

Low Frequency Sound Treatment Promoting Physical and Emotional Relaxa...

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Abstract

Low frequency sound has many applications to medicine but the efficacy and effectiveness of low frequency sound treatment in health prevention remains unclear. The purpose of this study was to explore the perspectives and potentials of physioacoustic chair's low frequency sound treatment when applied to daily activities among a sample of music students, faculty and/or staff, and to examine how participants view the benefits of the intervention for their well-being, health and health-related activities. The results show that the physioacoustic low frequency treatment added to participants' subjective well-being by increasing their physical and emotional relaxation level, decreasing pain and stress, and increasing emotional enrichment and concentration. The study served as a pilot, to confirm stakeholder interest and to inform the feasibility of a larger study.

Keywords: Low Frequency Sound, Rehabilitation, Wellness, Pain

Introduction

Low frequency sound has many applications to medicine. However, the extent to which human beings utilize and perceive low frequencies as beneficial when applied to their health prevention programs remain unknown, and the efficacy and effectiveness of low frequency sound treatment in health prevention and well-being remains unclear. The aim of this qualitative pilot study was to develop a clearer description of this phenomenon, based on participants' perceptions of their low frequency sound treatment experiences. The purpose was also to explore the perspectives and potentials of the physioacoustic low frequency sound treatment process [1] when applied to daily activities among a sample of music students, faculty and/or staff. A final objective was to determine the feasibility of administering a further, quantitative study exploring the perspectives of participants regarding the application of low frequency treatment to health. Research questions were: (1) What is the participants' subjective experience concerning the low frequency treatment? (2) What impact do participants perceive this low frequency treatment to have on their health and well-being?

The main purpose of this research project was to study mindfulness

and its relation to attention and psychological well-being. In order to gain a deeper understanding of the construct of mindfulness and the mental health benefits associated with mindfulness based programmes, the relation between mindfulness and its proposed core component, self-regulation of attention, was studied. The main purpose of this research project was to study mindfulness and its relation to attention and psychological well-being. In order to gain a deeper understanding of the construct of mindfulness and the mental health benefits associated with mindfulness based programmes, the relation between mindfulness and its proposed core component, self-regulation of attention, was studied. The main purpose of this research project was to study mindfulness and its relation to attention and psychological well-being. In order to gain a deeper understanding of the construct of mindfulness and the mental health benefits associated with mindfulness based programmes, the relation between mindfulness and its proposed core component, self-regulation of attention, was studied.

Relation to existing research and literature

The following preventative programs incorporate various low frequency programmes into their recommendations i.e.: Physioacoustic chairs (Hairo, 2002; Punkanen, 2004; Kärkkäinen, & Mitsui, 2006; King, Almeida, & Ahonen, 2009; Zheng, Sakari, Cheng, Hietikko, Moilanen, Timonen, Fagerlund, Kärkkäinen, Alèn, & Cheng, 2009), vibroacoustic programme also known as

Vibroacoustic Therapy (VAT) (Skille, Weekes, & Wigram, 1989; Rüütel, 2002; Rüütel, Ratnik, Tamm, & Zilensk, 2004; Bergström-Isacsson, Julu, & Witt-Engerström, 2007; Lundqvist, Andersson, & Viding, 2008), Somatron (Brodsky, 2000). Another treatment program is the Whole-body-vibration (Fontana, Richardson, & Stanton, 2005; Haas, Turbanski, Kessler, & Schmidtbleicher, 2006).

Several research studies have already analyzed participant perspectives of low frequency treatments as a therapeutic tool in health prevention (Rüütel, 2002; Rüütel, Ratnik, Tamm, Zilensk, 2004; Sirkkola & Nieminen, 2007, Karkkainen & Mitsui, 2006), promoting the well-being in individuals and as a form of rehabilitation (Fontana, et al., 2005). For instance, low frequency treatments have been found to improve mobility, increase circulation (Karkkainen & Mitsui, 2006) and decrease low-density lipoprotein and blood pressure (Zheng, et al., 2009). Low frequency treatments may be an ideal alternative for individuals who are less active or are unable to exercise (Zheng, et al., 2009).

