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RESEARCH | PEER REVIEWED

A Single-Case, Mixed Methods Study Investigating the Role of Music Listening in Vibroacoustic Treatment

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Abstract

Chronic pain is a widespread issue accompanied commonly by depression and anxiety. Chronic pain has been shown to alter brain processing within the emotional and reward circuits, pointing towards a possible link between pain and comorbid mood disorders. Pain relief may be achieved by alleviating depressive and anxious symptoms. Relaxation is important for pain relief and eliciting relaxation through music listening is shown to relieve pain, depression, anxiety, and discomfort among others. In addition to auditory stimuli, vibroacoustic treatment – the tactile application of low frequency sinusoidal sound vibration, plus music listening and therapeutic interaction – has been shown to be beneficial for relieving these symptoms. Although the combination of music listening and low frequencies has been previously explored, the role of the music listening within the vibroacoustic treatment context is unknown. A single case, mixed method crossover study was conducted with a client suffering from chronic pain and comorbid mood disorders, four sessions with music listening, and four sessions without. Quantitative outcomes showed the client was more relaxed, less anxious, and had less pain after the music sessions. Qualitative findings showed that the client at first could not relax without the music listening because of her severe anxiety, later learned to use music as a distractor from her thoughts to relax, but also that silence was equally important for her. These hinged on her making the choice based on her needs, which had previously been difficult for her.

Keywords: *music listening, vibroacoustic treatment, pain, anxiety, depression*

Introduction

One in ten adults report chronic widespread pain (Mansfield, Sim, Jordan, & Jordan, 2016). Furthermore, depression and anxiety are prevalent in individuals with chronic pain, with these mood disorders longitudinally predicting chronic pain and pain-relat-

ed disability (Lerman, Rudich, Brill, Shalev, & Shahar, 2015). Chronic pain patients may experience maladaptive anxiety and harbour a tendency towards hypervigilance or catastrophising their symptoms, often being focused on the negative meaning or potential consequences of their pain (Symreng & Fishman, 2004). Chronic pain has also been shown to alter brain processing, being observed in the emotional and reward circuits, showing a possible link between chronic pain and comorbid mood disorders (Navratilova, Morimura, Xie, Atcherley, Ossipov, & Porreca, 2016). Indeed, reducing depression, anxiety, and pain catastrophising is found to relieve pain, and reduce pain-specific disability days and likelihood of disability (Scott, Kroenke, Wu, & Yu, 2016). Due to this interrelation between pain and anxiety, discerning the principle factor may be difficult; however, this overlap is fortuitous in treatment as approaches for treating one can be beneficial in simultaneously managing the other (Symreng & Fishman, 2004).

Music interventions for relieving pain and mood

Non-pharmacological interventions that have been beneficial for managing both pain and anxiety include those such as paced breathing techniques, muscle relaxation, or attention diversion (Symreng & Fishman, 2004). Indeed, relaxation has been shown to be an important element in relieving pain (Ezenwa et al., 2018) and anxiety (Nelson, Adamek, & Kleiber, 2017) and as musical experiences (e.g. music making such as singing or listening to pre-recorded music) elicit and evoke emotional responses in us, they are often used to regulate emotions (Lonsdale & North, 2011) but also for the purpose of pain relief (Tamplin & Clark, 2016).

Music interventions have been shown to be efficacious at relieving anxiety, depression (Lai, Li, & Lee, 2012), pain, and inducing a state of relaxation (Liu & Petrini, 2015). It is proposed music may act as a distractor from patients' psychological and physiological sensations as well as reducing patients' experiences of discomfort (Nilsson, 2008) by serving as an audioanalgesic, audioanxiolytic, or audiorelaxant, as well as music listening having an effect on hospital patients' stress responses (Nilsson, 2009). A systematic review (Bradt, Dileo, & Shim, 2013) found that music listening might be beneficial for reducing anxiety in people with myocardial infarction, also indicating that music listening may reduce pain. Although music as a distractor is an important mechanism in anxiolytic responses (Nilsson, 2008), Bradt et al. (2013) argued that music also affords an aesthetic experience, able to offer comfort, and creative engagement in music may result in an increase in perceived control. In a surgical setting, Wu, Huang, Lee, Wang, and Shih (2017) reported significantly reduced anxiety for patients undergoing an awake craniotomy after listening to their preferred music. Although Gillen, Biley, and Allen (2008) found that anxiety reduction from music listening seems to be more strongly reflected in the psychological parameters (e.g. State-Trait Anxiety Inventory) rather than physiological markers of anxiety and stress (e.g. heart rate), the aforementioned overlap between the physiological and psychological aspects of pain and anxiety/depression points towards a cumulative intervention effect. This may be important in designing interventions for patients suffering from these psychological and physical symptoms. Results of studies presented here seem to generally suggest consistently positive and significant reduction in anxiety and pain due to music intervention, as well as increased relaxation and decreased depression.

Vibroacoustic treatment for eliciting psychophysiological changes

Music interventions can also be delivered in a tactile manner such as with pulsed, sinusoidal, low frequencies between 20–120 Hz through a recliner chair or mattress combined with music listening and therapeutic interaction. When applied by a trained practitioner, these combined elements (see Figure 1) are referred to as Vibroacoustic (VA) treatment (Campbell, Hynynen, & Ala-Ruona, 2017). Low frequencies may also be delivered without music listening, based on the client's needs and preferences, e.g. music may evoke memories or sensations which the client is not yet ready to address.

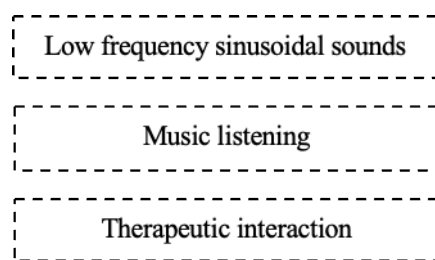


Figure 1
Elements of VA treatment

The rationale for listening to music is therefore based on whether the music listening may enhance the experience for the client. For those who enjoy music, it may more readily enable relaxation and offer a source of comfort.

