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ARTICLE

A first-person phenomenological pilot case study exploring the efficacy of using whole-body low frequency sound vibration to treat stress and anxiety

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ABSTRACT

The purpose of this pilot first-person case study was to test if whole-body low frequency sound vibration decreases stress and anxiety and to evaluate the equipment used to measure the effects of vibration to inform a more extensive, long-term clinical study in the future. The Next Wave Physioacoustic Chair was used to apply the treatments, which consisted of six 20-minute sessions spread out over 15 days. Qualitative data consisted of daily journal entries and pre- and post-treatment observations. A phenomenological analysis involved the identification of emerging themes. Quantitative data was collected using a Garmen Vivosmart 4 device worn on the wrist twenty-four hours daily (except when charging). The device measured pre- and post-treatment heart rate, heart rate variability (HRV), and sleep quality. An overall stress score was computed using HRV measurements and sleep. The results showed that Physioacoustic treatment can have a positive effect on stress and anxiety levels. This was shown by a consistently lowered heart rate following each treatment, increased body awareness and connection, decreased pain and tension, and a sense of relaxation, calm, mental clarity, and focus. The recommendation is for further long-term studies using a more significant number of participants reporting high levels of stress and anxiety along with control groups. Further studies may also benefit from incorporating electroencephalogram (EEG) measurements to examine brainwave activity to further understand stress-related outcomes.

KEYWORDS

low frequency sound,
vibration,
anxiety,
stress

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INTRODUCTION

Stress and anxiety are natural defence responses to the world around us. However, they can become pathological and interfere with daily life. In recent years, a focus on mental health has emerged with staggering statistics. By the time Canadians reach 40 years of age, half of them have experienced some level of mental illness (Centre for Addiction and Mental Health, 2021). Anxiety can affect people of all ages, genders, and backgrounds. It can lead to other serious illnesses, shorten life expectancy reduce quality of life and negatively affect the economy (Meier et al., 2016; Wilmer et al., 2021). A report conducted in 2016 by the Conference Board of Canada found that lost productivity due to workers' anxiety costs over $17 billion a year (Anxiety Canada, 2016). An Ipsos Reid poll conducted in Canada in 2021 found that 56% of Canadians experience increased stress or anxiety as a result of COVID-19. With a rise in significant stressors such as the COVID-19 pandemic, the global climate crisis, and political unrest in many parts of the world, anxiety levels seem to be on the rise. There are many methods used to manage anxiety, such as medication, mindfulness practices, physical activity, and massage therapy. Every person experiences anxiety in unique ways and responds differently to various treatment methods. Affordability, availability, and accessibility of treatment can also be factors in which methods are available in each case.

The purpose of this study was to explore the efficacy of low-frequency sound vibration of the Next Wave Chair to treat and manage stress and anxiety. This study also explored the equipment used to measure the effects of low-frequency sound vibration to inform a more extensive, long-term clinical study in the future. This study tracked heart rate activity and daily stress as indicated by the Heart Rate Variable (HRV) measurements, sleep cycles, and oximeter readings in real-time. This treatment is currently only available in a couple of clinics in Canada. However, other low-frequency devices are more accessible, available, affordable, and portable, e.g., in-home consumer devices like Sound Oasis VTS1000 (Sound Oasis, 2016).

This was a first-person case study. The first author was the research participant and the researcher. She first heard about the use of low-frequency sound vibration a few years ago after her mother was diagnosed with dementia and she became interested and involved in an Alzheimer's study. This led to her curiosity about the potential effects of this type of therapy for anxiety. As a woman who has experienced issues with anxiety for several years, she was interested in exploring the possibility that this treatment could also be used to help alleviate the symptoms of anxiety. As a music therapist, she felt that her experiences with this treatment might integrate well into her music therapy practice when working with clients suffering from stress and anxiety.

LITERATURE REVIEW: LOW FREQUENCY SOUND VIBRATION, STRESS, AND ANXIETY

Low-frequency sound vibration utilising various devices (e.g., Physioacoustic Next Wave chairs, Vibroacoustic beds, and Somatron, Sound Oasis) have been studied to treat a wide range of health issues (Ala-Ruona & Punkanen, 2017). Among many of these studies, a common finding is a reduction in stress and anxiety. One study on a vibrobed device found some effect on heart rate variability, stress perception, and mood following the treatment. However, the researchers proposed that the impact of

the low-frequency vibration may be different when combined with listening to music. They recommended this hypothesis be investigated in future studies (Vilímek et al., 2022). A similar statement was found in Kantor et al.'s (2022) study that investigated the benefits of the Vibrobed in managing stress among university students. Ahonen et al. (2012) used Physioacoustic Next Wave treatment with university students, faculty, and staff to study its potential benefits for overall well-being. The results of this pilot study showed that the treatment improved participants' subjective well-being, decreasing stress and pain, increasing emotional enrichment and concentration, and increasing emotional and physical relaxation levels.