Low frequency studies include the use of physioacoustic chairs, whole-body-vibration,

vibroacoustic therapy and Somatron, as a means of health prevention, improving the well-being, decreasing stress and anxiety, to name a few, for participants. Pulkanen (2004) used physioacoustic chairs as part of the rehabilitation process when working with clients with drug additions. Pulkanen found that the physioacoustic chair helped clients become aware and in touch with their physical body.

King, Almeida, and Ahonen (2009), researched the effect of vibration therapy with participants with Parkinson's disease. Through the use of a Unified Parkinson's Disease Rating Scale, a pressure sensitive mat, gait assessments were made. Lastly, a grooved pegboard was used to measure the dexterity and coordination of participants in their upper limbs. Researchers found the use of physioacoustic chair to have significant effects in decreasing rigidity and tremors with participants with Parkinson's disease. That is, following physioacoustic treatment there was a carry-over effect in the post-rest period (King, Almeida, & Ahonen, 2009). Similarly, the use of whole-body-vibration has been studied for its positive effects for people with Parkinson's disease (Haas, Turbanski, Kessler, & Schmidtbleicher, 2006). After receiving treatment, there was an improvement in reducing tremor and rigidity.

Rüütel, Ratnik, Tamm, and Zilensk (2004), used vibroacoustic therapy (VAT) with adolescent girls who had stress symptoms. Participants had ten VAT sessions (used the low frequency sound vibration of 56.7 Hz) and listened to relaxing music during the session. These treatments were complemented with other therapeutic techniques such as having a discussion, drawing and completing mood checklists. Researchers found that participants experienced a release of tension, increased self-discovery and VAT treatment to be a beneficial experience.

The use of Somatron increased relaxation (Standley, 1991). Brodsky (2000), found that professional orchestra musicians who had sessions in the Somatron Acoustic Massage Power Recliner with music playing had increased levels of relaxation, experienced imagery and experienced an intensified depth of verbal narrative. Specifically, there was a reduction of negative moods over a sequence of eight sessions. Brodsky concluded that, “music-generated whole-body vibroacoustic stimulation seems to enhance the intensity of self-related emotion and cognition during music listening” (p. 112) and further explained “whole-body acoustic stimulation incites a process of interaction from peripheral nervous system input, through activation of sympathetic

and parasympathetic mechanisms of the central nervous system, causing a concentrated discharge of chemicals and hormones, resulting in intensified emotional responses which are then reported verbally by subjects” (p. 113). This remark was explained as there were three conditions for participants: no-music, music-alone, and music and vibration. The different qualities and levels of stimulation affected a participant’s outcome.

Methodology

Data Collection

Original data consisted of 11 volunteering participants: Music students (n=9), faculty/staff (n=2), males (n=2), females (n=9). The low frequency sound treatment process took place in the end of a winter semester, which is usually a very stressful time for music students, faculty, and staff.

The frequencies were delivered using the physioacoustic method (Lehikoinen, 1994, 1997, 1998; Ahonen, 2007). The participants were sitting on an arm chair and the physioacoustic software produced and controlled sound frequencies from its six speakers allowing the whole body to experience its effects. The software uses low

frequencies, between 27-113 Hz. frequencies to cause the sound to vary around a fixed pitch (scanning). This is to ensure correct resonance frequencies. Participants sense a pulse-like sensation and a traveling sound pressure in the body that facilitates circulation (Lehikoinen, 1990). When sitting in the chair, legs, thighs, buttocks, back, shoulder, neck, and head were to be in contact with the surface of the chair at all times. Participants were instructed to close their eyes.

Each participant received individually selected frequencies and physioacoustic relaxation /massage programmes according to their needs (i.e. general relaxation, intensive back massage, shoulder massage). Therefore the individual session time varied between 30 min to 60 min. The treatment process length varied. Eight of the participants received 8 sessions during the 8 week period, two of the participants received 6 sessions, and one participant only 4 sessions. It was the goal that all participants would receive 8 sessions during the 8 weeks period. However, due to the time-table issues, this was not always possible. Therefore, to ensure the validity of the study the data analysis only consists of data from 10

participants who received a minimum of 6 sessions, once a week.

In the beginning and in the end of the process, and in the beginning and in the end of each session participants were asked to answer structured qualitative questionnaires.