As is often the case for music listening, relaxation is one of the most commonly reported outcomes of VA treatment (Ala-Ruona, Punkanen, & Campbell, 2015; Campbell, Hynynen, & Ala-Ruona, 2017). The relaxation response, a relaxed but alert state elicited through repeated and focused meditative practices (Benson, 1975), is posited to be one possible explanation for the positive outcomes associated with this treatment modality (Punkanen & Ala-Ruona, 2012). Recent studies focusing only on the pulsed sinusoidal low frequency sound vibration, i.e. without music listening or therapeutic interaction, have shown that low frequencies are beneficial for pain relief and mood regulation (Braun Janzen, Paneduro, Picard, Gordon, & Bartel, 2019; Naghdi, Ahonen, Macario, & Bartel, 2015), anxiety reduction (Rüütel, Ratnik, Tamm, & Zilensk, 2004), spasticity in those with spinal cord and brain injuries (Rüütel, Vinkel, & Eelmäe, 2017), can be beneficial for decreasing both pain and stress, and increasing emotional enrichment, concentration, and physical and emotional relaxation (Ahonen, Deek, & Kroeker, 2012) as well as reducing anxiety and affording relaxation in those with Alzheimer's disease (Clements-Cortés, Ahonen, Freedman, & Bartel, 2017). Campbell, Hynynen, and Ala-Ruona (2017) showed improvements in pain, mood, and relaxation for those receiving the combined treatment of low frequencies and music listening with therapeutic interaction. Skille and Wigram (1995) compared the effects of music plus vibroacoustic stimulation (40 and 55 Hz) to music alone for those with multiple physical disabilities, finding that vibroacoustics was beneficial in reducing muscle tone and increasing range of motion. Wigram (1996) compared new age music listening, vibroacoustics (40 Hz), and lying in silence with non-clinical participants and found reduced arousal in the vibroacoustic group compared to both the music and control group. Both vibroacoustics and music groups had reduced heart rate compared to the silence group. Rüütel (2002) also examined the effects of music, vibroacoustics, and silence on healthy people, finding that one or two sessions of vibroacoustics were beneficial for reducing fatigue or stress for healthy people in everyday life.

These studies have examined the effects of low frequencies alone, the combination of all three VA treatment elements, as well as comparing the effects of low frequencies with and without music. However, the role that music listening plays in the treatment session with therapeutic interaction has not been explored. As discussed, music listening has been shown to be efficacious at inducing a relaxed state and relieving pain, anxiety, and depression. Low frequency vibration has also been shown to do so, as has the combination of music listening, low frequencies, and therapeutic interaction. Given that both music and vibration can be beneficial for symptom relief, the aim of this study was to explore in more detail the role that the music listening element within a practitioner-supported VA treatment setting may have with a client suffering from chronic pain, anxiety, and depression. Furthermore, this study investigates whether the client's perception and experience of her symptoms - and the influence VA treatment has thereon - are enhanced by music listening.

Method

Study design

A mixed method, n-of-1 crossover design was used to explore the role of music in VA treatment, integrating quantitative and qualitative data to triangulate the results and findings to gain a greater understanding of these subjective physical and psychological phenomena. Although quantitative methods are helpful when addressing the relationship between specific variables, they are not suitable for answering process-oriented questions that can be addressed using qualitative approaches (Leech & Onwuegbuzie, 2007). Triangulation of mixed methods is used to describe an issue (e.g. pain) from several perspectives to gain a more complete impression of the phenomenon (O’Cathain, Murphy, & Nicholl, 2010). In case studies, the quantitative data can shed light on a patient’s change (e.g. potential improvement) during the therapeutic process, whilst the qualitative data may be used to understand the sudden fluctuations on the symptoms represented in the quantitative scales (Sandahl & Wilberg, 2006).

Participant

Jane was a 34-year-old mother of two living with her partner who was on disability sick leave. She first took leave in 2008 due to burnout and then due to surgery for a herniated disc in 2012 after a brief return to work. She had moderate depression, panic disorder and anxiety, difficulty relaxing and sleeping, stress, tension headaches, migraines, and shoulder pain, although there was no organic reason for these symptoms. The lack of discernible medical explanation for her collection of symptoms may be grouped under the term Medically Unexplained Symptoms (MUS). This includes musculoskeletal pain and ‘pseudoneurology’ – tiredness, sleeping issues, fatigue, and mood changes (Eriksen & Ursin, 2004). Although unexplained, these symptoms have, in addition to headaches, high blood pressure, and emotions such as anger, anxiety, and panic, been linked to negative stress (Yehuda & Seckl, 2011) such as from shock. She explained she would like to move forward with her life but was feeling stuck. Once or twice per month, Jane visited her local healthcare centre and spoke with the psychiatric nurse. She did not take any medication, except for analgesics when migraines were particularly severe. She had applied to participate in music therapy as part of clinical training at the Music Therapy Clinic for Research and Training at the University of Jyväskylä, Finland, and due to the severity and collection of symptoms, was approached by EAC regarding her willingness to participate in VA treatment instead of music therapy for managing pain and comorbid symptoms. The research was conducted at the music therapy clinic and therefore followed the general principles and rules of therapeutic work at healthcare units. She gave informed consent to have weekly sessions and to publish her experiences of the process.

Procedure

Vibroacoustic (VA) treatment consists of three elements: pulsed sinusoidal low frequency sound vibration (20-120Hz), (client preferred) music listening, and therapeutic interaction between client and practitioner (Campbell, Hynynen, & Ala-Ruona, 2017; Ala-Ruona & Punkanen, 2017). The music listening and low frequency sound vibration are received simultaneously. The sound vibration is transmitted through devices such as chairs, cushions, or mattresses whilst the music listening is typically delivered through headphones. In general, the procedure is conducted in several stages: preparation for the session (setting up the equipment), introducing the client to the treatment modality, beginning the combined sound vibration and music listening, monitoring the client’s reception, ending the stimulus, and post-stimulus work (e.g. processing) (Grocke & Wigram, 2007). The therapeutic relationship between the client and practitioner may take the form of verbal interaction between the client and practitioner, usually before and after the low frequency sound vibration and music listening. However, in some cases, the client may wish to interact with the practitioner during

the stimulation. A client may fall asleep during the stimulus and the practitioner's role thereafter is to reassure and guide the client back to the present moment. Before and after the stimulus, the practitioner plays an important role in experiential processing. This may take the form of offering comfort and helping the client to process and reflect on experiences and sensations.

The VA treatment procedure in this study was as follows: 10 VA treatment sessions were planned with the client (hereafter referred to as 'Jane') to take place once per week in a single case crossover design of Vibroacoustic sessions with (VA-Music) and without (VA-Silence) music listening. Jane wore headphones in all sessions, but no music was played during VA-Silence sessions. Before the first session, the practitioner asked Jane to send a list of her preferred music listening choices. Jane suggested some artists to which she sometimes listened and the practitioner made a playlist based on these suggestions. The VA sessions took place in a music therapy clinic equipped with a Next Wave Physioacoustic recliner chair (Next Wave, n.d.). The client lay in a supine position on this chair with a blanket during all sessions and the lights were dimmed during the low frequency stimulation. The same 20-minute low frequency programme (ranging from 29–61 Hz) was used in all sessions; this frequency range has been beneficial for managing physical and psychological disorders and inducing relaxation (Campbell, Hynynen, & Ala-Ruona, 2017).

The client received eight sessions in total; two sessions were cancelled due to illness. Four sessions (S1, S3, S5, S6) comprised usual protocol for VA treatment: low frequency sound vibration, music listening, and therapeutic interaction (VA-Music). Four sessions (S2, S4, S7, S8) comprised all of these elements minus music listening (VA-Silence). It was planned that every second session would be VA-Silence, however this change in scheduling was made for therapeutic reasons (discussed in sections *Control through choice* and *Music as a translational mechanism*).

