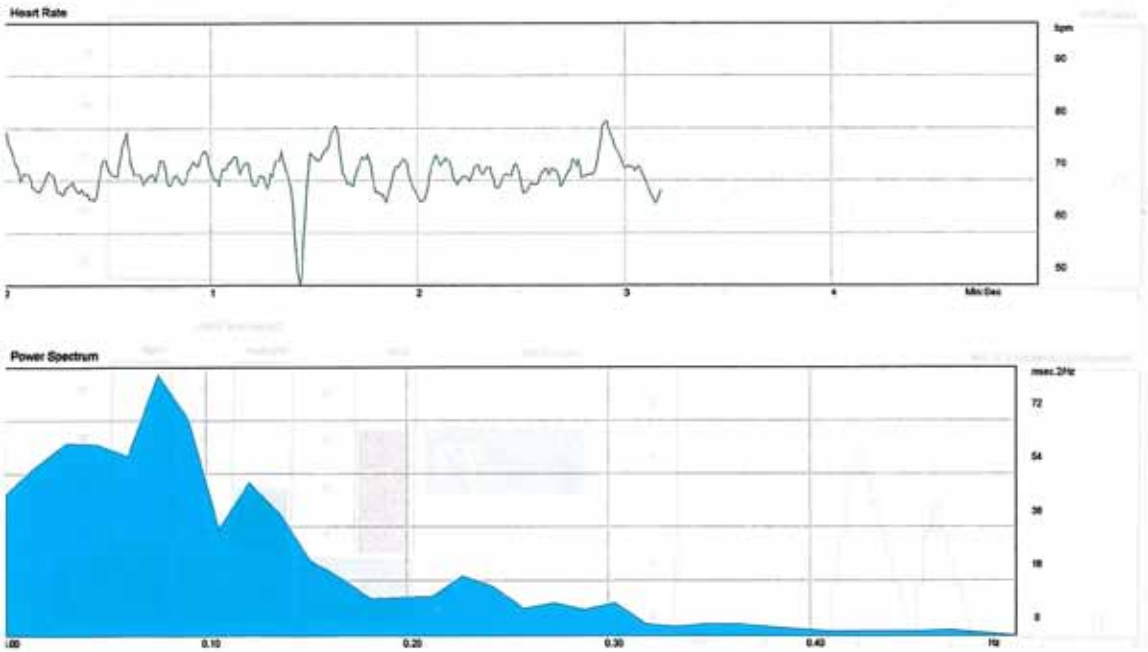
Example 3b: Post-test results with peak in HF (parasympathetic activity)



Example 4a: Pre-test results with peak in LF



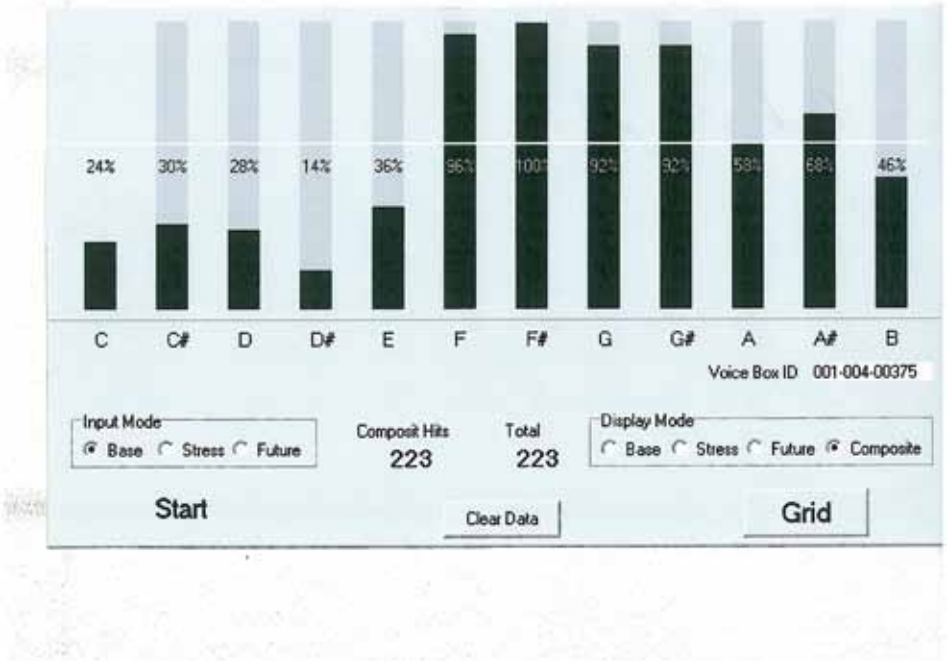
Example 4: Post-test results with shift of peak to MF (more coherence)



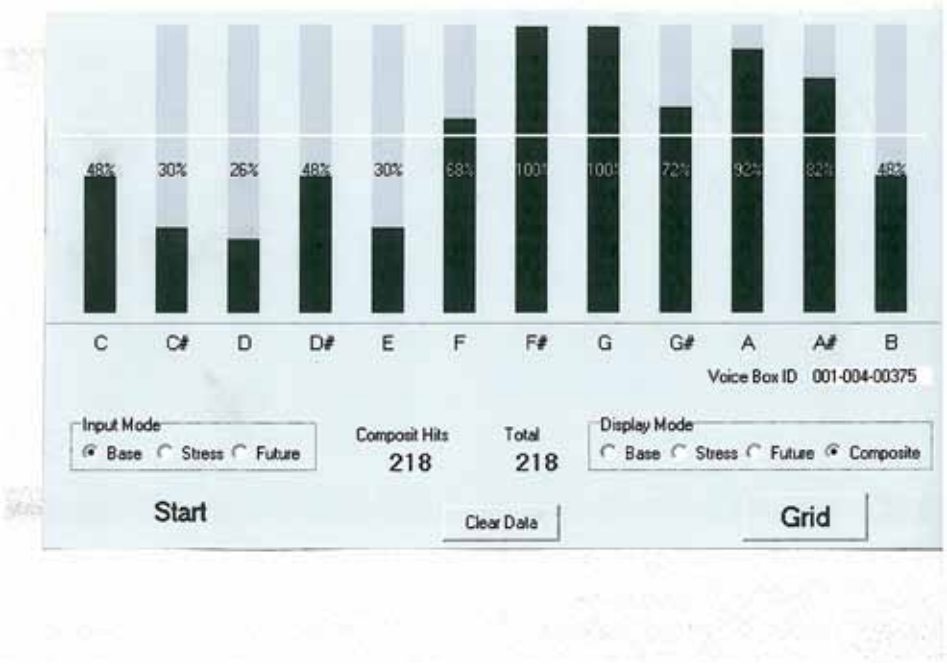
APPENDIX O
Examples of VIBEprint™ Results

Equal Energetic Balance: Graph version

Example 1a: Pre-test

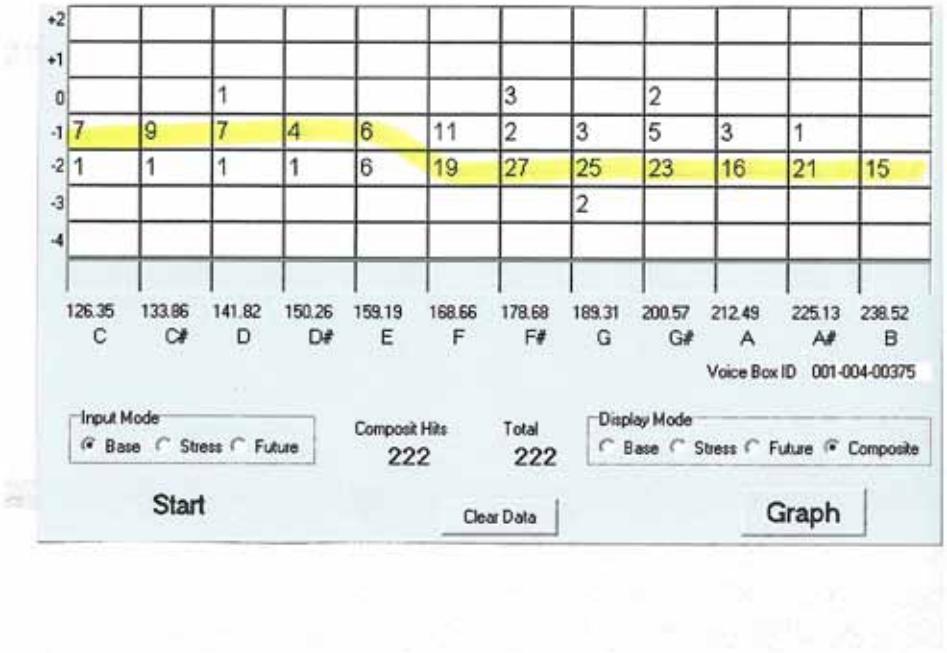


Example 1b: Post-test demonstrating Equal Balance



Equal Energetic Balance: Grid scores

Example 1a: Pre-test



	126.35 C	133.86 C#	141.82 D	150.26 D#	159.19 E	168.66 F	178.68 F#	189.31 G	200.57 G#	212.49 A	225.13 A#	238.52 B
+2												
+1												
0			1				3		2			
-1	7	9	7	4	6	11	2	3	5	3	1	
-2	1	1	1	1	6	19	27	25	23	16	21	15
-3								2				
-4												

Voice Box ID 001-004-00375

Input Mode: Base Stress Future

Composit Hits 222

Total 222

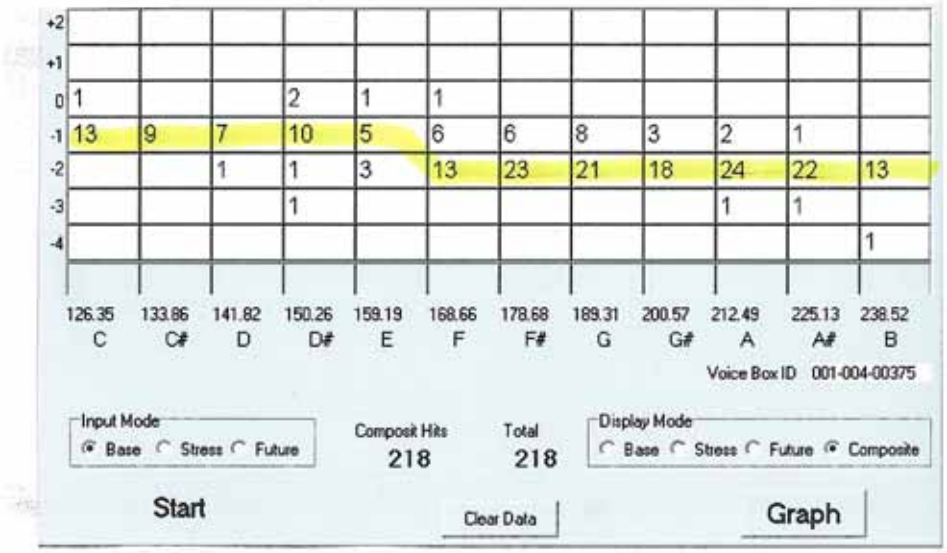
Display Mode: Base Stress Future Composite