There is also a known relationship between anxiety and pain perception, whether acute or chronic. Several studies have found that pain and tension decreased with the use of physioacoustic and vibroacoustic treatments (Ahonen et al., 2012; Boyd-Brewer & McCaffrey, 2004; Campbell et al., 2019; Naghhi et al., 2015).

According to Folk (2021), brain fog is often one of the symptoms of anxiety disorders. Interestingly, studies on the effects of Somatron (Brodsky, 2000) and Physioacoustic Next Wave chairs (Ahonen et al., 2012) have found that mental clarity, alertness, and focus can increase after use (Ahonen et al., 2012). Increased alertness and clarity were also noted in the Physioacoustic Next Wave treatment studies of Clements-Cortes et al. (2016a, 2016b, 2017).

Rüütel et al.'s (2004) study used vibroacoustic therapy along with music, verbal therapy, and drawing with a group of adolescent girls with eating disorders who reported symptoms of stress. This study found that participants benefited from vibroacoustic therapy by decreasing tension, increasing feelings of calm, and improving self and body awareness. Similarly, a study on individuals with drug addictions and trauma found that Physioacoustic Next Wave treatment helped clients become more in tune with and aware of their physical bodies (Punkanen, 2004). Somatron treatments were also reported to increase body awareness with a group of orchestra musicians (Brodsky, 2000).

There is also a connection between anxiety and sleep issues. In a study on patients with fibromyalgia, participants reported that regular sleep disturbances were decreased by 90 percent following an individualised course of 40 Hz low-frequency sound stimulation during vibroacoustic treatment (Naghdi et al., 2015).

METHOD

The research questions of this first-person phenomenological case study included the following:

(1) How does whole-body low frequency sound vibration affect anxiety levels in an adult with a history of anxiety?

(2) Can whole-body low frequency sound vibration be utilised as a tool to improve and maintain lower levels of anxiety?

(3) What type of data and data collection tools provide the most complete measure of the effects of whole-body low frequency sound vibration on stress and anxiety levels?

DATA COLLECTION

The Next Wave Physioacoustic chair (see Image 1) was used for the application of the treatments consisting of six 20-minute-long sessions spread out over 15 days (Lehikoinen, 1990, 1997; Next Wave, 2015).

As this was a first-person case study, the first author was the research participant and researcher – she is a 41-year-old Caucasian woman. Stress and anxiety symptoms included headaches, sleep disturbance, occasional anxiety attacks, and neck and shoulder tightness. Qualitative data consisted of daily journal entries and pre and post low-frequency sound vibration treatment observations, and it was gathered using the research participant's self-observation, self-reflection, and retrospection (Bruscia, 2016).

Image 1: Physioacoustic next wave chair

Quantitative data was collected using a Garmin Vivosmart 4 device worn on the wrist 24 hours daily for 15 days (except when charging). The device was linked to the Connect application by Garmin on the iPhone to track real-time (pre- and post-treatment) daily heart rate activity, the overall daily stress score as indicated by the Heart Rate Variable (HRV) measurements, sleep cycles, and pulse oximeter readings. Stress levels (ranging from 0 to 100) on the Garmin device are estimated by the Firstbeat Analytics engine, which primarily utilises a combination of heart rate (HR) and heart rate variability (HRV) data. This information is collected by the optical heart rate sensor located on the back of the device (Garmin, 2024). The pulse oximeter on the Garmin device uses a combination of red and infrared lights, along with sensors located on the back of the device. This setup estimates the percentage of oxygenated blood in the bloodstream, known as peripheral oxygen saturation (Garmin 2024). Quantitative baseline data was collected one week before the low-frequency sound vibration period as a comparison.

INTERVENTION

The Next Wave Physioacoustic chair utilised in this study consisted of an armchair run by software that produced sound vibrations and afforded a whole-body somatosensory experience from its six speakers (see Fig. 1). The stimulation software was PhysAc.Net (2005). The device is approved by the Canadian Standards Association (CSA), the Food and Drug Administration (FDA; USA), and the British Standards Institution (BSI). It is classified as II: low-risk, non-invasive. The participant closed her eyes and kept her legs reclined and uncrossed when sitting in the chair. Lower legs, thighs, buttocks, lower back, and upper back were kept in contact with the surface of the chair at all times. Similar instructions were given in the previous studies of Mosabbir et al. (2022) and King et al. (2007). The sessions took

place at the Manfred and Penny Conrad Institute of Music therapy Research lab, and the research participant (first author) was alone in the room during the treatment There were no music-listening interventions during the treatment. The treatment started with a relaxing programme customised and developed for the research participant by the second author. However, due to the computer software (Nextwave) suddenly crashing during data collection, this programme was utilised only during the first three sessions. As it was impossible to fix the computer/software issue immediately, the participant administered the last three sessions using the device's hand-programming unit and chose the 'relaxation programme' and volumes she felt comfortable with at the beginning of each session. The baseline measurements were taken one week prior to the start of the intervention.