Sessions 1 and 2 focused on preparing Jane for the procedure and becoming accustomed to the sensation of low frequencies and discussing her difficulty with relaxation in general. Sessions 3–5 focused on how Jane could become more aware of her physical sensations as a way to anchor her in the present moment. She was also paying attention to the effects of the treatment and beginning to integrate these changes into her daily life. Sessions 6 and 7 were about making choices for her regarding self-care (e.g. taking medication, receiving massage) and noticing other changes outside the sessions. The final session further explored making choices and how the effects of the sessions may be translated into daily life, and expressing a willingness to continue to try and help her.

Outcomes assessment

The data for this study consisted of both qualitative and quantitative measures. The qualitative data were transcribed discussions between Jane and Practitioner, whilst the quantitative data comprised Visual Analogue Scales (VASs). A VAS is a unidimensional self-complete scale composed of a horizontal 100mm line with two verbal descriptors on either end (Hawker et al., 2011). The scales used in the present study assessed pain (VAS-P), mood (VAS-M), anxiety (VAS-A), and relaxation (VAS-R) and were completed by Jane before and after each 20-minute treatment programme in each session. The anchors for these scales were: 0 (*worst pain imaginable*) to 100 (*no pain*); 0 (*depressed*) to 100 (*happy*); 0 (*very anxious*) to 100 (*no anxiety*); and 0 (*tense*) to 100 (*relaxed*) respectively. At all VAS measurement points, Jane was asked to mark each scale to represent her current state at that moment, thereby enabling an assessment of both within- and between-session change. Visual Analogue Scales are widely implemented in diverse populations due to low respondent burden and ease of administration (Hawker, Mian, Kendzerska, & French 2011).

Quantitative data analysis

The pre- and post-treatment VAS outcomes were analysed using SPSS (IBM SPSS Statistics, Version 24). Both an overview of the process as well as a comparison between each condition are presented. The pre-treatment score in Session 1 and the post-treatment score in Session 8 for each variable are used to give an overview of the between-session therapeutic process. Additionally, the mean (and standard deviation) pre- and post-treatment pain, mood, anxiety, and relaxation scores for both VA-Music and VA-Silence conditions are presented to show within-session change. Guidelines for interpreting quantitative outcomes such as VASs are beneficial to understand patients' responses to interventions. Jensen and colleagues (2003)¹ recommend cut-off interpretation points for VAS-P of 0-4mm (*severe pain*), 5-44mm (*moderate pain*), 45-74mm (*mild pain*), and 75-100mm (*no pain*). Further, clinically relevant change is also necessary in intervention evaluation; this is referred to as the minimal clinically important difference (MCID) and for VAS-P has been defined as 10-20% as MCID, > 30% as moderate improvement, > 50% as substantial improvement (Dworkin et al., 2008). These interpretation guidelines are employed here to evaluate all VAS data.

Qualitative data analysis

Patients' experiences and the corresponding disability or *ill-being* resultant of chronic pain are important in further delineating the efficacy of chronic pain management treatment methods. Understanding how a client engages in meaning-making and the elements of a subjective experience which they consider important give insight into the experience of suffering and alleviation thereof. To this end, interpretative phenomenological analysis (IPA) allows researchers to gain insight into what is important to participants, then exploring what this *means* to them (Smith & Osborn, 2007). Situating and understanding a participant's experiences and meaning making can help to interpret findings from quantitative outcomes (Larkin & Thompson, 2011). Thus, IPA was used in this study to gain greater insight into the meaning of music within her VA treatment process.

The analytic process was as follows. The transcripts from all sessions were read and re-read several times to obtain a sense of the participant's experiences. Several coding methods were used. The first coding round consisted of descriptive coding, in addition to emotion coding, process coding, conditional coding, and evaluation coding. Descriptive coding highlighted Jane's experiences throughout the process, whilst process coding showed what happened to the participant throughout this process; emotion coding highlighted all emotion words used by the participant; conditional coding was applied to structures such as 'if...then', to find connections between conditions and actions/outcomes, and finally evaluation coding was applied to see how the participant evaluated each condition/intervention. These codes were primarily organised into themes and then explored for interrelationships (Saldaña, 2009), with a focus on Jane's overall response to the VA treatment sessions and then paying attention to how she responded to the VA-Music and VA-Silence sessions separately. Themes that clustered together were grouped as superordinate themes (Osborn & Smith, 1998; Smith & Osborn, 2007). The emergent themes were organised such that a consistent and meaningful representation of Jane's experiences were presented, representing the essence of her responses to the treatment and the factors potentially influencing this response. The analysis thus followed an inductive rather than deductive approach, establishing themes from the data rather than from pre-determined constructs.

Integration

After both qualitative and quantitative outcomes were analysed separately by EAC, the results and findings of each were co-explored and are presented narratively and visually, highlighting the quantitative responses to each treatment modality and discussing the qualitative findings supporting these outcomes. The role of the VASs was to gain

insight into the potential influence of VA sessions with and without music listening on pain, mood, anxiety, and relaxation, however as these are subjective phenomena, the participant's subjective experiences of the treatment – as well as her state in between sessions – was important in bringing greater understanding to how the treatment process affected her. The verbal processing within the treatment sessions, and later in the member check interview, afforded her the possibility to explore and share her own experiences (Bradt et al., 2015).

Member check

To assess the validity of the analysis, a member check interview – otherwise referred to as a validation interview – was conducted with Jane to discuss the emergent themes and their genesis based on the transcripts, and to “confirm, substantiate, verify or correct researchers’ findings” (Buchbinder, 2011), i.e. to discuss whether the themes presented accurately represented the discussions and her experiences during the treatment process. In the interview, EA-R presented both quantitative results and the qualitative findings to assess if these were accurate representations of her experience during the process or not, whether she wished to add something to the outcomes which she felt was important, or whether there were aspects she wished to correct in the results and findings to better portray the sessions. (EAC's role in this process is discussed in the subsequent section.) Conducting the member check interview – termed as descriptive triangulation – in which the researcher(s) show the findings or interpretations to the participants in order to assess accuracy, was a means of increasing trustworthiness of the qualitative findings (Leech & Onwuegbuzie, 2007).

Roles of the researchers / practitioner

The authors played various roles in the therapeutic process as well as the data collection and analysis phases. During the treatment process, EAC filled the roles of both practitioner and researcher. She met with the client to discuss the procedure of the sessions, acquired informed consent from Jane, and collected the data at the beginning and end of each session. In the practitioner role, EAC facilitated the therapeutic process, delivering the music and tactile interventions at each session. A number of clinical researchers subscribe to the idea that research in itself, as well as follow-up interviews, has a therapeutic effect (Sandahl & Wilberg, 2006). From this perspective, the interacting and overlapping roles of a practitioner and researcher may involve complementary processes.

Both EAC and EA-R conducted the member check interview. Although it was initially planned that only EA-R would conduct the member check, Jane requested that EAC also be present in the meeting. EAC's role was passive in the member check interview unless clarification was needed and requested from the participant.