Start

Clear Data

Graph

Example 1b: Post-test



	126.35 C	133.86 C#	141.82 D	150.26 D#	159.19 E	168.66 F	178.68 F#	189.31 G	200.57 G#	212.49 A	225.13 A#	238.52 B
+2												
+1												
0	1			2	1	1						
-1	13	9	7	10	5	6	6	8	3	2	1	
-2			1	1	3	13	23	21	18	24	22	13
-3				1						1	1	
-4												1

Voice Box ID 001-004-00375

Input Mode: Base Stress Future

Composit Hits 218

Total 218

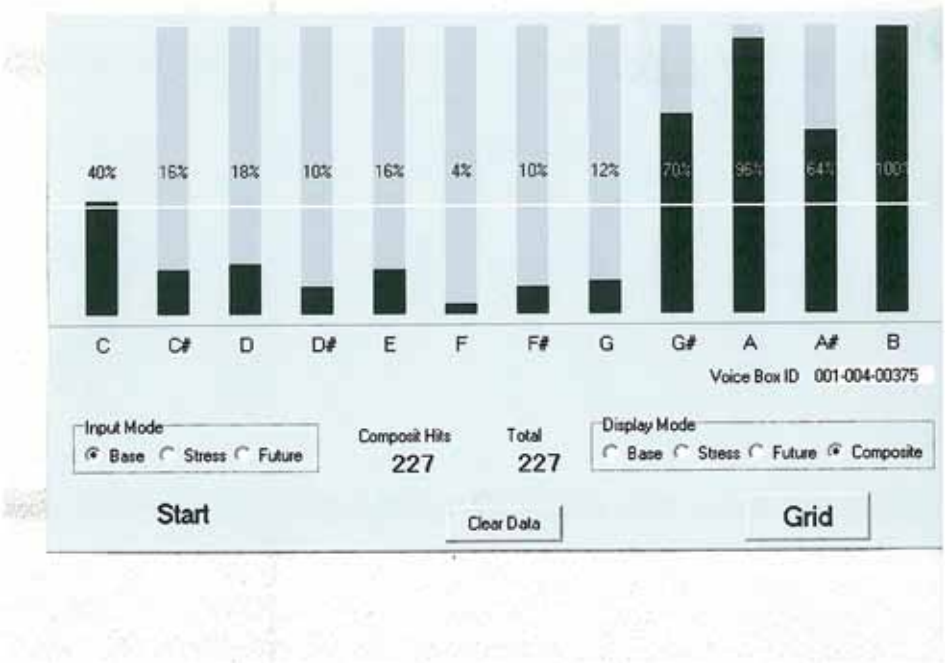
Display Mode: Base Stress Future Composite

Start

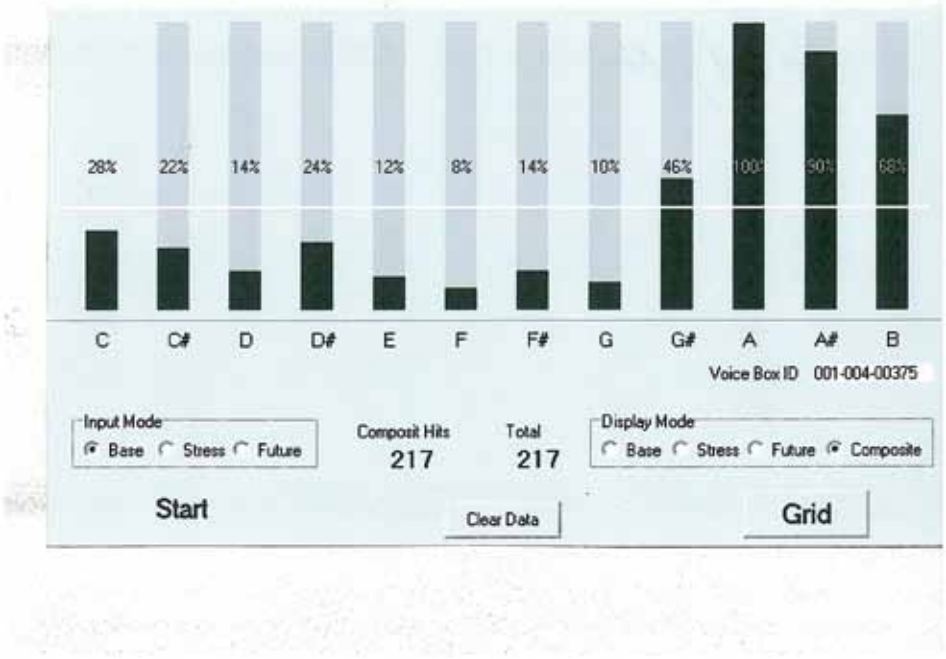
Clear Data

Graph

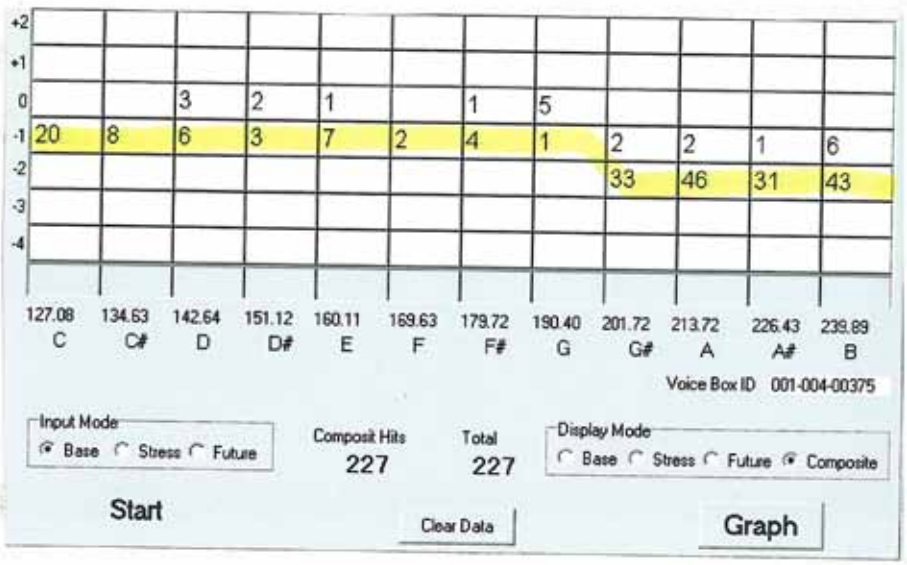
Example 2a: Pre-test



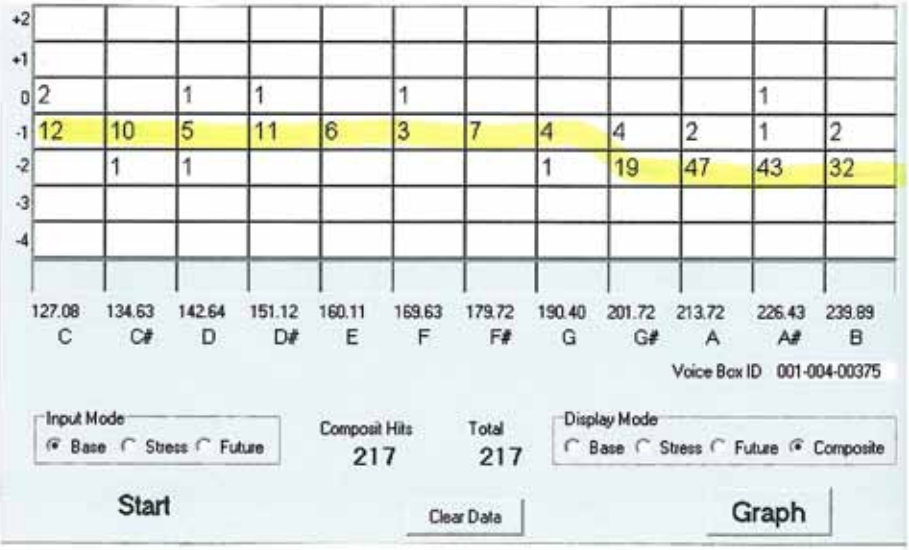
Example 2b: Post-test demonstrating Equal Balance