Sessions 1–3

Thirty- and 40-Hz low-frequency sounds were applied for 20 minutes through whole-body vibrotactile somatosensory stimulation. The programme parameters unique to the Next Wave Physioacoustic treatment included time, frequency, scanning, speed, cycle of amplitude, direction of sound movement, and strength of sound pressure. The cycle of amplitude modulation systematically varied the amplitude of the low-frequency sound impulse from silence (amplitude = 0 dB) to the set maximum (n > 0 dB) and back to silence. The length was set at 2.6 seconds as per the participant's preference. The direction of the sound changed every 2 minutes. During the first 2 minutes, constant sound came from all speakers. During the next 2 minutes, the sound progressively moved from head to legs, and during the last 2 minutes, the sound moved from legs to head. This cycle was repeated over and over during the 20minute program. The sound pressure was set for each speaker location – legs, thighs, back, and shoulder/neck – according to the participant's preference. The maximum volume was on the back area and feet. The lowest volume was on the neck area. The amplitude peaks and vibration metrics of displacement, velocity, and acceleration were not measured for this study. Similar to Mosabbir et al.'s (2022) study, the operational treatment frequency in this study was 30 and 40 Hz, which were alternated between these frequencies every 2 minutes. Similar to the studies by Clements-Cortes et al. (2016a, 2016b, 2017), these frequencies were set to scan between 29.93 Hz, 30.05 Hz, 39.86 Hz, and 40.06 Hz to avoid any mechano-receptor numbing effect. This resulted in a pulse-like sensation that causes a travelling sound pressure in the body, facilitating circulation (Lehikoinen, 1990, 1997).

Sessions 4–6

The Next Wave chair consists of several pre-set programmes: intensive programmes for a stimulating treatment and soft programmes for a relaxing treatment. The person sitting on the chair can administer these via a handheld controller unit. The person sitting on the chair can try different programmes and choose something they feel comfortable with at that moment. The different programmes focus on different body parts and the intensity of the vibration volume of each speaker can be adjusted according to the participant's preference. In this study, the research participant used different soft (relaxing) programmes during her last three sessions and adjusted the volume according to her needs and preferences. The frequencies ranged approximately between 27–60 Hz and the cycle duration was longer than 2.6 seconds during the last three sessions. Measuring the exact frequencies

or cycle durations was impossible. The participant simply chose something that 'felt good' in the moment.

DATA ANALYSIS

Qualitative data consisted of the research participant/researcher incorporating Van Manen's (1990) phenomenological perspectives by analysing her subjective lived experiences, her free-associated reactions to stress and anxiety, her breathing patterns, headaches, bodily sensations, energy levels, and emotional state during and after the low-frequency sound vibration.

Thematic, phenomenological analysis was performed manually on the free-associated journal entries and pre- and post-treatment observation reports. According to the principles of Van Manen (1990), the researcher participant/researcher reflected on the essential themes which characterised her low frequency sound vibration experience. This involved coding the data and identifying three main themes that had emerged throughout the data analysis.

During the first phase, the researcher read the journal entries and observation reports several times. After that she 'asked' herself, "What kind of experience is this?" Then she created particular meaning units, reflecting on the content of the experience and essential themes which characterised the phenomenon. Later on, these statements/phrases formed the beginnings of sub-themes and themes that gave meaning to the phenomena.

After the initial meaning units were set, they were re-read to search for meaning. The researcher asked: "What did this mean for me during the treatment process? During this phase, she was trying to apply thoughtfulness to an aspect of her lived experience and intending to make visible her feelings, thoughts, and body sensations. The emerging themes were then created to describe the low frequency sound experience. The researcher titled them so that they best described her experience and its meaning. The continual dialogue between seemingly meaningful words, phrases, and concepts, and questioning these sections of the text to ask "What is really being said here?" was an important part of the analysis process. After that, the themes were reviewed and questioned in light of all perspectives and questions. This process was a constant flow during the data analysis.

Finally, the descriptive categories and themes were created and named. According to abductive reasoning, each emerging theme was examined within the context of other literature and compared to the quantitative data to understand the phenomenon further. Three main themes are presented as the qualitative results of this study.

Quantitative data (HRV measurements, sleep cycles, and pulse oximeter readings) were first organised into an Excel chart developed by the researcher and then translated into bar graphs. The visual depiction of pre- and post-treatment results allowed the researcher to view emerging patterns.

RESULTS

The results of this pilot case study indicated that whole-body low frequency sound vibration can positively affect physical, mental, and emotional relaxation. The quantitative data collected focused on pre- and post-pulse rates, length and quality of sleep, and overall stress scores. Qualitative data findings include pain relief, body awareness, relaxation, mental clarity, and focus. The quantitative

data analysis findings will be introduced first, followed by a description of the three qualitative themes and quotes from the data.

Quantitative results

Heart rate

The comparison of heart rates before and after the session, along with the daily averages for resting and high heart rates, indicates that whole-body low-frequency sound vibrations may reduce heart rate, suggesting a decrease in stress levels.