Results

Quantitative results

When viewing the overall process, Jane recorded clinically relevant pain decrease and relaxation increase were when only the pre-treatment score from Session 1 and the post-treatment score from Session 1 are presented (i.e. both VA-Music and VA-Silence sessions). At the end of the process, her pain corresponded to *no pain* and relaxation corresponded to *mild tension* when following the interpretation guidelines (Jensen et al., 2003). Mood and anxiety deteriorated during this time to a minimal clinically relevant degree (see Table 1). Both mood and anxiety were *moderate* at the end of the treatment process.

When comparing the mean VAS outcomes between the music and silence sessions, VAS-M, VAS-A, and VAS-R showed improvement; VAS-P change was negatively clinically relevant change in the silence sessions, but showed improvement in the music sessions, indicating that music was at least somewhat beneficial for pain. VAS-M im-

Table 1

Pre-treatment Session 1 and post-treatment Session 8 scores for all variables showing progression over time, and mean (and standard deviation) of all pre- and post-treatment scores for each variable comparing VA-Music and VA-Silence sessions.

Note: All Visual Analogue Scales range from 0-100mm; a higher score represents a more favourable outcome; *Indicates the *Minimal Clinically Important Difference* (MCID); **Indicates moderate change; ***Indicates substantial change

	VAS-Pain		VAS-Mood		VAS-Anxiety		VAS-Relaxation	
Overall treatment process (0-100mm; higher score indicates better outcome)								
Whole process	Session 1	Session 8	Session 1	Session 8	Session 1	Session 8	Session 1	Session 8
	69	93*	51	43	64	52	5	71*
Comparing VA-Music and VA-Silence sessions (0-100mm; higher score indicates better outcome)								
	Pre-treat- ment	Post-treat- ment	Pre-treat- ment	Post-treat- ment	Pre-treat- ment	Post-treat- ment	Pre-treat- ment	Post-treat- ment
VA-Music	60.82(17.86)	65.25(12.19)	43.39(7.46)	52.75(5.31)*	34.79(17.98)	54.5(13.28)***	21.54(14.54)	51(12.75)***
VA-Silence	85.75(5.26)	73.75(11.65)	47.75(8.13)	50.5(13.46)	35.5(8.20)	45.25(12.70)*	30.75(16.16)	54.75(13.94)***

provement was clinically relevant in the music sessions, but VAS-A and VAS-R were substantially clinically relevant in both conditions according to the MCID (see Table 1). These results indicate that the VA-Music sessions were more beneficial for anxiety and relaxation than for pain or mood.

Pain

VA-Silence pre-treatment scores were generally better compared to VA-Music, as the mean pre-treatment score for VA-Silence was in the *minimal* category and for VA-Music was in the *mild* category. From an individual session perspective (see Figure 2), substantial improvement was recorded in Sessions 3 (VA-Music), with MCID in Session 5 (VA-Music). MCID negative change was reported in Sessions 1 and 6 (VA-Music) and Sessions 2, 4, and 7 (VA-Silence). There was relatively high variation between the conditions; however, when the pre-treatment score was the worst (Session 3), the improvement was also the most substantial.

Mood

Mean mood scores for pre-treatment VA-Music sessions was in the *moderate* category and VA-Silence in the *mild* category. Again, Session 3 (VA-Music) showed substantial improvement (see Figure 3), whilst Sessions 1 and 6 were also clinically relevant. For VA-Silence sessions, moderate improvement was reported in Session 4, clinically relevant improvement in Session 7 but negative clinically important change in Sessions 2 and 8. Therefore, although the final score at the end of the process was worse than the beginning of the process, the mean change over time was nevertheless towards improvement, although only clinically relevant for the VA-Music sessions.

Anxiety

Pre-treatment scores in both conditions on average were *moderate* and post-treatment scores were *mild* for both conditions, suggesting that both were beneficial for anxiety relief. There was greater relief recorded for the music sessions, however. Minimal clinically important change was reported in Sessions 1 and 7, with moderate improvement in Sessions 4 and 8, and substantial improvement in Sessions 3 and 6. As seen in Fig-

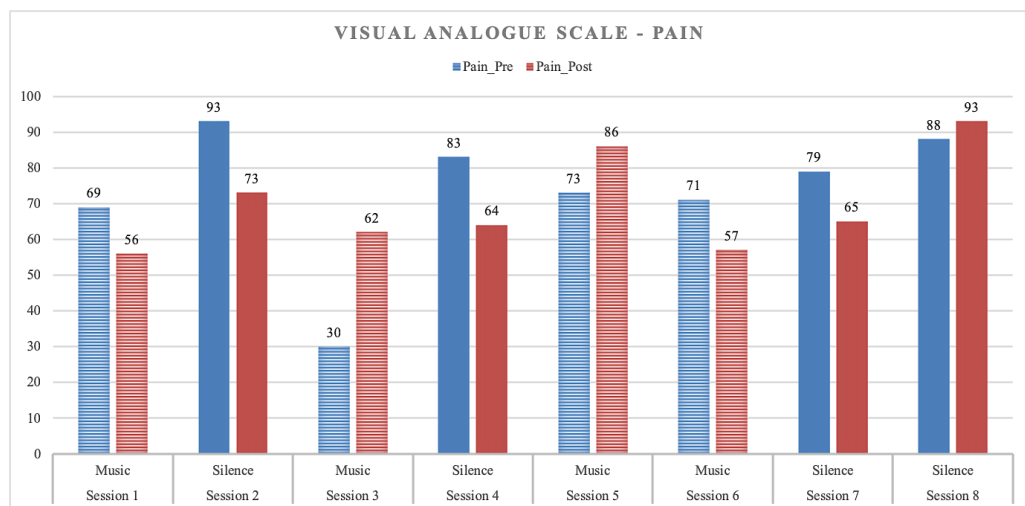


Figure 2

Pre- and post-treatment scores for pain completed before and after each treatment in all sessions. Solid colours represent VA-Silence sessions. Visual Analogue Scales range from 0 (worst pain imaginable) to 100 (no pain). Point increase (+) relates to less pain.