Example 2a: Pre-test

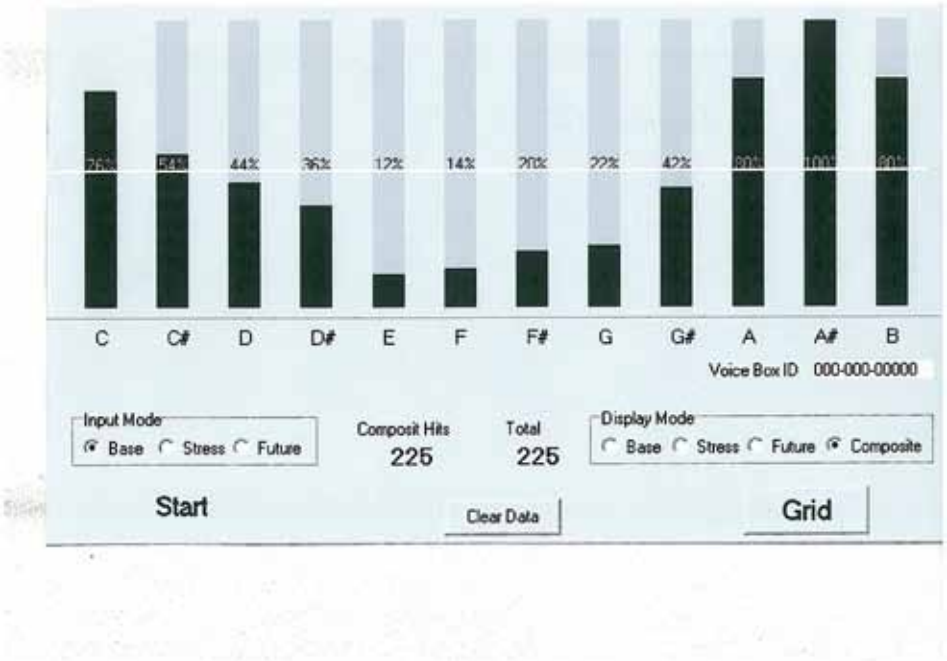


Example 2b: Post-test

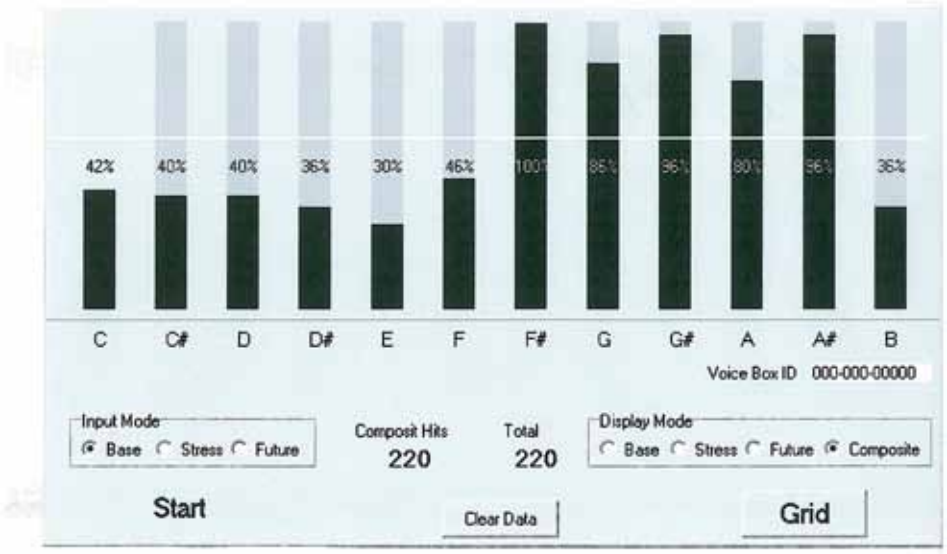


Less Energetic Balance: Graph

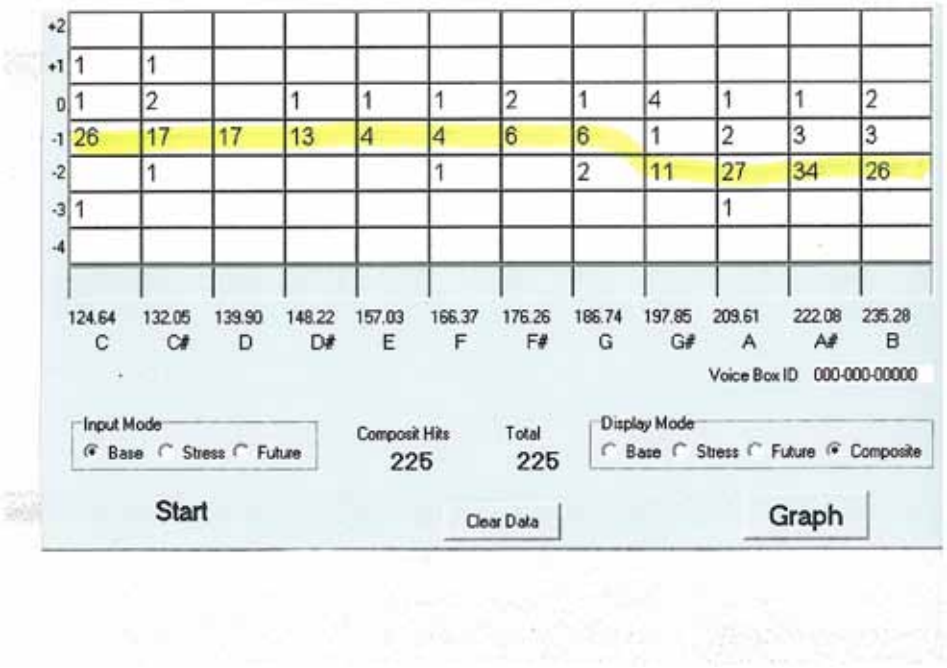
Example 1a: Pre-test



Example 1b: Post-test demonstrating a loss in the sine-curve



Example 1a: Pre-test



	124.64 C	132.05 C#	139.90 D	148.22 D#	157.03 E	166.37 F	176.26 F#	186.74 G	197.85 G#	209.61 A	222.08 A#	235.28 B
+2												
+1	1	1										
0	1	2		1	1	1	2	1	4	1	1	2
-1	26	17	17	13	4	4	6	6	1	2	3	3
-2		1				1		2	11	27	34	26
-3	1									1		
-4												

Voice Box ID 000-000-00000

Input Mode: Base, Stress, Future

Composit Hits 225

Total 225

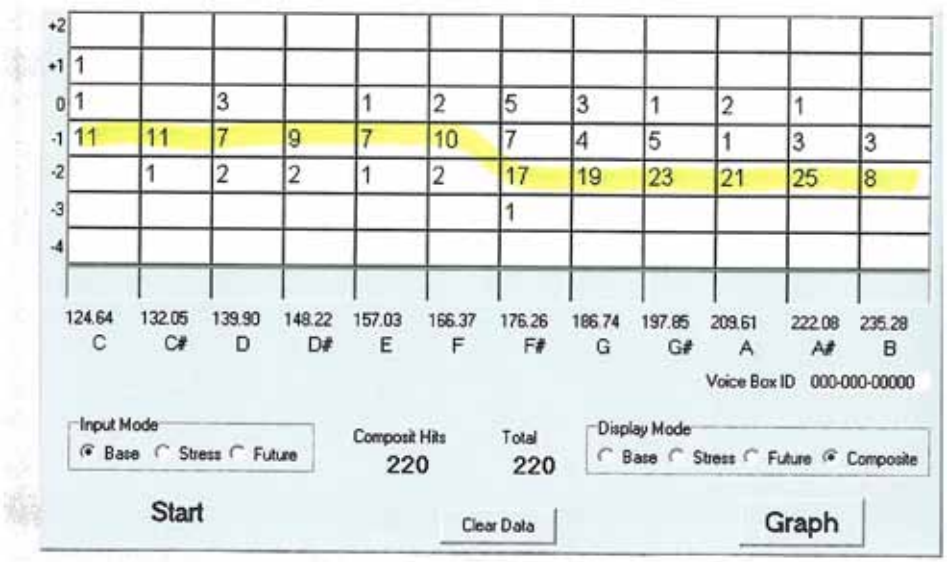
Display Mode: Base, Stress, Future, Composite

Start

Clear Data

Graph

Example 1b: Post-test



	124.64 C	132.05 C#	139.90 D	148.22 D#	157.03 E	166.37 F	176.26 F#	186.74 G	197.85 G#	209.61 A	222.08 A#	235.28 B
+2												
+1	1											
0	1		3		1	2	5	3	1	2	1	
-1	11	11	7	9	7	10	7	4	5	1	3	3
-2		1	2	2	1	2	17	19	23	21	25	8
-3							1					
-4												

Voice Box ID 000-000-00000

Input Mode: Base, Stress, Future

Composit Hits 220

Total 220

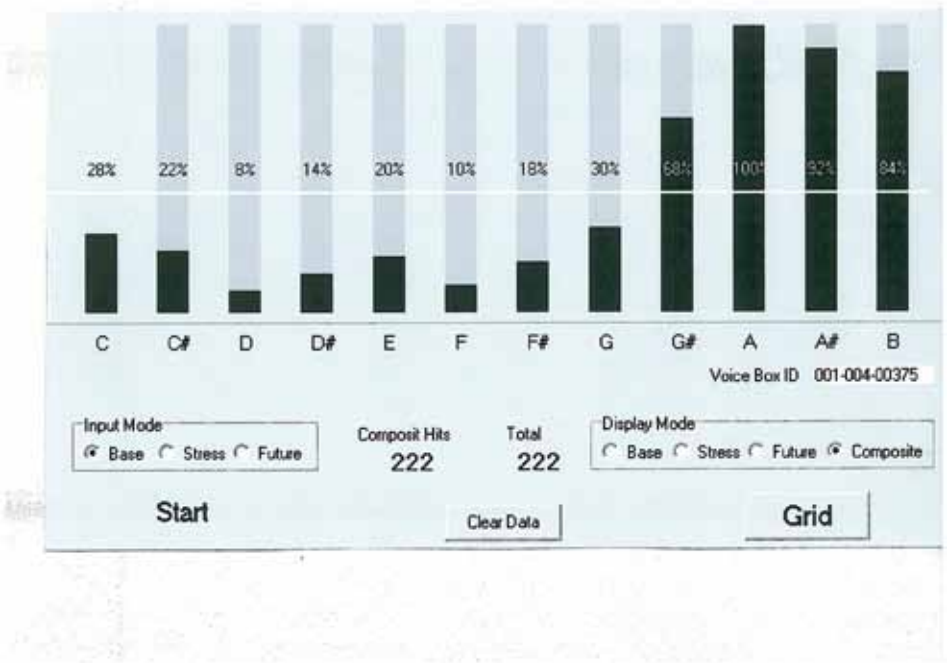
Display Mode: Base, Stress, Future, Composite