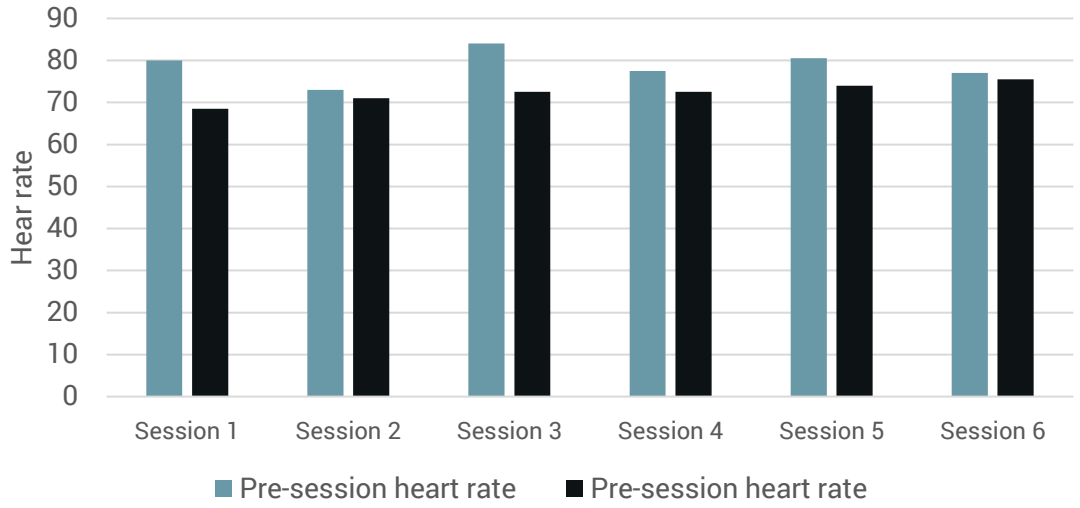

Figure 1: Pre-post session heart rate comparison

The results showed a consistent decrease in heart rate from pre-session to post-session, averaging 6.33 beats per minute in post-treatment heart rates. Figure 2 shows the overall daily resting and high heart rate averages throughout the baseline week and testing period.

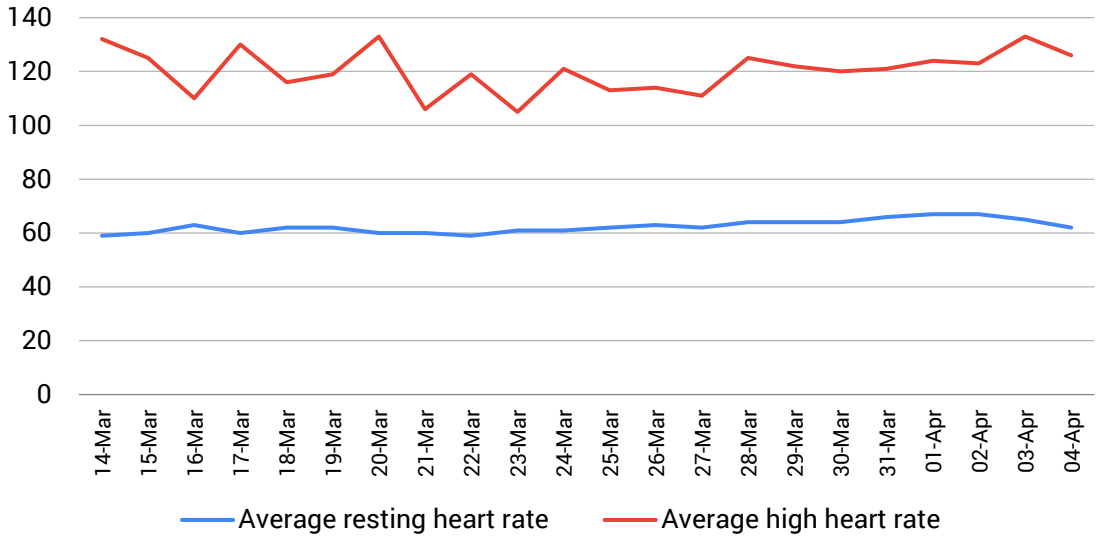

Figure 2: Daily heart rate averages: Resting and high

Sleep

Sleep scores were relatively consistent and healthy throughout the baseline and treatment periods. According to the Centers for Disease Control and Prevention, adults between 18 and 60 should get at least 7 hours of sleep per night (CDC, 2022). Figure 3 shows the amount of total nightly sleep as well as the percentage of that which was spent in deep, light, rapid eye movement (REM), and awake stages. T The first seven bars represent the baseline data, with March 21–April 4, 2022, showing the treatment period.