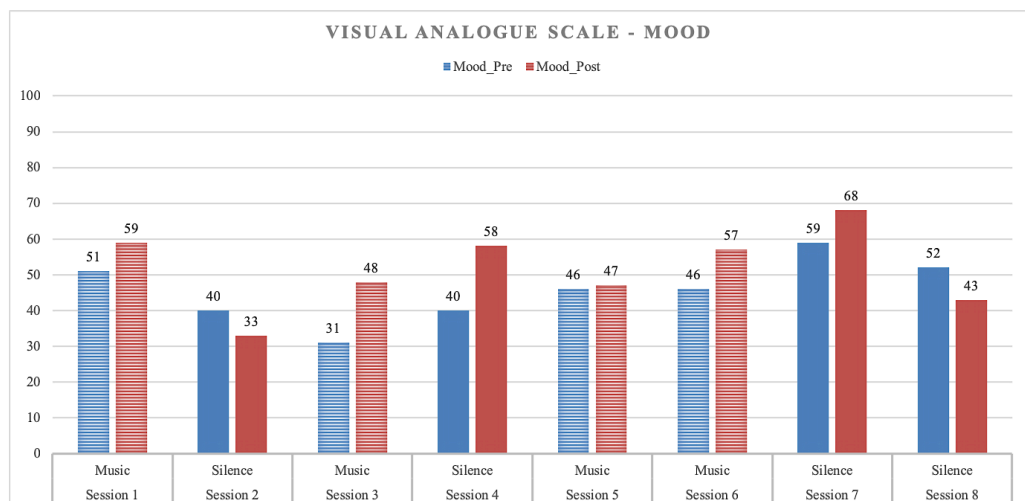


Figure 3

Pre- and post-treatment scores for mood completed before and after each treatment in all sessions. Solid colours represent VA-Silence sessions. Visual Analogue Scales range from 0 (depressed) to 100 (happy). Point increase (+) relates to better mood.

ure 4, on days when anxiety was the worst, Jane reported the greatest improvement (Session 3, 143%; Session 6, 184%).

Relaxation

The greatest improvements overall were recorded for relaxation (see Figure 5). Pre-treatment scores for both conditions were *moderate*, changing to *mild* post-intervention. MCID was recorded in Session 5, moderate improvement in Session 6, and substantial improvement in Sessions 1, 3, 4, 7, and 8. Again, Jane experienced the greatest increase in relaxation in those sessions with relatively higher tension pre-treatment.

Qualitative findings

Jane's experiences of VA treatment and the role that music played in this process were explored in the interaction between her and the practitioner during the eight VA ses-

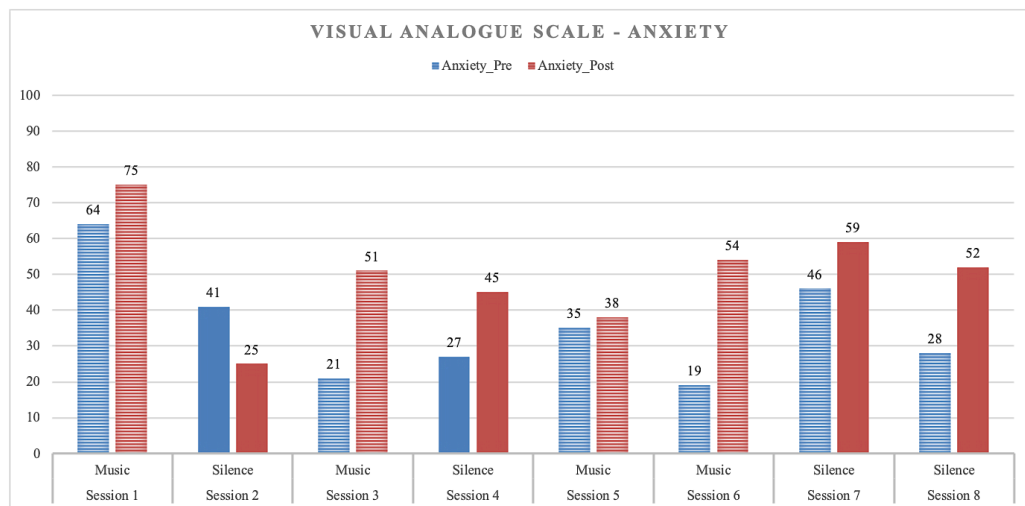


Figure 4

Pre- and post-treatment scores for anxiety completed before and after each treatment in all sessions. Solid colours represent VA-Silence sessions. Visual Analogue Scales range from 0 (very anxious) to 100 (no anxiety). Point increase (+) relates to less anxiety.

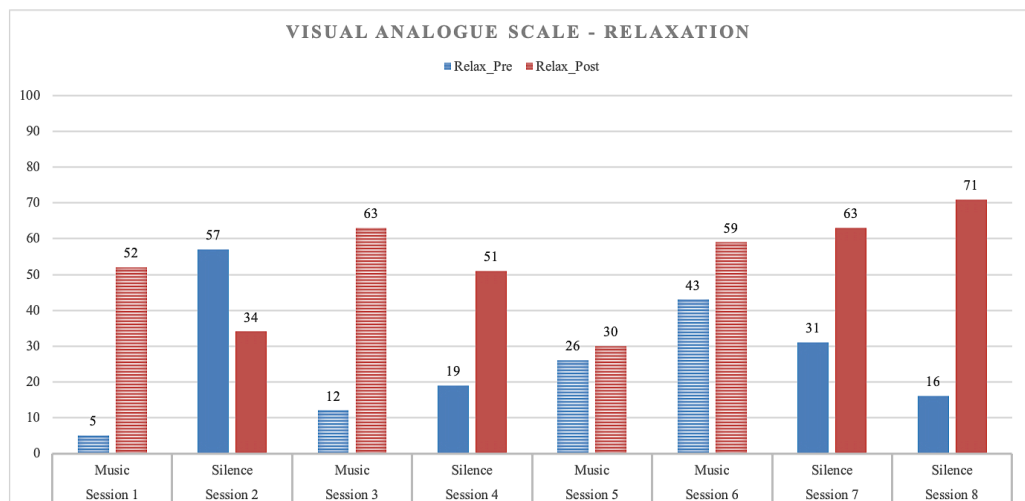


Figure 5

Pre- and post-treatment scores for relaxation completed before and after each treatment in all sessions. Solid colours represent VA-Silence sessions. Visual Analogue Scales range from 0 (tense) to 100 (relaxed). Point increase (+) relates to greater relaxation.

sions. Three superordinate themes emerged from the analysis: *Trapped by her anxiety*, *Control*, and *A changing self-reflection*; the interrelationships of these themes are shown in Figure 6. Each superordinate theme had subthemes, which are presented narratively with exemplative quotations. The first two superordinate themes were interconnected – Jane sought control as she was trapped by her own anxiety – and the second and third superordinate theme were interconnected – Jane began to see changes by using music listening as a means to take control in a different way. The interrelationships of these themes are represented in the figure such that Jane’s anxiety and need for control were pervasive and connected to each other. Being *Trapped by her anxiety* overlapped with her need to control all situations, yet her anxiety and need for control were starting points in the process and are therefore stacked rather than linear as both themes were equally prevalent. The superordinate theme *A changing self-reflection* is justified to the right as it signifies the process of moving forward, rather than the stagnation of being trapped by one’s emotions. It overlaps with *Control* because Jane was nonetheless

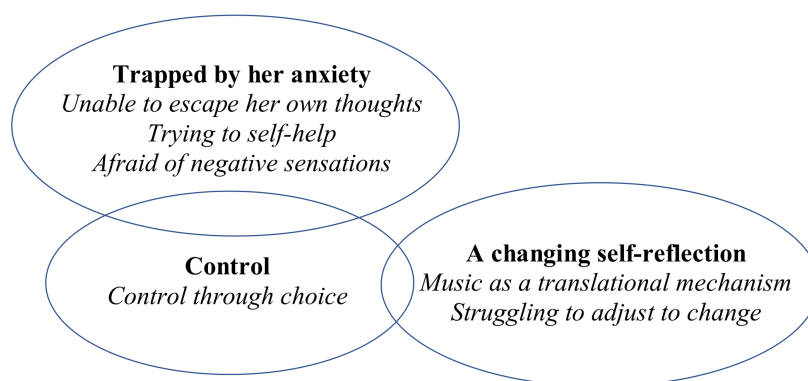


Figure 6

Interrelationships of the three superordinate themes

struggling to make this change, but was able to try with the help of the VA treatment sessions.