Start

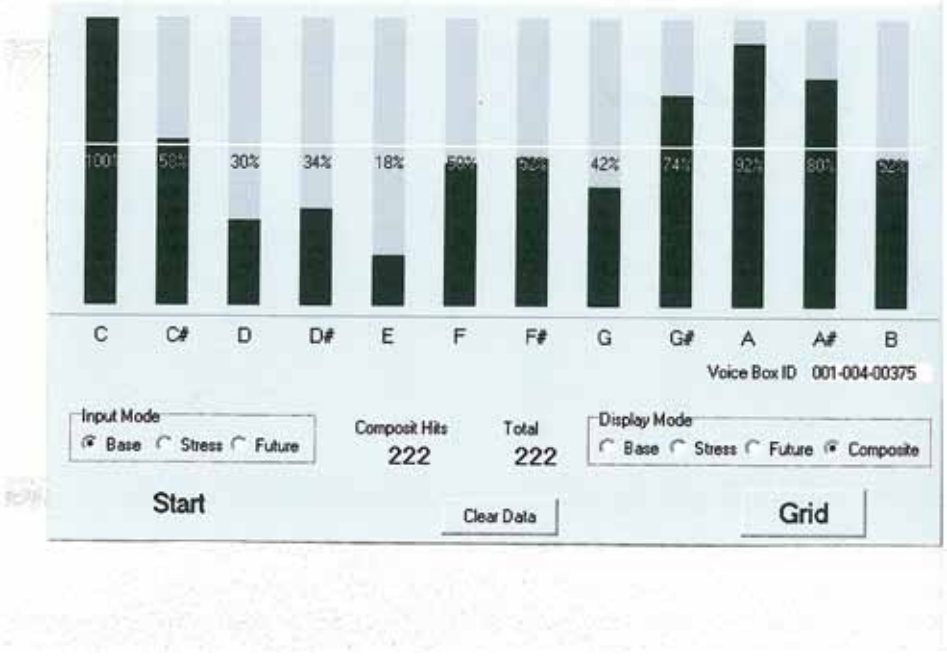
Clear Data

Graph

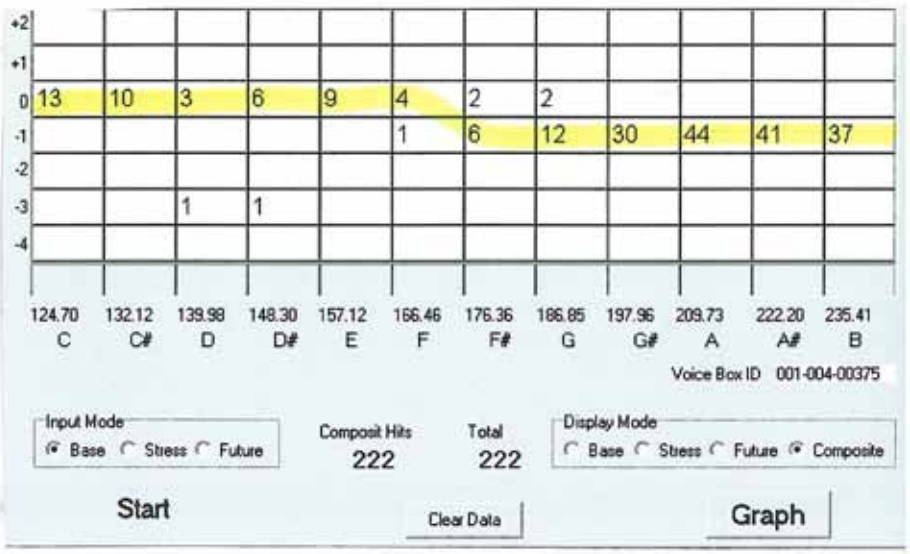
Example 2a: Pre-test



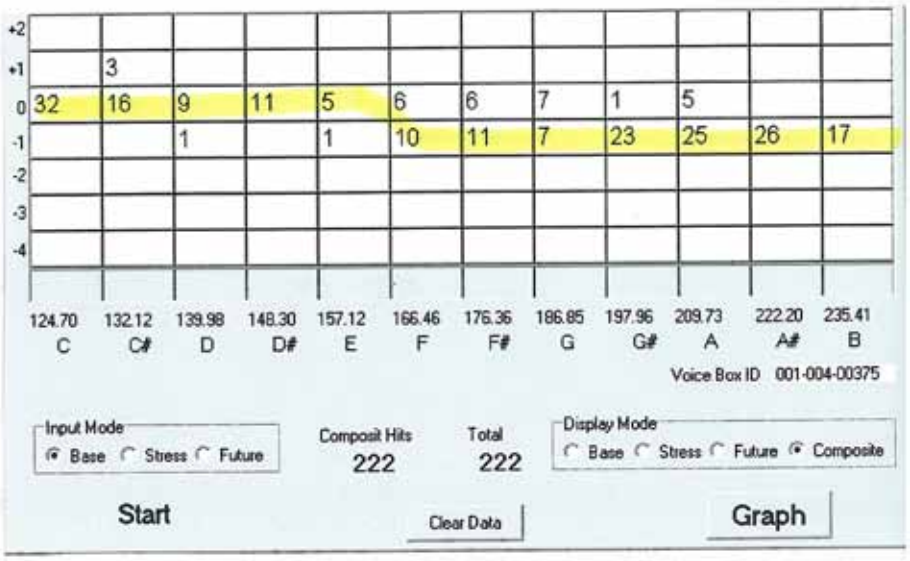
Example 2b: Post-test demonstrating Less Balance



Example 2a: Pre-test

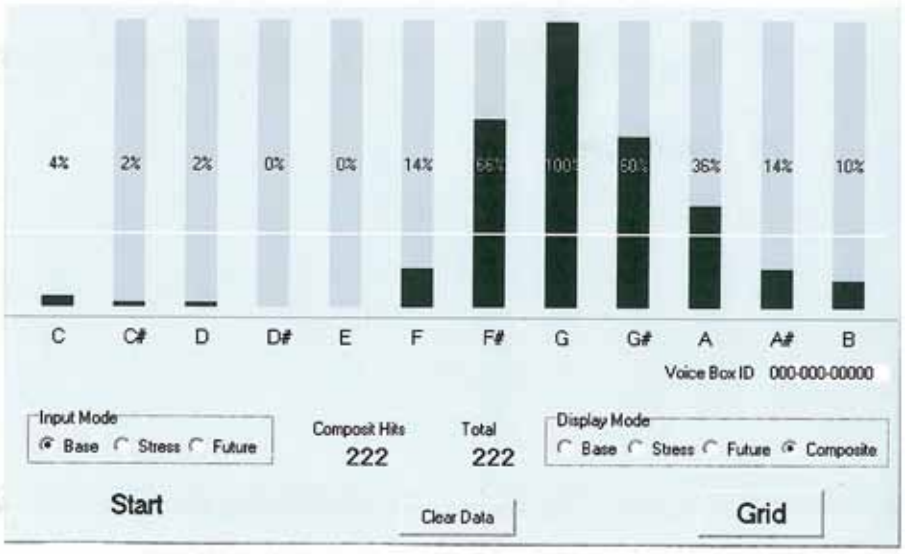


Example 2b: Post-test

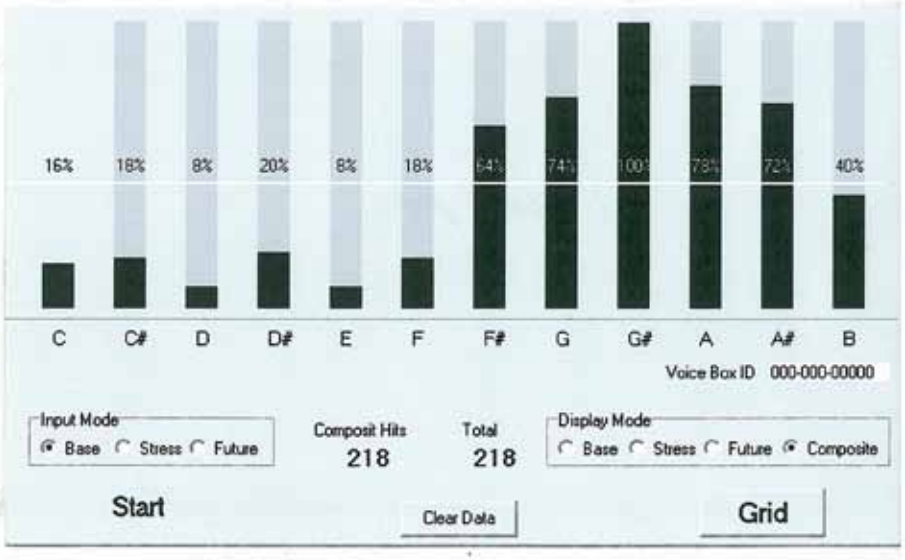


Examples demonstrating More Energetic Balance: Graph

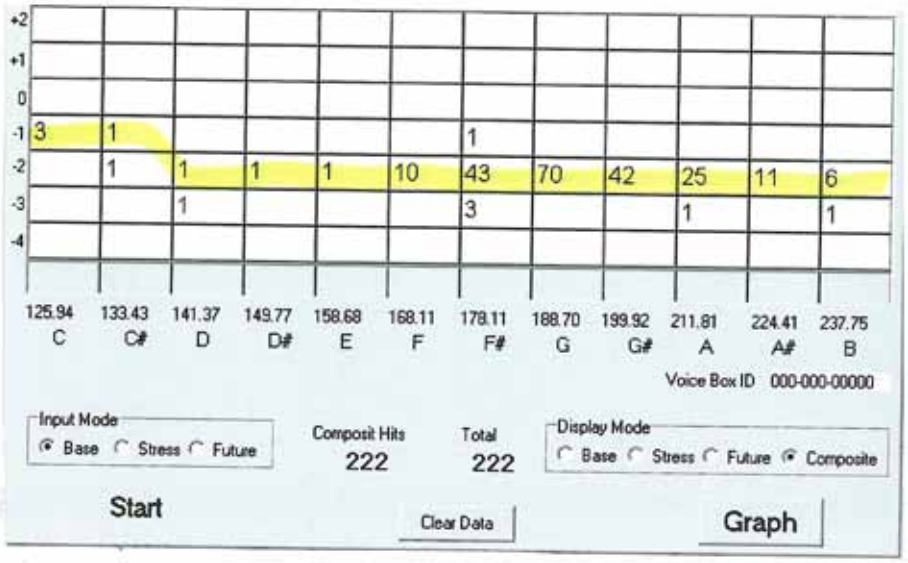
Example 1a: Pre-test



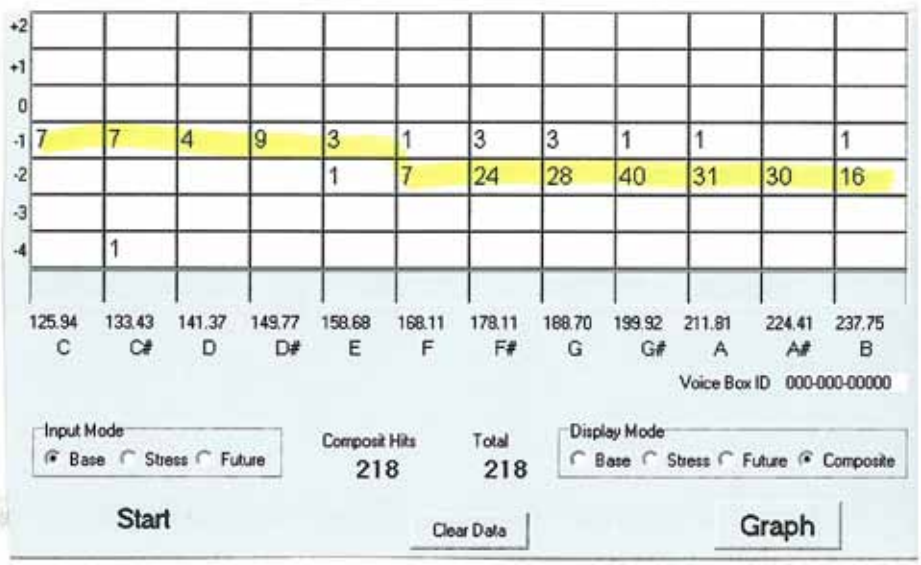
Example 1b: Post-test demonstrating frequency in all notes