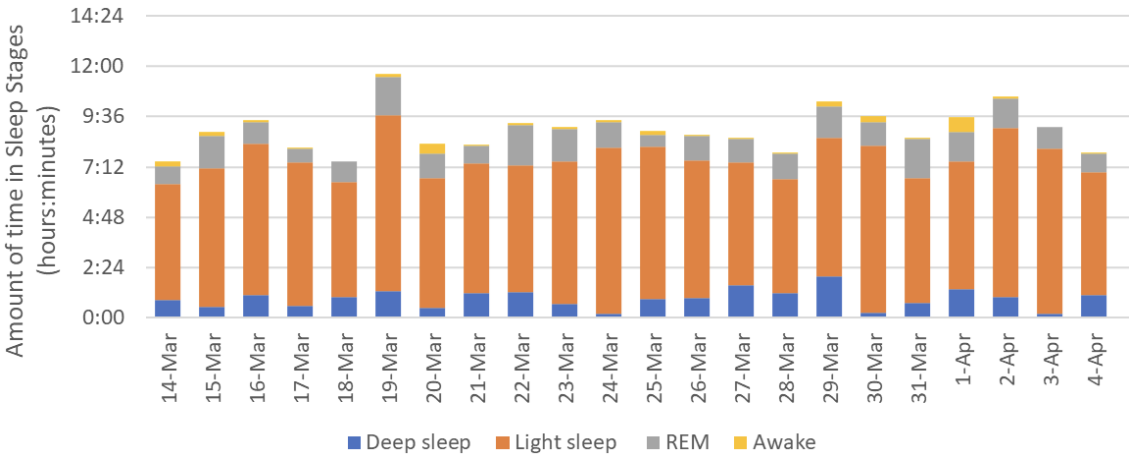

Figure 3: Total sleep and sleep stages

Stress scores

Stress scores were calculated by the Garmin watch using HRV. Levels 25-100 indicate that the sympathetic nervous system is more active than the parasympathetic nervous system, with a higher number reflecting more stress experienced by the body. The daily stress scores in Figure 4 ranged from 22 to 39 did not show any discernible change patterns between baseline and intervention periods. Similarly, in the average weekly scores in Figure 5, the differences seem minimal and do not appear to have any meaningful differences as they are low.

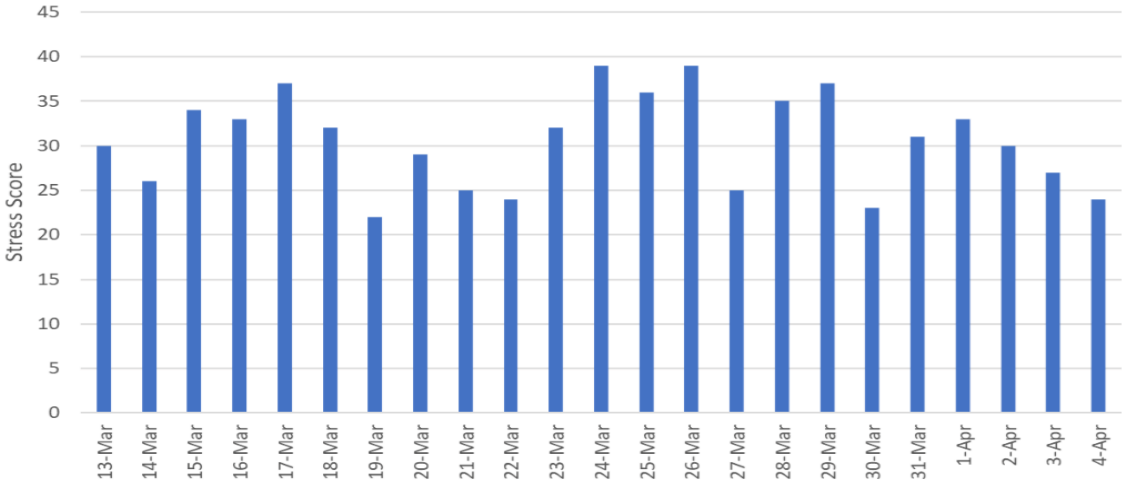

Figure 4: Overall daily stress score

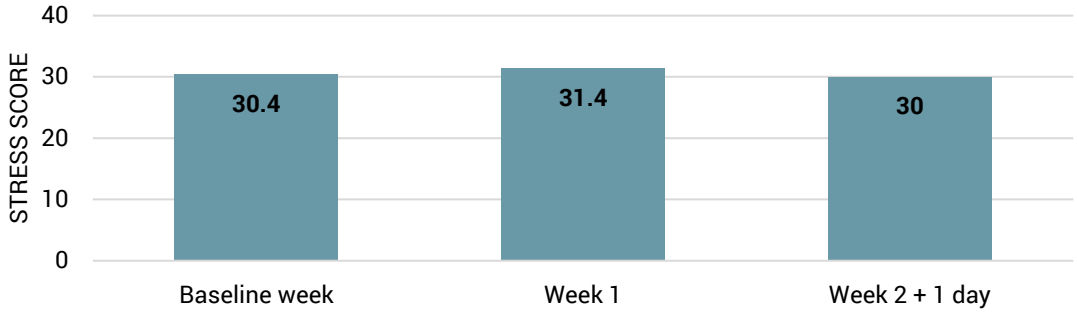

Figure 5: Average weekly stress score

QUALITATIVE FINDINGS

Qualitative findings included three different themes that emerged during phenomenological analysis (Van Manen, 1990): (1) Body awareness and connection; (2) Pain relief; (3) Relaxation, mental clarity, and focus.