Trapped by her anxiety

Jane was unable to relax at home – she sometimes found solace wandering the shops and could relax there because she was alone and it was quiet; she described her attempts to relax at home as “*chaos*.” She equated this chaotic feeling with the inability to relax during her first VA-Silence session: “But it is the same if I’m at home and I try to relax and I have that same kind of feeling as now without the music.” She felt trapped in feelings from which she could not escape, her health situation, and being so sensitive to each sensation she felt caused her great distress: “It’s too distressing...I feel as though I am in a box and I can’t get out of it.”

Unable to escape her own thoughts

She tried to consciously avoid thinking about situations that gave her anxiety – such as her daughter wishing to move in with her biological father – and admitted that this in turn increased the sensation:

If I don’t think about those things consciously, about my daughter and my health, then they just circulate in my mind and I think about them in the evening and I get that kind of feeling...and I think it’s exacerbated by that.

Jane found in Session 2 (VA-Silence), that she had no distraction from her thoughts in the absence of music: “Somehow I wasn’t able to relax; I was thinking the whole time, and there was nothing else.” She found her thoughts were initially much more relaxed with music than without (Session 3): “My mind was much more peaceful than without music, even though I wasn’t necessarily listening to the lyrics, but still somehow...it was relaxing!”

In addition to this, Jane had no resources to alleviate her anxiety. This led to her suppressing her emotions even further, creating a space in which she had no escape from her anxiety: “I don’t have the resources to take the anxiety away or reduce it. Maybe it would be better if I just spoke about it, but who can I talk to? Talking to yourself isn’t fun!” She recognised her need to talk as a means to understand and process her situation, yet this was problematic. She was alone in her suffering; she had only one friend, whom she seldom met. This meant that she could not offload and it caused her to spiral into unhealthy patterns of rumination. She was highly aware of this fact:

“If I can’t speak to someone about it then I don’t think rationally and there’s uncertainty.”

Trying to self-help

When attempting to rectify this and speak to a friend to relieve her anxiety, she was unable to prioritise her own feelings, again trapping herself in this anxious space; after making plans to meet during the day and then to watch a film together in the evening, Jane received a message from her friend cancelling the earlier meeting: “I was disappointed that we couldn’t meet during the day because then we can’t talk.” When asked whether she could have told her friend that it was important, it became clear that her own feelings were not a priority: “I could have written that it’s very important, but what can I do if she’s feeling really bad and she just can’t make it to meet during the day?” Additionally, Jane expressed that she had expected such a cancellation message; it was almost a self-fulfilling prophecy in not expressing this to her friend. Instead, she suppressed rather than expressed her anger.

Although she was trapped in her anxiety, Jane was also seeking out ways to help herself. She did not find the visits with the psychiatric nurse beneficial and did not want to take mood regulators as “it kills something [inside you] when you take that...I don’t like taking medications.” Despite gaining no use from the visits, she still went once per month; she was afraid to give these up, having a strong desire to improve her situation. She felt desperate with her own emotions and sought out methods to help herself, including complementary medicine, avoiding interventions with which she had previously had negative experiences i.e. pharmacological mood regulators.

Afraid of negative sensations

In addition to being in an almost constant state of emotional upheaval, she was also acutely and constantly aware of physical sensations in her body, having pain and tension every day, immediately attributing new sensations to a new health concern: “Now, I’m always afraid of what it [new pain] is.”

Control

She admitted that she found it difficult to be out of control of a situation: *‘I’m that kind of person that needs to always know what is happening next’*. This stemmed from the sudden need for surgery after a herniated disc and as a result being afraid of each sensation she felt, anxious that it may lead to something more serious: *‘I worry about what’s coming. It’s pretty hard’*. She also felt unable to control her own thoughts and incapable of calming herself down. During the process, she was awaiting a phone call from her doctor with results from a scan. She explained that she felt extremely anxious the night before the expected phone call and was unable to relax. Nevertheless, she felt that she was lucky that she had not been worrying the whole week, suggesting that she felt her anxiety was out of her control: *‘Luckily I didn’t worry before’*.

Control through choice

Although Jane expressed that she felt the need to constantly be aware of what was coming and be in control, she also seemed to fear this control. This manifested in her difficulty to make choices for herself. During a scheduled VA-Silence session, Jane asked to listen to music, asserting her need for distraction. This moment of choice was important, as asking for something she needed was difficult for Jane; it showed she could control her affect regulation when really needed. As this choice had been important, the practitioner asked Jane in a later session whether she wished to listen to music or not, offering her the choice based on her needs; although she was eventually able to make the decision (deciding on silence), and afterwards felt it was good there was no music, she found it hard to make the choice.

A changing self-reflection

After the first session (VA-Music), Jane felt *'just wonderful'* and spent six to seven hours shopping after the treatment; thereafter, she noticed how tired she was. She was surprised by her ability to relax during the first session of trying something new: *'This mode worked surprisingly ... for the first time...surprisingly well'*, but she was not able to pace herself after the session and was fatigued after spending hours walking around the shop. Interestingly, although she felt physically relaxed afterwards, her mind was still very active throughout the stimulation; she was quite anxious, spending the entirety of the treatment programme counting the songs to figure out how long was left: *'Always thinking about what song is next – calculating now three minutes, and one song is almost four minutes and now it's been eight minutes'*.

Initially, she responded poorly to the VA-Silence sessions. She found her mind was much more restless without music as she had nothing with which to distract herself: *'My mind was much more agitated without music. ... The thoughts lasted the whole time, it was terrible, it wasn't good, no, no, just terrible'*. She found it difficult to be in the sessions without music and was overwhelmed by it. She felt that, even if she does not listen to the lyrics of the songs, she could choose when to listen to the music and when to let her mind wander and this relaxed her: *'At the same time I can think and then I can listen again to the singing'*. This became a technique for her during VA-Music sessions; selective listening became a way for her to self-regulate her anxious thoughts.

Struggling to adjust to change

Jane's symptoms were relieved from the treatment, she found that she was able to think more clearly, and expressed having a *'free feeling'* after leaving each session. This improvement, however, also sparked anxiety. She feared what would happen in the Autumn when the darkness would return and she would no longer have VA treatment sessions, again alone in her suffering. She expected to feel worse again and for the improvements to be only fleeting. Unable to enjoy the improvement, she hampered the sensation, instead worrying about the future. She was not able to adjust to the positive change, instead stuck in the feeling that her symptoms would not remain away. Despite this worry about the future, she remarked in Session 7 that she had not had pain or tension in the previous two weeks and she also felt that her frame of mind was better: *'Sometimes I think I think better'*. Although struggling to adjust to the change, she also acknowledged that she was experiencing relief and she was beginning to pay attention to the positive rather than worrying about negative feelings she experienced.