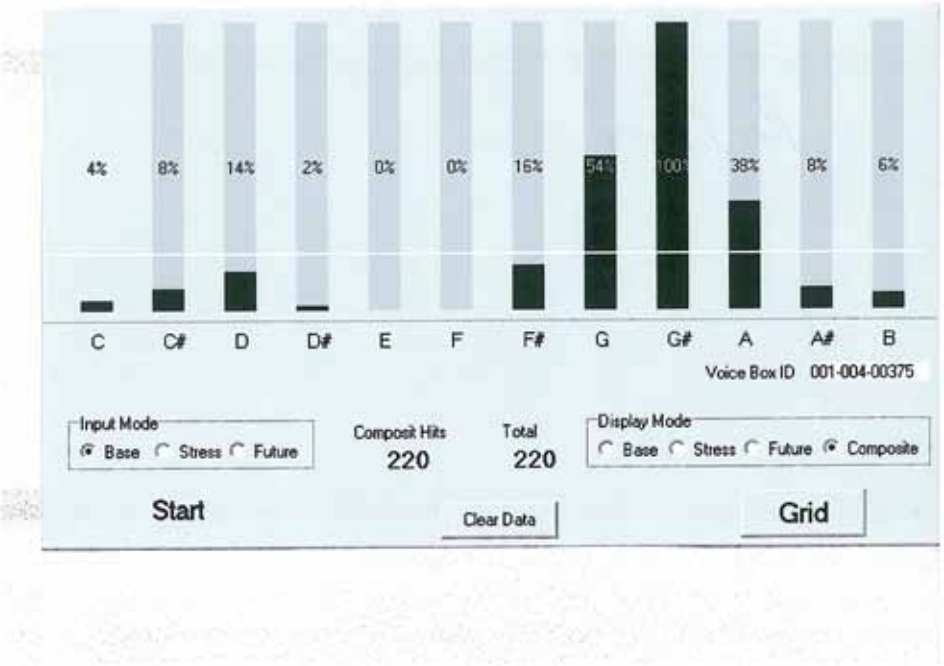
Example 1a: Pre-test



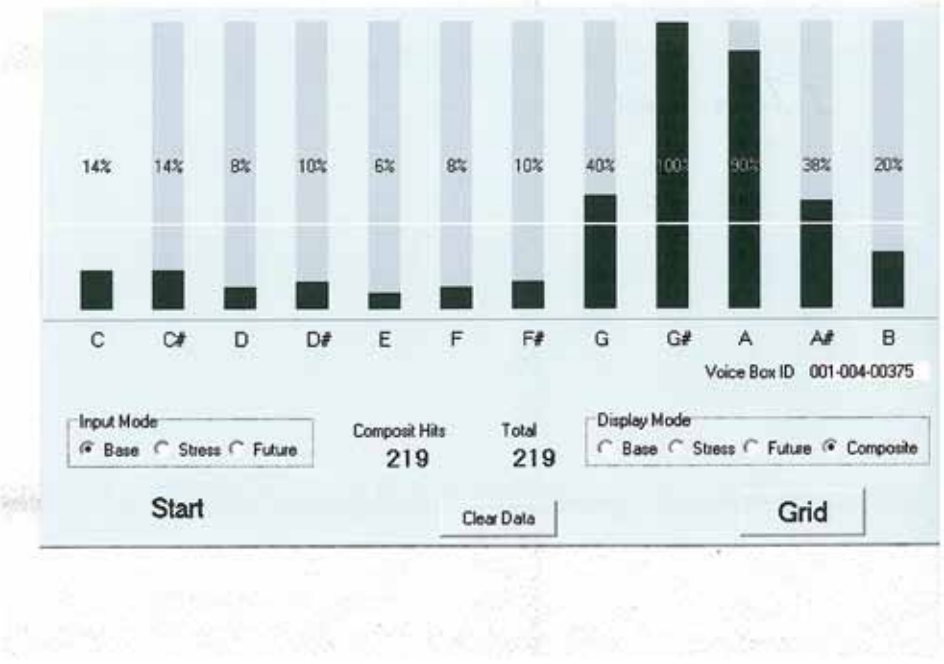
Example 1b: Post-test



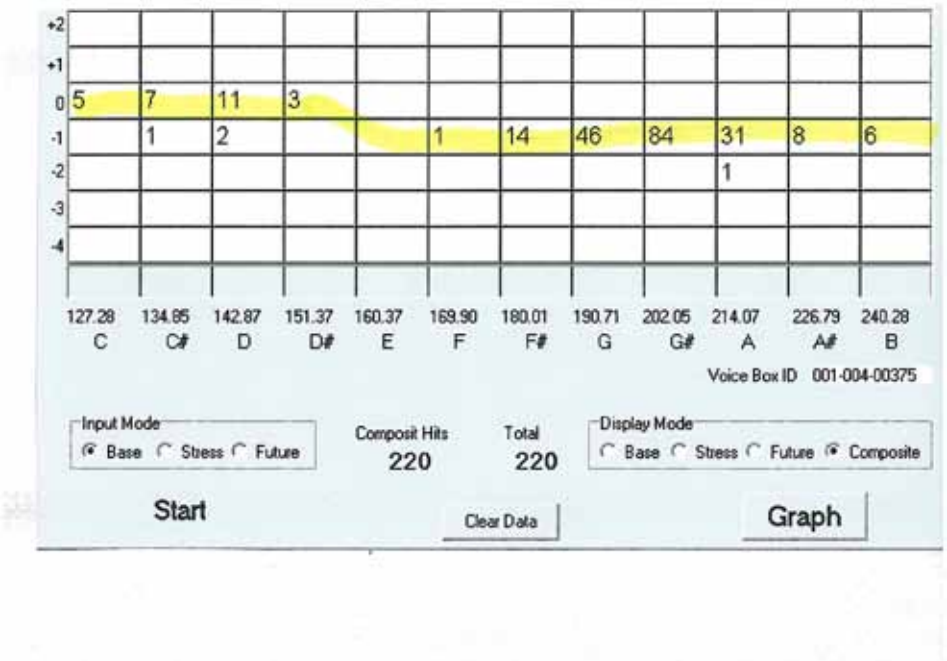
Example 2a: Pre-test



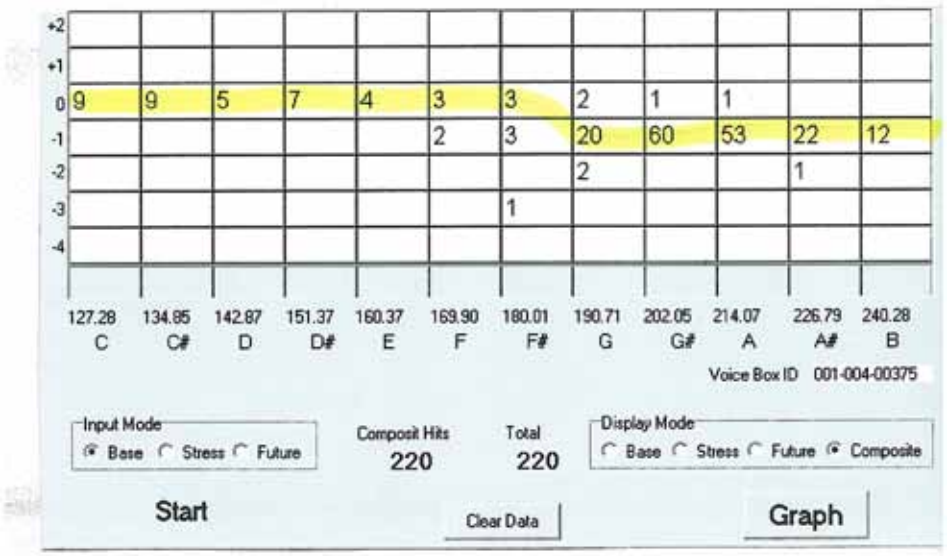
Example 2b: Post-test demonstrating frequency in all notes



Example 2a: Pre-test



Example 2b: Post-test



APPENDIX P

Note Chart of Voicebio Analysis™

C	C#	D	D#
Physical Areas Thyroid Lymph circulation Meridian Small intestine	Physical Areas Kidney (right) Tendons & Ligaments Meridian Kidney	Physical Areas Kidney (left) Hardening of the arteries Meridian Pericardium	Physical Areas Adrenals Parasites Meridian Bladder
E	**F**	**F#**	**G**
Physical Areas Spleen/Thymus Candida-Yeast Overgrowth Meridian Spleen	Physical Areas Pancreas Eyes Ears Meridian Triple Warmer	Physical Areas Brain Sympathetic nervous system Pituitary gland Meridian Stomach	Physical Areas Neurotransmitters Parasympathetic nerve sys Liver Meridian Liver
G#	**A**	**A#**	**B**
Physical Areas Enzyme production Prostate Meridian Gallbladder	Physical Areas Bladder Lungs Meridian Lung	Physical Areas Heart/heart valves Coronary arteries Meridian Heart	Physical Areas Colon Large intestines Meridian Large Intestine

*Please note that this list is not complete and includes only examples of some areas in the body associated with certain notes

APPENDIX Q
IRB Proposal

PROTOCOL FOR EXPEDITED REVIEW OF RESEARCH

Title of Research: The Effects of Vibrational Frequencies of Sound and Positive Emotional States on Energetic and Psychophysiological Balance

Background and Theoretical Framework:

Most people in the Western world experience high levels of stress in the high-tech, fast-paced society they live in. The list of stressors seems endless, whether it is the stress related to jobs, relationships, world events or money.

The natural stress-handling mechanisms in the body adapt to mounting tension, but when strain and stress continues, the body experiences symptoms of overload and imbalance. Natural defense mechanisms break down which result in fatigue, loss of concentration, sleeplessness, anxiety, depression and a variety of other symptoms.

In a special report, Paul Rosch describes the different views on stress.[1] The 19th century French physiologist, Claude Bernard emphasized that good health depends on the ability of the organism to maintain constancy of the internal environment (*milieu interieur*), specifically the chemicals in the blood and tissues, body temperature, blood pressure, heart rate and various other physical parameters. This state of balance was also described as "homeostasis", fifty years later by Walter Cannon. Hans Selye defined stress as "the non-specific response of the body to any demand or change." He later added the term "stressor" to try to define causes of stress. Selye described the "alarm reaction" by showing the response in the hypothalamic-pituitary-adrenal cortex with the so-called "fight or flight" reaction.

The stress response or "fight or flight" response is described as being similar to the classic response of primitive man when his life was threatened by wild animals or natural disasters. In our modern society the threats seem to be repetitive emotional or mental challenges that occur several times a day through interaction with colleagues, a difficult manager, heavy traffic etc. The body still responds in a similar fashion as the hunter's did, which leads to repetitive triggering of the stress response during a single working day. Soon chronic stress develops with all its associated health risks and poor performance.

The relationship between performance, arousal or stress and health was demonstrated by Watkins, demonstrating that performance increases with initial arousal.[2]

During the anabolic phase energy is being stored with regeneration that is made possible. However, when fatigue sets in and nothing is done to restore those energy levels, performance actually decreases during the catabolic stage. The actual performance is then much lower than the intended performance with the possibility of illness and burn-out.