Theme 1: Body awareness and connection

Qualitative results showed an increase in the participant's body awareness. Although this was not one of the primary research questions or anticipated outcomes, it emerged as a prominent theme. The following are selected excerpts from the participant's journal emphasising how the low frequency sound treatment increased her body awareness and sense of body connection.

There was an increased awareness around her neck and shoulder area and understanding of how they may be holding her stress:

> About two-thirds through, the vibrations were focused around the head and neck. I could feel that this was an area that I hold a lot of stress. It felt so good but also like it couldn't quite let go. It was helpful to be able to pinpoint this area. I knew that I held on to stress in my neck and shoulders, but the chair really emphasised it for me. Post vibes, still seated I feel a little dozy, I feel a warmth and openness in my throat and chest. My face and body feel a slight tingle. I feel relaxed.

Similarly, there was a new awareness of the lighter and more open sensations of the chest and stomach area. It was easier to breathe after the treatment:

> I had to rush out, but I feel light in my chest.

> Deep breaths feel like less effort, and chest and stomach area feel more open.

> Open feeling again in my stomach and chest, deep breaths are very easy.

There was an increased awareness of legs and feet with the participant noting that "legs (calves) are particularly sensitive, almost ticklish to vibrations today."

Theme 2: Pain relief

Pain relief emerged as an unexpected finding, as stated in the following journal excerpts. It seems that lowering anxiety and stress levels may influence a decrease in pain perception. After one of the sessions, the participant stated: "I started today's session with a stress headache and ended the session with no headache!!!" At the beginning of another session, the participant wrote: "cramps are currently uncomfortable, sharp in the right side but manageable (no Advil yet)." However, post-treatment, she wrote: "Cramps are gone!" However, cramps returned about an hour later.

Theme 3: Relaxation, mental clarity and focus

Another consistent theme throughout the treatment period was a feeling of calm, mental clarity, and focus that was reported directly after each treatment. After the first session, the research participant reported "feeling less overwhelm and more clarity." At the beginning of another session, she reported feeling "overwhelmed and worried," but after the session, she wrote: "as I get up and start to walk, I feel relaxed. I am thinking clearly and feel less rushed to get things done today."

The following are also excerpts from the post-treatment journal entries. The research participant declared that she was "feeling relaxed and clear-headed." Another time, she disclosed "feeling calm but not as open in my stomach and chest as other sessions."

The sessions occurred during a hectic time of the participant's life. However, after the treatment, she felt calm, relaxed, lighter, and more focused:

> Anxiety is lower now. I was feeling rushed to get a bunch of things done today. Now I'm feeling less rushed, enjoying this moment and where I am post-session.
>
> Felt a little anxious during session about how much I have to do and about being late for everything today and had to rush out but I feel light in my chest and alert.

DISCUSSION AND CONCLUSION

The biological markers examined in this pilot case study included heart rates, amount of sleep, and stress scores measured using HRV. The results indicate that low-frequency sound vibration can have a positive effect on stress and anxiety levels. Post-treatment heart rates were consistently lower by an average of 6.33 beats/minute than the pre-treatment heart rate. The consistency of this result immediately following the treatment suggests that it is significant. However, the daily average resting and high heart rates did not show significant changes. This could indicate that the treatment's effects may be transient, which signals the need for a long-term study. The results could also suggest that low-frequency sound vibration may be beneficial for treating acute, but not chronic, stress and anxiety. However, treating the rapid onset of stress and anxiety may also lead to beneficial long-term results for individuals who experience frequent high anxiety levels. Low-frequency sound vibration may work to both improve and maintain lower anxiety levels. Kärkkäinen and Mitsui (2006) also supported the idea that treating acute stress and anxiety may also lead to beneficial long-term results.

Interestingly, there was no difference between sessions 1-3, which incorporated 30-Hz and 40-Hz frequencies, and sessions 4-6, which used multiple low frequencies; non-predetermined low frequency sounds were experienced as similarly beneficial. A future study could investigate the effects of very low frequencies (e.g., 4-7 Hz or 8-12 Hz) and their potential to increase Theta and Alpha brain waves. Alpha waves are linked with a relaxed, restful, idle brain state, and they are in the frequency range of 8-12 Hz. Theta waves, 4-8 Hz, are linked with a deeply relaxed, 'dream-like' brain state.

Sleep scores were relatively consistent and healthy throughout the baseline and treatment periods. Since there were no significant sleep issues prior to the treatment, it was not easy to gauge whether the treatment could significantly impact sleep patterns. Participants in future studies should include individuals who experience insomnia related to stress and anxiety. Additionally, it will be important to gather more comprehensive sleep data and conduct long-term analyses to assess the effects of low-frequency sound vibration treatments.