The pre-process questionnaire included open-ended questions investigating participant's physical sensations (such as tension, pain, relaxed). For instance, if they felt any tension, pain etc. they were instructed to color the "Body illustration" developed by Ahonen (2010) to best describe the area and to write down what they felt in that area. They were also asked to describe their emotions coming into this session. They were asked to make use of the "Feeling Wheel" illustration [\[2\]](#) and color the applicable feelings. Participants were also asked to rate their emotional and/or physical stress level using the following 5-point scale: 0=no stress at all, 1=little bit stress, 2=manageable stress level, 3=elevated stress level, 4=lots of stress, and 5=enormous amount of stress. If they were currently experiencing stress, they were also asked to describe the source of it. Furthermore, participants were asked about their present sleep habits, and their ability to focus and concentrate

on daily routine tasks.

The post-process questionnaire included many of the same topics but participants were also asked to evaluate, what effect, if any, do they feel that the process of these sessions has had on the level of stress in their life, sleeping patterns, emotions, concentration/alertness, and general well-being. They were asked to describe any changes.

In the beginning of each session the participants answered a pre-session questionnaire and in the end of each session, they filled post-session questionnaires. Pre-session questions were the same as the pre-process questions. The post-session questions also included questions about any images experienced during the session.

During the process the music therapists conducting the treatment kept their session notes concerning the Physioacoustic programme used and its rationale, duration, music used, and general comments (i.e. how did the participant react during the treatment: bodily reactions, emotions, images, and discussion topics). The research was reviewed and accepted by the Wilfrid Laurier University Ethics Board.

Data Analysis

The research design of this study was based on qualitative (Denzin & Lincoln, 2000), abductive (Peirce, 1839-1914), and descriptive (Bruscia, 2005, p.81) paradigm. Phenomenology (Van Manen, 1997; Polkinghorne, 1989; Forinash & Grocke, 2005, p. 323; Forinash & Gonzalez, 1989) was used as main research method to analyze the experience of the participants and the outcome of the intervention.

A phenomenological approach allowed the researcher to focus on the richness of participants' experience and to seek to understand a situation from their own frame of reference – as experienced by them. The point of this phenomenological research was to borrow participants' experiences in order to understand the deeper meaning of it in the context of the low frequency intervention as a therapeutic tool (Van Manen, 1984 in Baler et al, 1992, p. 1357). The NVivo qualitative software analysis program was used for the text-analysis of the structured, qualitative questionnaires. Following Van Manen's phenomenological method (1997) the text was read several times and the statements that were particularly relevant for the phenomenon under investigation were identified and highlighted. These then became the beginning threads of the

thematic analysis (Borkan, 1999). When the descriptive categories began to emerge, it became obvious that some of them have similarities with mindfulness theory (Langer, 1989).

The following sections introduce the results of the study. They are presented as descriptive and explorative categories, not as a multiple case study. This kind of holistic description “gives the what, when, where, and how, without the whys. It is concerned with discerning what constitutes the phenomenon”(Bruscia, 2005, p. 89). For the purpose of this article, they have been linked to mindfulness theory (Langer, 1989) and the findings that the cultivation of mindfulness can have a positive effect on well-being (Shapiro, Oman, Thoresen, Plante and Flinders, 2008). One of the main studies regarding the effects of mindfulness cultivation on well-being was done in 2008 at Santa Clara University in California. Shapiro, Oman, Thoresen, Plante and Flinders found preliminary evidence that at least one aspect of mindfulness, measured by the Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003) results in positive outcomes regarding well-being (2008). Further analysis of this study resulted in increases in perceived stress and rumination (2008). It should be noted that it would be beyond the scope of this article to

describe the entirety of this study in detail.

Results:

Low frequency sound intervention - increased well-being in daily life - physical and emotional relaxation

The results of this study show that low frequency sound treatment can have a positive effect for participants' overall well-being in their daily life:

“...I feel it has increased my well-being. I experienced joy in the chair...” Increased well-being includes both physical and emotional relaxation. The descriptive categories created based on participants experiences focus on physical pain and tension, emotion enrichment, stress management, and concentration skills. The results show that pain and tension decreased, sense of peace, self-reflection, and clarity increased as well as focus and alertness.

Diagram: Increased well-being in daily life

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