The stress response includes intricate reactions from the nervous and endocrine systems facilitated by the secretion of ligands in response to a stressor. *Ligand* is a Latin word meaning 'to bind' and includes hormones, neurotransmitters and peptides. In the bodymind communication system described by Candace Pert there are more than 200 peptides, each linked to different emotions like bliss, anger, frustration etc.[3] In the earlier chemical/molecular model Pert describes the lock-and-key model, where each cell receptor is specific for a certain ligand and when the receptor and ligand bind, key processes are initiated in the cell.

However, the latest findings indicate a more dynamic relationship between ligand and receptor, based on 'vibratory attraction'. In this model of 'cellular resonance' the receptor is in a constant state of flux, creating a certain vibration that would then resonate with a ligand with the same frequency. Pert compares this cellular resonance between ligand and receptor to what happens when one string of a guitar is plucked and a second guitar in the same room, starts resonating with the same frequency. "This creates a force of attraction, the way that peptides resonate with their receptors and come together to strike that emotional chord as they bind."[4] In this model of the multidimensional human being the attracting vibration is the emotion, carried by the specific ligand, and the connection of receptor and ligand is the physical or biochemical manifestation of the emotion, which allows us to feel. Another interesting fact is that the amount of receptors wax and wane in number and sensitivity depending on how often they are occupied by peptides or other informational substances. This explains how the body changes in response to different emotions.

The scientific findings in the field of energy medicine strive to explain resonating forces or vibrations present within the multidimensional vibrational make-up of the body. According to Gerber "vibrational medicine provides a scientific perspective of subtle physiology which will allow physicians to understand and treat the varied effects of stress on the human bioenergetic system."[5]

Apart form the physical body the human energy field consists of various subtle energy bodies. Scientific studies like the Rolf Study conducted by Valerie V. Hunt provide evidence of the electromagnetic field that surrounds all living things, including the human body.[6] This electromagnetic field surrounds the body and extends into the environment. Measurements done in various laboratories have provided evidence of different components like electrostatic, sonic, thermal, magnetic, electromagnetic and visual components of the human energy field.

According to the International Society for the Study of Subtle Energies & Energy Medicine (ISSSEEM) energy is the common denominator that connects and links everything and includes "all energetic and informational interactions resulting from self-regulation or brought about through other energy couplings to mind and body." Energy is also part of the magnetic, electric, electromagnetic, acoustic, and gravitational fields that have an effect on biology and psychology.[7]

In striving for energetic balance there needs to be communication and flow between the different subtle energy bodies and the physical body. The subtle energy bodies include the emotional, mental and spiritual realms. Any disruption or obstruction in any of these areas will cause the whole energetic system to be out of balance.

According to Rosch, electromagnetic communication can explain the myriad homeostatic and "fight or flight" responses that take place instantaneously and automatically when stress is experienced.

All these findings have huge implications for a better understanding of the connection between human behaviour, stress management and health. Implementing practical tools and methods based on the latest scientific findings of the vibrational make-up, can help individuals to reach new heights of sustainable performance, while managing stress and creating balance.

In the world of business a new paradigm is emerging where a gradual shift is taking place to support a more organic and holistic view of managing organizations. Even more importantly this paradigm shift triggers corporate cultures to be more flexible and fluid when managing people in order for them to reach their highest levels of potential.

Incorporating new scientific findings into the business environment, specifically into personal development and self-management is an exciting challenge.

The Institute of HeartMath (IHM) is a nonprofit research and education organization with a specific focus on the electromagnetic field that surrounds the heart which is also the largest electromagnetic field surrounding the body.[8] The IHM has developed user-friendly tools and techniques to provide stress-relief, improve a sense of balance and creativity, as well as enhancing performance and energy. The methods are based on the principles of psychophysiological coherence.

Coherence is defined as "the quality of being logically integrated, consistent, and intelligible." In physics, coherence can also be described in terms of the frequency and shape of a sine waveform. The more stable in frequency and waveform, the more coherent, which in this case is called *autocoherence*. In physiology, coherence is described as a functional mode in which two or more of the body's oscillatory systems, such as respiration and heart rhythms, become *entrained* and oscillate at the same frequency. Entrainment is also called *cross-coherence*. Entrainment or cross-coherence has been observed between various bodily systems, for example between heart rhythms, respiratory rhythms and blood pressure oscillations.[9]

Rollin McCraty and Doc Childre describe another physiological phenomenon that occurs during coherent states, namely *resonance.* Resonance is described as "an abnormally large vibration that is produced in a system in response to a stimulus whose frequency is the same as, or nearly the same as, the natural vibratory frequency of the system." In a state of cross-coherence between the heart rhythm, respiratory rhythm and blood pressure oscillations, these subsystems all vibrate at a resonant frequency of 0.1 hertz. This is the frequency that has been shown to be the resonant frequency of the human cardiovascular system and is equivalent to a 10-second rhythm. This resonant frequency is displayed during sleep, states of deep relaxation and when a person is experiencing positive emotions like appreciation. In the power spectrum of the heart rhythm display of the Freeze Framer® 2.0 this state will be indicated by an unusually large peak around 0.1 hertz. Resonance in the system leads to many physiological benefits, for example increased synchronization between the cells throughout the body that leads to increased system-wide energy efficiency and metabolic energy savings.

Psychological and physiological measurements, like heart rate variability (HRV), DHEA and cortisol are used to measure the states of coherence and resonance within the cardiovascular and autonomic nervous system and are a reflection of inner emotional states and stress. Negative emotions lead to disorder in the heart's rhythms and in the autonomic nervous system, while positive emotive states lead to increased harmony and coherence in heart rhythms. The research also shows shifts in perception and the ability to reduce stress, with increased psychophysiological coherence that leads to mental clarity, emotional balance and personal effectiveness.

McCraty and Childre describe positive emotions and optimal functioning as 'a deep sense of peace and internal balance – you are at harmony with yourself, with others, and with your larger environment, you experience increased buoyancy and vitality. Your senses are enlivened – every aspect of your perceptual experience seems richer, more textured. Surprisingly, you feel invigorated even when you would usually have felt tired and drained."[10]

The heart plays a central role in emotional states. Emotions like anger, frustration or anxiety lead to erratic heart rhythms with less synchronization between the parasympathetic and sympathetic branches of the autonomic nervous system (ANS). In contrast, positive emotional states like appreciation, love or compassion, are associated with coherent patterns in the heart rhythms and greater synchronization between the two branches of the autonomic nervous system.

Longstanding negative emotional states can lead to chronic stress and suppress the immune system. The heart also plays a role in emotional balance and has been placed in a central position by the research done at The HeartMath Institute. "Our research findings have led us to support a systems-orientated model of emotion that includes the heart, brain, and the nervous and hormonal systems as fundamental components of a dynamic, interactive network that underlies the emergence of emotional experience."[11]

In positive emotional states it has been found that people find it easier to think clearly, feel less agitated and irritated, while their creativity seems to flow freely. Heart rhythm coherence increased as well as the ratio of synchronization between the heart and alpha brain rhythms when subjects used a positive emotion-focused technique. McCraty et al. showed increased alpha-ECG synchronization measured in the left temporal lobe in subjects who generated positive emotional states while listening to music that enhanced positive emotions.[12]

Physiological signs of coherence include:

- Increased synchronization between sympathetic and parasympathetic branches of the autonomic nervous system
- A shift towards increased parasympathetic activity
- Increased heart-brain synchronization
- Increased vascular resonance
- Entrainment between diverse physiological oscillatory systems
- Smooth, sine-wave like pattern in the heart rhythms (heart rhythm coherence)
- A narrow-band, high-amplitude peak in the low frequency range of the HRV power spectrum, at a frequency of about 0.1 hertz

Associated feelings characteristic of a positive emotional state include a sense of gratitude and appreciation for self and others and a deep sense of fulfillment.

Unmanaged emotions can cause a leak in the energetic system and puts stress on the whole body with resultant conditions such as fatigue, burnout and an increased susceptibility to both infectious and chronic disease. Learning positive emotion-focused techniques to create psychophysiological coherence can create an "internal environment that is conducive to both physical and emotional regeneration."[13]

Sound as vibrational healing tool can be used as support to create positive emotional states. Some of the earliest research done on the links between sound, form and living systems was done by Hans Jenny , the inventor of Cymatics, a general systems study of sound, who placed drops of water, sand, organic or inorganic powder on special metal plates that vibrated with the use of specialized sound transducers. Jenny found that certain sound frequencies produced symmetrical patterns that resembled living cells and even complex organisms.[14] Richard Gerber postulates that the research of Jenny shows that sound can be applied therapeutically to change vibratory and physical structures. Cymatic sound patterns assist us in visualizing the behavior of energy patterns. The cymatic patterns change when a new tone is introduced. Although not that easy to see a similar change on an energetic level within the vibrational make-up of the human body, one can assume that new tones or vibrations introduced to the body will change the whole

system. The challenge is to find the correct sonic frequencies that will supply the body or "system of vibration" with the frequencies it might lack.

This principle was used by Dr. Peter Guy Manners who applied ultrasonic waves to acupuncture points to treat various medical conditions. Sound then becomes a vibrational remedy to address the energetic needs of a patient or client in a very specific way, using it to assist the healing process in the body or recreating balance in the energetic system.

Dr. Alfred Tomatis, a French Ear, Nose and Throat specialist, studied the effects of sound on the ear and the nervous system, investigating the effects of sound and vibration on the unborn fetus.[15] In his extended research on sound and the effect it has on the body, Tomatis postulated "that high-frequency sounds (3,000 to 8,000 Hz) generally resonate in the brain affecting cognitive function like thinking, spatial perception and memory, middle frequency sounds (750 to 3,000 Hz) tend to stimulate the heart, lungs and emotions while low sounds (125 to 750 Hz) affect physical movement."[16]

More and more contributors from the fields of sound therapy, neuroscience and complementary fields of healing are exploring the effect of sound on brainwave frequencies. Since the discovery of the neuro-chemical model of communication between various bodily systems in the fields of neuroscience and pyschoneuroimuunology, there is a general acceptance of a broader understanding of higher brain function, including memory, attention, concentration, problem solving, insight and extra-sensory perception.

Apart from the effect of sound frequency on brainwave patterns, it seems as if music creates a balancing and healing environment for the body and various bodily systems. Brainwave entrainment is used to reach different states of consciousness, reaching states of emotional and mental balance while creating a healing environment for the body.

Le Roux et al.[17] demonstrated the positive effects of Bach's *Magnificat* on emotions, immune and endocrine parameters during physiotherapy treatment of patients with infectious lung conditions. The intervention of music combined with physiotherapy demonstrated positive changes in the POMS-scale, CD4+:CD8+ ratio, cortisol, and the cortisol:DHEA ratio.