Although the results show that low-frequency sound vibration can lower heart rate, indicating an improvement in the stress response, the daily stress scores did not significantly change from the baseline week to the end of the two-week treatment period. However, there were several issues with this particular feature on this device. First, readings were not accurate on days the Garmin Vivosmart 4 device required charging because several hours were not accounted for. The missing data resulted in lower stress scores. The overall stress scores throughout the recorded time were in a healthy range; however, someone with consistently higher stress and anxiety baseline measurements may show a more significant change over time. Another problem was that the stress score was affected by many factors, such as exercise, which is a healthy stress. Therefore, daily activity must be consistent throughout the baseline and treatment time frame for more accurate results to achieve a more accurate overall measurement. Another option would be analysing only the time period directly before, during and after the treatment.

While there were obstacles to overcome with the Garmin Vivosmart 4 device, there were also many benefits. Real-time access to a heart rate monitor was critical for accurately collecting pre- and post-treatment data. It was also very convenient, especially on hectic days, because the Garmin application collected and saved the data for later analysis.

Qualitative data showed increased body awareness and connection, decreased pain and tension, a sense of relaxation, feeling calm, having mental clarity, and focus. Although the study did not set out to specifically examine these categories and the participant was allowed to freely share her feelings, images, and body sensations, they emerged dominantly throughout the treatment process. Interestingly, similar themes were found in previous studies related to Physioacoustic Next Wave chair treatment (Ahonen et al., 2012; Punkanen, 2004) and Somatron (Brodsky, 2000). The decreased anxiety levels may explain the decrease in pain. According to Tang and Gibson (2005), "higher trait anxious individuals tend to exacerbate perceived pain stimulations more than lower trait anxious individuals" (p. 612). "Higher state anxiety (HTA) led to an increase in reported pain intensity for all participants. Furthermore, HTA individuals reported significantly higher levels of anxiety and pain intensity than lower trait anxious (LTA) individuals across all pain and anxiety conditions" (Tang & Gibson, 2005, p. 612). Lowering pain may also result from increased amounts of endorphin or decreased amounts of cortisol in the body. Many studies have investigated music's impact on increasing endorphins

(Blood & Zatorre, 2011; Chanda, 2012; Gangrade, 2012; McKinney et al., 1997) or decreasing cortisol (Bradt & Dileo, 2009; Chanda & Levitin, 2013; Fukui & Yamashita, 2003; Helsing et al., 2016; Khalfa et al., 2003; Kreutz et al., 2004; McKinney et al., 1997; McKinney & Honig, 2017; Mockel et al., 1994). However, there are no studies on the impact of pure low-frequency sound stimulation on these hormones using blood or saliva tests.

The participant was particularly intrigued by the strong sense of calm and mental clarity experienced immediately following treatments. The human brain emanates electrical activity in the form of brainwaves. Two of these frequencies are of particular interest here: alpha and theta. With frequency ranging from 9-14 cycles per second, alpha brainwaves produce reflective, meditative states. Theta brainwaves, which range from 5 to 8 cycles per minute, occur in a free-flow, daydream state that can be connected to creativity and is often a positive mental state (Scientific America, 1997). Results of a 2015 study showed that neurofeedback training with patients with generalised anxiety disorder "caused an increase in alpha and theta brain waves amplitude and is effective in reducing GAD [Generalized Anxiety Disorder] symptoms" (Dadashi et al., 2015, p.19). Therefore, future studies may also benefit from incorporating electroencephalogram (EEG) measurements to examine the effects of low frequency sound vibration on brainwave activity. Including data on the brain, biological markers, bodily sensations, and emotions could offer a more complete picture of the effects of this treatment. In a related study, Physioacoustic Next Wave treatments found similar results of increased concentration, focus, alertness, and clarity, while also helping participants to feel relaxed (Ahonen et al., 2012).

The design of the current study is subject to many limitations. First, the small sample size (one person) reduced the study's external validity. However, many of the results corresponded with previous research, indicating patterns across various studies that are worth exploring further. Another limitation of the study is the lack of a control group. Optionally, a control group could simply lie down for 20 minutes on the chair without receiving any low-frequency treatment, as was done in the Mosabbir et al.'s (2022) study. In future, a more systematic approach is needed to understand the effect of the vibration in each particular session and how this changes over time. Even if the same programme would be used in all sessions, people respond differently each time and this is impacted by many factors. It would be important to analyse the data so that the results indicate the actual timing of the reactions.

Furthermore, the short length of the study is a limitation. For example, it would be beneficial to have a follow-up after three months and six months. A long-term study, i.e., a 12-week intervention, investigating the effects would also be interesting. Finally, although regularly discussed with the second author who was the research supervisor overseeing the project, the participant/researcher collected the data first-hand, leaving room for subjectivity as is always the case in first-person qualitative studies where the researcher analyses themselves. There can be a tendency to put much hope into a new way of treating or coping with chronic stress and anxiety. This feeling of hope itself may offer some relief. The researcher acknowledges this as a possible bias. Nevertheless, these limitations and learning are helpful when considering the need and direction for further study.