Music as a translational mechanism

Music changed the way Jane perceived the treatments; the sensation of the VA treatment programme was different depending on whether she was listening to music or not. The music distracted her both from her own thoughts but also translated the sensation of the vibrations so they felt less intense, although the same frequency series was used each time. She felt that the treatment programme went by more quickly with music and that the vibrations moved up and down her body differently, sensing them in different parts of her body when she listened to music (moving from legs towards chest) compared to no music (chest area, no movement).

Music also translated the way Jane felt about silence. Although she was at first afraid of the sessions without music, she later found that the silence was an important element for her, too, and that actually she needed the silence when she was in a highly aroused state. She was anxious and upset about her daughter wishing to move in with her biological father; Jane recognised that her previously having used music as a way to distract herself from her anxiety did not apply at this point and, music was not something she needed at this time. She did not desire an escape from her anxiety and felt that listening to music would be too overwhelming for her. Although she did not feel relaxed after the session, she felt that *'it was good there was no music'*. This was a stark

contrast to her initial fear of silence. Her choice to not listen was an important step in her process and made her realise that she did not need to have music to distract her all the time, rather could selectively use it when she felt she needed support, feeling in control of her fear of silence: *'I think I beat my fear'*. This mirrored what she did during the VA-Music sessions, during which she chose to selectively listen to the music and channel it when she felt the need.

Integrated results

Both quantitative and qualitative outcomes of this study showed that Jane was in a state of suffering. Throughout Jane's process, it was possible to see her move through an isolated and anxious state of suffering towards the hopeful understanding of the possibilities that music offered her in symptom management and in showing her that it is possible to relieve her anxiety. She displayed how one may struggle to cope but also how VA treatment can be used to help retrain one's focus from negative sensations towards developing a sense of self-efficacy, making choices based on her own needs.

The findings revealed that anxiety had control over Jane's ability to engage in daily activities, which was sometimes overwhelming; her need for control in general was magnified when she felt out of control of her own thoughts. She began to take small steps towards discovering and enacting her own needs and this was highlighted at the pivotal stage of choosing to first have music in Session 6 and then not in Session 8. *Control* was overlapping both her struggles with anxiety and her *changing self-reflection*, and the means of taking control for her was to utilise the music listening to regulate her anxiety within music sessions when needed, but also to choose when not to listen to music. Music affected her during the process by enabling her to make this choice and increase her sense of control. Bradt, Dileo, and Shim (2013) also found that engaging in music can increase the perception of control. During the first VA-Silence session (Session 2), pain, mood, anxiety, and relaxation got worse; this negative reaction was supported by her verbal processing of the experience (*'My mind was much more agitated without music. ... The thoughts lasted the whole time, it was terrible, it wasn't good, no, no, just terrible'*). In the next session (VA-Music), Jane reported substantial improvements in pain, anxiety, and relaxation, and moderate improvement in mood with the VASs, and also verbally reported as such (*'My mind was much more peaceful than without music, even though I wasn't necessarily listening to the lyrics, but still somehow...it was relaxing!'*). Jane's perception of being calmer during VA-Music sessions is also represented in the mean outcomes per condition (i.e. VA-Music vs VA-Silence), as mean improvement for anxiety was substantial in VA-Music sessions, yet substantial improvement was clear for relaxation in both VA-Music and VA-Silence sessions. The VA treatment thematic interrelationships with control as a catalyst for this positive development are shown in Figure 4 and presently individually discussed.

Low frequencies and music listening

The first interconnected elements were the low frequency sound vibrations and the music listening. Relaxation was pivotal for eliciting change, which for Jane was at first only possible with the additional music listening element. This is evidenced by the negative response to VA treatment in Session 2 (VA-Silence). The ability to relax was a crucial aspect for her in reducing stress and anxiety and building up the therapeutic space. This was also visible in the VAS-A scores, as anxiety improvement (and worsening) mirrored that of the VAS-R scores. Relaxation was something that Jane reported had previously been quite impossible, however within the context of VA sessions she learned how to do so. The low frequencies allowed her to experience positive bodily sensations, rather than always expecting and experiencing pain. The music listening gave her a means to relax and distract herself from her own thoughts without feeling the stress and frustration of trying and failing to do so in silence. Music was thus a key element in the sessions and process overall, first to help her relax, then as a way

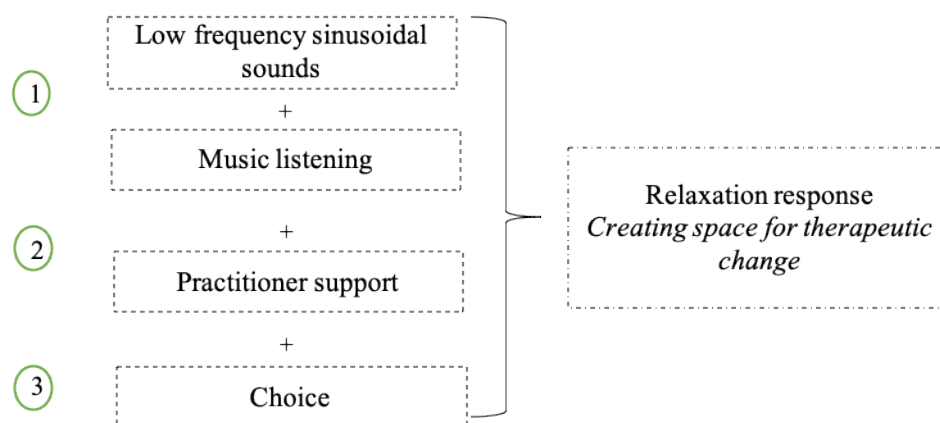


Figure 7

Interrelated elements of (1) low frequency sinusoidal sounds and music listening, (2) practitioner support, and (3) choice, together creating space for therapeutic change through the relaxation response within the VA treatment setting

to selectively listen and use the music as a distractor as needed within music sessions, and finally to make the choice based on her needs, i.e. choosing to not listen to music.

This is supported by the quantitative outcomes; Jane was unable to relax without music in Session 2 and her relaxation decreased by 40% (VAS-R), her anxiety increased by 39% (VAS-A), her pain got worse by 22% (VAS-P), and her mood also deteriorated by 18% (VAS-M), all clinically relevant changes. It can also be seen that the worsening in pain during VA-Silence sessions represented clinically relevant change, compared to only minimal and non-clinically relevant worsening in VA-Music sessions. Elicitation of a relaxation response seems to have an important role to play in VA sessions, but interestingly an increase in pain levels apparently did not affect her ability to relax nor reduce her anxiety, suggesting that her overall state of suffering was more related to her anxiety than was affected by her pain. Indeed, severe anxiety seems to have taken precedence over her physical symptoms.