A meta-analytic review of 22 research articles using music to decrease arousal due to stress was conducted by Cori L. Pelletier.[18] Results demonstrated that music alone and music assisted relaxation techniques significantly decreased arousal. Further analysis of each study revealed that the amount of stress reduction was significantly different when considering age, type of stress, music assisted relaxation technique, musical preference, previous music experience, and type of intervention.

Burns et al. evaluated the effects of different types of music on perceived and physiological measures of stress on sixty undergraduate psychology students.[19] Participants were randomly assigned to listen to different types of music or silence while skin temperature, frontalis muscle activity, and heart rate were recorded. Participants rated their relaxation and anxiety levels after listening to music or silence and results suggested that music may have an effect on the cognitive component of the stress response.

McCraty et al. demonstrated that music enhances the effect of positive emotional states on salivary IgA.[20] The designer music that had this effect was composed to create mental and emotional balance. It was found that different types of music had different effects on immune functioning. The immune-enhancing effect was not observed with new age or rock music.

Entrainment is the process that happens when bodily systems like respiration, heart rate and brainwaves synchronize with frequencies that are heard. This principle is widely used by sound therapists to heal the body with frequencies of sound, supporting the body to balance and heal itself. Candace Pert refers to this process when "your cells resonate with the internal chemicals your body makes, the external drugs that you take both legally and illegally, and with the emotions you feel. They also resonate with the sounds you hear."[21]

The most recent findings in cellular communication indicate that music, which is a patterned vibration, can bypass the ligand and directly resonate with the receptors on the cell. In this case the sound or music acts like a peptide, a drug or even an emotion that stimulate cellular activities.[22]

Apart from the fact that music has been shown to influence brainwaves, it has a direct effect on the whole body affecting cellular communication through the psychosomatic network. It is postulated that brainwaves oscillate at the same frequencies as ion channels, receptor binding and the harmonics of music. In the field of Psychoacoustics which is the scientific study of the perception of sounds, these findings have huge implications to develop even more refined sounds formulas for vibrational healing.

Creating balance in the vibrational make-up of the body by the application of sound formulas then becomes the next logical step in providing practical tools for energetic balance.

Study Design:

This study uses a pre-test/post-test design with repeated measure of dependent variables. An experimental and control group will be formed after determining their

stress levels with the Holmes-Rahe Social Readjustment Rating. A compatible profile will be created between the experimental and control groups.

Population: Men and women with ages ranging between 25-50 years

Inclusion Criteria:

- 25-50 years of age
- Experiencing high stress levels as determined by the Holmes-Rahe Readjustment Rating
- No history of serious mental or physical disease
- Working in the same environment
- Participants will show willingness to participate by signing an informed consent form

Exclusion Criteria:

- Serious physical or mental disease
- Hearing impairment
- Following any other method of stress reduction

List Potential Risks/Safety:

As the specific music that will be used for the daily 30-minute intervention induces deep states of relaxation, participants will be advised not to listen to the music while they are driving.

A 1-hour information session will be conducted with the participants prior to the intervention. During the information session clear instructions will be given on how and when to use the research tools. The 30-minute music intervention will be provided in the form of a CD for each participant, with an accompanying set of headphones. There will also be a demonstration of how to induce a positive emotional state by creating a state of gratitude. Written details will be provided to each participant to refer to if necessary with contact details of the PI if necessary.

Participants will be advised to listen to the music with a set of headphones while they are sitting on a chair or lying down. They will be advised to listen to the music at the same time each day. Each participant will be provided with a similar set of headphones that they will be able to use with a notebook computer or stereo sound system.

As part of the pre-test phase, the Freeze Framer measurement is done while the participant is connected to a notebook computer with a fingerprobe. Each measurement will take 3 minutes during the pre- and post-tests.

The Voicebio Analysis is done with the participant having to speak into a microphone that is connected to a laptop computer via the VIBE machine. The VIBE machine is an 8x6x5 cm box with outlets on the back and front of the machine. On the front is the main switch for electrical power, switching the machine “On” or “Off”; a socket for the microphone and a socket for the charger which works like a cellphone charger and connects with an external power supply. At the back of the box is the connector socket to the com port of the notebook computer as well as the “tone box” that is used during toning sessions which is not relevant and won’t be used for this research

project. During the taking of a Voiceprint recording the participant is holding the microphone at a distance of 5 cm from the mouth while speaking directly into the microphone for 3-5 minutes. The microphone is plugged into the microphone inlet of the VIBE machine. The VIBE machine is connected with the notebook computer via a serial port. The notebook computer will be connected to an electrical power supply.

Both the Freeze Framer and the Voicebio Analysis equipment have been designed with adequate safety measures and have been extensively used with patients, clients and research participants. Both these instruments are non-invasive and hold very low risk for participants.

Discontinuation Criteria for Subjects:

A participant may withdraw from the study at any time upon his/her request. If the participant withdraws or is discontinued from the study before the completion, the date of withdrawal and reason will be recorded and reported to the IRB.

Tests to be used:

The Holmes-Rahe Social Readjustment Rating

The Holmes-Rahe Social Readjustment Rating was developed by T.H Holmes and R.H Rahe, and enquires about changes in 43 life events that have taken place over the previous 12 months.[22] Good and bad life events can increase stress levels and give an indication of the probability to develop physical or mental illness, according to the prediction model used by the test.

- LOW: 150 points or less indicate a low amount of life change and low susceptibility of stress-induced health breakdown
- MEDIUM: 150-300 points indicate a 50% chance of a major health breakdown in the next 2 years
- HIGH: 300 points or more raise the odds to 80% to develop physical or mental problems in the next 2 years

The Profile of Mood States (POMS)

Since its release in 1971, the POMS assessment has proven itself to be an excellent measure of affective mood state fluctuation in a wide variety of populations including psychiatric outpatients, medical patients, and in sports psychology.[23] The POMS identifies and assesses transient, fluctuating affective mood states. The POMS Standard will be used for purposes of this study. The POMS Standard uses a 65-item, 5-point adjective rating scale and measures six identifiable mood or affective states, namely Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor-Activity, Fatigue-Inertia and Confusion-Bewilderment.

The POMS can be re-administered on a weekly basis, which is long enough to detect the respondent's mood responses to his or her current life situation, but short enough to assess acute treatment effects. However, different waiting periods may be more appropriate for certain research studies. Consequently, the POMS items may be interpreted as referring to last week, last month, or last year.

The Freeze Framer®2.0 interactive software

The Freeze-Framerâ software has been developed by the HeartMath Institute in order to help individuals within organizations to develop states of coherence, improve self-management and increase mental clarity and emotional balance to maximize productivity and performance.[24] The aim is to help develop awareness in the moment, encourages reaching levels of balance very quickly while decreasing stress.

The heart has its own form of intelligence that can be measured and influenced by managing the emotional state. The heart forms the largest electromagnetic field of the body, extending from the chest area and influencing the function of every cell in the body by its powerful rhythmic electromagnetic field, almost like radio waves sending signals out the whole time.

By applying the Freeze Framer software three measurements will be taken:

1. Heart Rate Variability (HRV): In the resting state the rhythm of the heart differs by a few milliseconds between beats, which is referred to as the Heart Rate Variability (HRV)
2. Heart Rate: the amount of heartbeats per minute
3. Power Spectrum Density graph: an indication of the level of coherence between the sympathetic and parasympathetic parts of the autonomic nervous system

These three measurements are used to measure the state of coherence and resonance within the cardiovascular and autonomic nervous systems and are a reflection of inner emotional states and stress. Negative emotions lead to disorder in the heart's rhythms and in the autonomic nervous system, while positive emotive states lead to increased harmony and coherence in heart rhythms and increased balance within the autonomic nervous system.

Voicebio Analysis™

VoiceBio Analysis□t is an energetic assessment tool that is pain-free, non-invasive and easy to use.[25]

The software program measures the frequencies present in the voice to provide a composite graph or VIBEprint™ that represents the frequencies present in the human

body. Each emotion, organ, gland and system of the human body has its own frequency that resonates to particular nutrients, minerals and vibrations required for their function. VoiceBio™ reveals twelve frequency patterns in the body, showing what tonal frequencies are either heavy (overworked or exhausted) or weak (stagnant or not working). An assessment of the heavy and weak areas of a VIBEprint™ gives an indication of the physical-emotional energetic imbalances that are present for that person at that moment.

A VIBEprint is taken in under 5 minutes by asking 3 questions. The first question is aimed to get a neutral response by asking the client to describe something like his or her home. The second question is aimed to trigger the stress response, by asking what the greatest stressor in the person's life is. The third question focuses on what is positive in the person's life i.e., what they are dreaming about, hoping for or is excited about.

Consent Form for Participants:

The Informed Consent form is included at the end of this form as Appendix A.

Protocol Monitoring:

Pre-Inclusion Screening:

All participants are employees of a Corporate and Business Bank, in the Medium Business division which is a sub segment within the Business Banking Services. Medium Business cells are set up to satisfy the needs of Medium Business customers through solution driven relationship banking. The relationship is based on trust, respect and confidentiality and the business banker within the banking service acts as the single point of entry for the client into the banking group. The business banker becomes a partner in any medium sized business, who will assist in growing the business and seeing to its financial needs.

The value proposition of Medium Business is based on their highly professional and knowledgeable staff, which provides innovative & creative solutions to address their customer's needs.

The business banking environment is characterized by high demands on their staff and stress levels among employees are high.

Consent and approval for the research process was given by the two managers of two cells within the Medium Business division. The first group consists of 40 employees (cell A) and the second group of 20 employees (cell B). Both managers are excited about the prospect of the research project being a first strep in addressing their staff's needs as far as better self-management and stress management is concerned.

All employees will be introduced to the process in written format via e-mail, as well as by a 1-hour information session. During this session they will complete the consent form of which they will get a copy for themselves. They will also complete the Holmes-Rahe Social Readjustment Rating which will be used to create a compatible profile between the experimental and control groups.

Testing:

The 60 participants will be divided into an experimental and control group of 30 members each by the PI, based on the results of the Holmes-Rahe Social Readjustment Rating. Because there are two cells participating in the research, the first group (cell A) will be divided into 20 members for the experimental and control groups, and the second group(cell B) will be divided into 10 participants each for the experimental and control groups.

The pre-testing includes completion of the POMS, the Freeze-Framer and the Voicebio Analysis. For this each participant will need to spend 15 minutes with the PI, while the measurements are taken.

Dates and times will be provided to the participants to have this done. For Cell A two dates will be provided to complete the 10 hour pre-test phase. For Cell B 1 day will be used in which 5 hours of pre-testing will take place. Each participant will spend 15 minutes with the PI to complete the pre-test. The schedule will be coordinated by the Personal Assistants of both managers.