The recommendation is for a long-term study using a sufficiently powered sample size comprising participants who report high levels of stress, anxiety, and insomnia, along with control

groups. It is also recommended that EEG tests be included along with biological markers and qualitative data, such as participant interviews, for a more holistic view. Furthermore, it is recommended to test the impact of certain frequencies.

The results of this pilot case study indicate that whole-body low-frequency sound vibration can positively affect physical, mental, and emotional relaxation. Although low-frequency sound vibration treatments are usually seen as music medicine interventions (Ahonen, 2018), the results about body awareness, connection, relaxation, mental clarity, and focus indicate that low frequency sound vibration could also be a feasible music therapy intervention for clients suffering stress, anxiety, and insomnia. According to Wigram and Crocke (2007), low-frequency sound vibration is a receptive music therapy method. Ahonen's (1996) Psychoauditive Music Therapy method utilises low-frequency sound relaxation during music psychotherapy. Clients received individualised low frequency sound vibration while discussing with the music psychotherapist. Ahonen (1996) also incorporated low-frequency sound vibration stimulation and guided imagery work for music listening thus enhancing body awareness and focus. Further research could explore incorporating low frequency sound vibration into music therapy sessions as a relaxation intervention or aiming to enhance the client's focus. It could be combined with music listening, using the client's preferred music for relaxation, thereafter discussing feelings, images, body sensations, and reflections.

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Ελληνική περίληψη | Greek abstract

Μια φαινομενολογική πιλοτική μελέτη περίπτωσης πρώτου προσώπου που διερευνά την αποτελεσματικότητα της χρήσης ηχητικής δόνησης χαμηλής συχνότητας σε ολόκληρο το σώμα για τη θεραπεία του στρες και του άγχους

Christa Mercey | Heidi Ahonen

ΠΕΡΙΛΗΨΗ

Ο σκοπός αυτής της πιλοτικής μελέτης πρώτου προσώπου ήταν να δοκιμαστεί η χρήση ηχητικής δόνησης χαμηλής συχνότητας σε όλο το σώμα για τη μείωση του στρες και του άγχους, καθώς και να αξιολογηθεί ο υλικοτεχνικός εξοπλισμός που χρησιμοποιείται για τη μέτρηση των επιδράσεων των δονήσεων, με στόχο την ενημέρωση μιας πιο εκτεταμένης, μακροχρόνιας κλινικής μελέτης στο μέλλον. Η φυσικοακουστική καρέκλα Next Wave χρησιμοποιήθηκε για την εφαρμογή των θεραπειών, οι οποίες αποτελούνταν από έξι συνεδρίες 20 λεπτών κατανεμημένες σε διάστημα 15 ημερών. Τα ποιοτικά δεδομένα περιλάμβαναν καθημερινές εγγραφές ημερολογίου, παρατηρήσεις πριν και μετά τη θεραπεία. Μια φαινομενολογική ανάλυση περιελάμβανε τον εντοπισμό αναδυόμενων θεματικών ενοτήτων. Τα ποσοτικά δεδομένα συλλέχθηκαν χρησιμοποιώντας τη συσκευή Garmen Vivosmart 4, η οποία φοριόταν στον καρπό για 24 ώρες καθημερινά (εκτός κατά τη φόρτιση). Η συσκευή μετρούσε τον καρδιακό ρυθμό πριν και μετά τη θεραπεία, τη μεταβλητότητα του καρδιακού ρυθμού (HRV) και την ποιότητα του ύπνου. Μια συνολική βαθμολογία στρες υπολογίστηκε χρησιμοποιώντας τις μετρήσεις HRV και του ύπνου. Τα αποτελέσματα έδειξαν ότι η φυσικοακουστική θεραπεία μπορεί να έχει θετική επίδραση στα επίπεδα στρες και άγχους. Αυτό φάνηκε από τον σταθερά μειωμένο καρδιακό ρυθμό μετά από κάθε θεραπεία, την αυξημένη σωματική επίγνωση και σύνδεση, τη μείωση του πόνου και της έντασης, καθώς και από ένα αίσθημα χαλάρωσης, ηρεμίας, νοητικής διαύγειας και εστίασης. Προτείνονται περαιτέρω μακροχρόνιες μελέτες, χρησιμοποιώντας έναν πιο σημαντικό αριθμό συμμετεχόντων που αναφέρουν υψηλά επίπεδα στρες και άγχους, μαζί με ομάδες ελέγχου. Περαιτέρω μελέτες ενδέχεται επίσης να ωφεληθούν από την ενσωμάτωση μετρήσεων ηλεκτροεγκεφαλογραφήματος (ΗΕΓ) για την εξέταση της δραστηριότητας των εγκεφαλικών κυμάτων, προκειμένου να κατανοήσουμε καλύτερα τα αποτελέσματα που σχετίζονται με το άγχος.

ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ

ήχος χαμηλής συχνότητας, δόνηση, άγχος, στρες