Research Intervention:

Each member of the experimental group will be provided with a stereo headset that is compatible with their personal computers. They will each receive a CD copy of Program 1 Deep relaxation of the AlphaRelaxationSystem of Jeffrey Thompson. The only track on the CD will be the 30 minute sound track. They will also receive written instructions that will repeat what was conveyed during the information session. This will include basic instructions including the following:

Each participant should choose 30 minutes each day, ideally at the beginning or end of the day that fit their schedules and programs, during which they will listen to the recording using the headphones. Ideally, they should not be disturbed while listening to the recording.

They can be in a sitting or lying position.

While listening to the music they will induce a positive emotional state by doing the following exercise:

1. Shift your attention to your chest or heart area. If it helps you can put your hand on your chest.
2. Focus on your breathing and take deep inhalations while exhaling slowly. Just focus on the gentle moving of your chest as it moves up and down.
3. Remember a person or situation which makes you feel deeply happy, uplifted and fulfilled and imagine yourself being with this person or in this situation again.
4. Become aware of the deep appreciation you feel when you think about this and hold that feeling while listening to the music.
5. If your attention drifts, just bring it back to your chest area, focusing on the feeling of gratitude.

The experimental group will do this exercise while listening to the music for 14 consecutive days.

Post- tests:

After the 14 days the post-tests will be done, repeating the tests used in the pre-tests.

Again a schedule will be drawn up with the help of the Personal Assistants to allow each participant to spend 15 minutes with the PI.

Monitoring Personnel for Research:

Chair of Dissertation: Patricia Norris, PhD

List Primary Researcher and any assistants:

Primary Researcher – Dr. Lynette Steele MD
Assistants – No assistants will be used

Research Results:

Analysis:

A statistician will be hired to do the analysis of the dependable variables.

Confidentiality Statement:

The following statement of confidentiality is included as part of the informed consent form:

> "Your participation in this study and any forms generated will be held in strict confidence. We assure you that your name will not be associated in any way with the research findings. The information will be identified only by a code number. Results of the study may be reported in scientific presentations or publications, but you will not be identified."

Method of sharing results with research participants

Participants will be asked if they would like to receive a summary of the study results upon completion of the dissertation. Those who indicate that they would like to receive this will be mailed printed information including the purpose of the study, a brief background and theoretical information section, and the results of the study, with discussion. All participants will be informed that the entire dissertation will be available on-line at www.hugs-edu.net if they would like to read it in its entirety. If enough interest is expressed, a presentation of the study results could be arranged.

Notes

[1] Paul Rosch, *Stress – A New Perspective* (Boulder Creek, California, 2004), 1-6.

[2] http://www.heartmath.org/research/science-of-the-heart

[3] Candace B. Pert, *Everything You Need to Know and Feel Good* (USA: Hay House Inc., 2006), 29-32.

[4] Ibid., 31.

[5] Richard Gerber, *Vibrational Medicine Third Edition* (Rochester, Vermont: Bear & Co, 2001), 464.

[6] Rosalyn L. Bruyere, *Wheels of Light* (New York: Fireside, 1994), 219.

[7] http://www.issseem.org/about.cfm

[8] http://www.heartmath.com

[9] Rollin McCraty and Doc Childre, *The Appreciative Heart* (Boulder Creek, CA: Institute of HeartMath, 2003), 6

[10] Rollin McCraty and Doc Childre, *The Appreciative Heart: The Psychophysiology of Positive Emotions and Optimal Functioning* (Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath, 2002), 2.

[11] Ibid., 4.

[12] Ibid., 8.

[13] Ibid., 15.

[14] Richard Gerber, *Vibrational Medicine Third Edition* (Rochester, Vermont: Bear & Co, 2001), 519.

[15] Don Campbell, The Mozart Effect (New York: Avon Books, Inc., 1997), 18.

[16] Ibid., 32.

[17] Frances H. le Roux, Patrick J.D Bouic and Maria M. Bester, "The Effect of Bach's Magnificat on Emotions, Immune and Endocrine Parameters during Physiotherapy Treatment of Patients with Infectious Lung Conditions," *Journal of Music Therapy* 44, no.2 (July 2007): 156-168.

[18] Cori L. Pelletier, "The Effect of Music on Decreasing Arousal due to Stress: A Meta-Analysis," *Journal of Music Therapy* 41, no.3 (November 2004), 192-214.

[19] Jason L.Burns et al., "The Effects of Different Types of Music on Perceived and Physiological Measures of Stress," *Journal of Music Therapy* 39, no.2 (2002) 101-116.

[20] Rollin McCraty, *Science of the Heart* (Boulder Creek, CA: Institute of HeartMath, 2001), 31.

[21] Candace B. Pert, *Everything You Need to Know and Feel Good* (USA: Hay House Inc., 2006), 110.

[22] T.H Holmes and R.H Rahe, "The *Social Readjustment Rating Scale*," Journal of Psychosomatic Research 11 (Oxford, UK: Elsevier Ltd, August 1967):213-218.

[23] DM McNair, M Lorr and LF Droppleman, *The Profile of Mood States* (San Diego, CA: Educational and Industrial Testing Service, 1971).

[24] Rollin McCraty et al., Heart Rate Variability: "*An Indicator of Autonomic Function and Physiological Coherence*," Science of the Heart (Boulder, California: Institute of HeartMath, 2001).

[25] http://VoiceBio.com

APPENDIX A: CONSENT FORM FOR PARTICIPANTS

Holos University Graduate Seminary supports the practice of protection for human subjects participating in research. The following information is provided to help you decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

The principal investigator, Dr. Lynette Steele is a qualified medical doctor with a special interest in the field of vibrational or energy medicine. Vibrational medicine recognizes that at the minutest part of our make-up we are pure vibration or frequency. When we address illness, introduce any form of healing or try to create balance in our lives, it would be ideal to find ways to balance and heal ourselves on a vibrational level. Healing methods provided through sound (which is also pure vibration) is one way to create balance on a vibrational level in our own bodies.

Most people experience huge amounts of stress in our high-tech, fast-paced society. We have stress from our jobs, relationships, world events, money etc. If stress continues and gets chronic, our defenses break down and we become more susceptible to disease and illness. When we introduce methods that help us to maintain balance in our bodies and in our lives, we can prevent many of these stress-related diseases to develop.

The purpose of this research is to provide each participant with a specific sound formula to create balance on a vibrational and psychophysiological level. The musical soundtrack has been chosen from an internationally recognized expert in the field of neuroacoustic Sound Therapy. Actual nature sounds are blended into the musical track which enhances its relaxing properties. The sound frequencies embedded into the musical soundtrack can lead participants to a state of deep relaxation and enhanced performance.

You are invited to take part in this study by committing to listen to the 30 minute soundtrack once a day for 14 consecutive days. A CD copy of the soundtrack as well as a stereo headset compatible with your personal computer will be provided to you by the principal investigator. As an employee of the Medium Business Bank division of Business Banking, you will have the opportunity to experience a method that will help you to relax, while providing you with more energy and creativity. You will be part of a group of 60 participants, all employees of the Medium Business Bank division of Business Banking.

The first step of your involvement will be required during a 1 hour information session where you will be provided with the background, scientific theory and an explanation of the research procedure. During this session you will be asked to give permission to be part of the research project. You will also complete a 5 minute questionnaire that will enquire about the most important stressors you have experienced over the past 12 months.

The second step is an individual session with the principal investigator. Dr. Steele. This will take 15 minutes during which 3 things will be asked from you:

1. Completion of another 5 minute questionnaire that will enquire about your emotional or mood state.
2. Measuring your energetic balance by making a voice recording. You will have to answer 3 questions while speaking into a microphone that is part of a software program on the PC of the principal investigator. What is important to note is that the content of what you say will not be recorded, but rather the frequencies that are present in your voice.
3. Measuring the balance between your heart and autonomic nervous system with another software program. You will be connected via a finger or ear probe to the PC. During this part of the session no questions will be asked. A 3 minute recording will be taken.

The only thing that will be asked of you before your individual session is to have nothing to eat or drink before the scheduled time, because this might influence the measurements that will be taken.

After the tests and recordings the group of participants will be divided into an experimental and control group with 30 members each. The members of the experimental group will each receive a CD copy of the music and a headset. They will have to listen to the music each day for 14 days. They will also receive written guidelines about the steps they need to take while listening to the music. Each participant should choose 30 minutes each day, ideally at the beginning or end of the day, during which you will listen to the recording using the headphones. Ideally, you should not be disturbed while listening to the recording. You can be in a sitting or lying position. While listening to the music you will be in a positive emotional state by doing a simple exercise to experience a state of deep appreciation or gratitude. The instructions for this will be provided by the principal investigator. The control group will not listen to the music or do the gratitude exercise during this time. The reason for asking only the experimental group to listen to the music, is to compare the effects of the sound formula on the balance in the body vs. not using it. Information from both groups is equally important during the research process.

After the 14 days another 15 minute individual session will be scheduled with Dr. Steele. The same procedure will be followed as during the first session. Both experimental and control groups will be part of this.

This intervention is a low-risk intervention with potential benefits for you as participant. As the music provided to you induces a deep state of relaxation, you are not allowed to listen to it while driving. Sometimes when people relax deeply, it stirs up emotions that need to be released. You might experience a wide range of emotions from a deep reverie to possible sadness. All of these emotions are acceptable and should not be resisted.

The possible benefits you might experience while taking part in this project includes deep relaxation, lower stress levels, restful sleep, better performance, enhanced creativity and possible healing. You might find that you have increased energy levels

while being able to maintain focus in your work. Participation in this study will be an introduction to many possibilities as far as stress reduction and creating balance in your life is concerned.

Please note that your participation in this study and any forms generated will be held in strict confidence. We assure you that your name will not be associated in any way with the research findings. The information will be identified only by a code number. Results of the study may be reported in scientific presentations or publications, but you will not be identified. There is no financial cost to you to participate in this study. Your participation is solicited, although strictly voluntary.

Your participation is greatly appreciated. If you would like additional information concerning this study, its procedures or its purpose, before or after it is complete, please feel free to contact Dr. Steele by phone or email.

If you have concerns or questions about your rights as a research participant, you may contact the Holos University Graduate Seminary Dean of Academic Affairs through the University at (888) 272-6109, 5607 S. 222nd Road, Fair Grove, Missouri, 65648.

Sincerely,

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_____ _____
Signature of Person Agreeing to Participate Date

With my signature, I affirm that I agree to take full personal responsibility for my participation in the protocol described above.

Print Your Name Here

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This protocol was approved by the Quantum Institutional Review Board (IRB) for Holos University Graduate Seminary on April 8, 2008 through an Expedited Review and assigned the number IRB #457.