Support from the practitioner

Secondly, the interaction with and supportive role of the practitioner was important, especially at a time when she felt isolated in her suffering. The VA sessions were a place where Jane could express herself when seemingly no one else was listening. The hope and expectations that Jane had for the sessions, coupled with experiences of self-efficacy from successful relaxation experiences within the session, founded on the supportive role of the practitioner, are indicative of some elements necessary to elicit therapeutic change.

Choice

Thirdly, increasing Jane's empowerment and self-efficacy was possible through affording her the control and choice of whether to listen to music or not during the sessions. She initially began this choosing process during VA-Music sessions, when she chose to use music as a distraction from her thoughts – weaving in and out of active and passive listening, using music as a way to self-regulate. Music and choice were the factors which opened the process of needs-based and client-centred decision making; although the choice of whether to listen to music was a struggle, she chose based on her needs and wants in that moment. In Session 6 when Jane made the pertinent decision to listen to music although it was intended to be a VA-Silence session, it was clear from the quantitative outcomes that she was making this decision from a state of acute anxiety; she experienced the greatest anxiety relief (184%, substantial improvement) in this session, suggesting that the combination of control from her choice, music listening

with the low frequency stimulus, and the encouragement from the practitioner were all part of the effect.

The interrelationships between the superordinate themes coupled with the VAS outcomes highlights the complexity of these interconnected symptoms and the ways in which they interact and influence each other.

Descriptive triangulation through a member check interview

In the member check interview, Jane confirmed that she felt less pain and anxiety, was in a better mood, and was more relaxed after the VA-Music sessions, and that VA treatment was a “good model” for managing her pain and anxiety. She also felt that, although there was a lot of variation and disruption in her quality of sleep, the relaxation and “maybe a little more of a tired feeling” after VA-music meant she did not ruminate as much before bed, attributing this to her better sleep.

She confirmed that although her pain was not severe during the process, it was persistent and interconnected with her anxiety and mood and that her MD had confirmed there was no detectable cause for her symptoms. Her experience of music or no music was contradictory, “sometimes it was good, sometimes not.” This, she explained, was dependent on her level of coping at the time. Jane noticed she was hypersensitive to sensory stimuli. If feeling low or stressed, she could tolerate only soft/quiet music. When she did listen to music, however, she found that it was difficult for her to focus on herself; during the VA-music sessions became immersed in the experience and felt like “being on top of waves, and the waves just carried me” but found this was a way she could also avoid working on her issues. She also told she was able to gain different perspectives on her issues through the discussions with the practitioner, experiencing a clarity of mind – “basically somehow lighter.”

She confirmed that her experience of the treatment was both a physical and mental one: “when the chair was vibrating, I could feel it in my body, but when I was quiet and concentrated on just that, again it affected my mind.” She told that during the process she learned to concentrate on herself and learned that the anxiety would not overwhelm her; if she could become quiet, she was then able to enjoy “a sort of...peaceful moment.” Initially, the non-music sessions were difficult for Jane because she had to “tolerate myself.” She was constantly aware of things happening in her surroundings, which was burdensome. She also commented if she noticed a new pain, she immediately categorised it as the worst possible pain – “I’m very sensitive to that.”

Jane acknowledged the themes from the qualitative analysis were representative of her experience and agreed that control is a major part of her personality. She also explained that her pain and anxiety were very tightly intertwined and that they usually co-existed. She confirmed that she felt trapped by her anxiety, that she struggled to remain in control of all aspects of her life, and that she began to change the way she thought about and approached situations because of the VA treatments: “I noticed that I have pain even if I did nothing and I learned to just live with it a bit better and then it was easier.” She felt that it was “always a kind of holiday feeling or something quite exciting [going to the sessions] ... I could cope somehow better... my head was a bit emptier,” but initially the sessions were frightening for her because she did not feel in control of the situation. When not in control, “I’m terribly anxious” and she found schedule changes very difficult: “If something surprising happens, I feel that the whole meeting is gone to pieces.”

Jane agreed with the finding of her changing self-reflection during this process. She began to teach herself how to approach things differently: “maybe that kind of more relaxed view, way of being.” Through attending the sessions, she felt that “my head got a bit of a break;” this clarity of mind was a contrast to the “lump” on her chest that she described as her anxiety. Finally, she told she was encouraged by the fact that the findings from the analysis were relevant to her and that it was “really nice for me that they are really my things and I felt I also got something from these results [discussed in the member check interview].”

Discussion

This single case study explored the influence of music listening within VA treatment and the triad of its components: low frequency sounds, music listening, and therapeutic interaction. The quantitative results showed that Jane left the VA sessions feeling much more relaxed, which was also corroborated by the qualitative findings and the member check interview, and that there were more consistent positive effects in the VA-Music condition. This, in addition to improvements in the remaining variables, may point towards lower levels of stress, as was reported by Rüütel (2002). Relaxation is one of the most commonly reported effects of VA treatment (Campbell, Hynynen, & Ala-Ruona, 2017; Punkanen & Ala-Ruona, 2012) and eliciting the relaxation response is beneficial for relieving stress (Esch, Fricchione, & Stefano, 2003). The relaxation response (Benson, 1975) results in reduced stress response and sympathetic nervous system arousal and may explain the effects of VA treatment (Punkanen & Ala-Ruona, 2012), perhaps due to the repetitive, pulsed nature of the frequency cycles in the treatment programmes and the sympathetic resonance between the body and the applied frequencies, as well as the transporting effect of listening to one's preferred music.

Suffering and sensitisation

The findings showed that Jane was struggling to cope with her unpredictable symptoms as well as uncertainty within her family structure, which contributed to an overall sense of suffering. Suffering is characterised as a state of distress instigated by threat and loss of wholeness, an individualised and subjective experience that includes assigning negative meaning to an event or perceived threat (Cassell, 1998; in Deal, 2011). After the surgery in 2012 she reported as unexpected, Jane was constantly afraid of various pains or sensations she felt, fearing they would result in more medical procedures. She was under continuing psychological threat to her subjective wellbeing. Medically unexplained symptoms (Eriksen & Ursin, 2004) are highly representative of Jane's suffering. The lack of identifiable cause also may have added to hyperawareness of her symptoms. Although the lack of discernible disease source for her physical pain was confirmed by a scan during the process, she was suffering from the psychological stress and anxiety associated with her fear of new pain and what implications it may have. Attentional (hypervigilance) biases in interpretation are strongly related to anxiety (van Diest et al., 2005). The theory of cognitive sensitisation for medically unexplained complaints (Brosschot, 2002) outlines that those who have an extreme concern about somatic disease will develop a cognitive bias for information related thereto. This bias appears in an activated cognitive network, meaning that signals related to, for example, pain are more closely observed and noticed by us. As a result, one would over-report, misattribute, or over-interpret these somatic sensations based on their own fears or illness beliefs. Jane was highly sensitised to all sensations – both somatic and psychological – and had developed a continued level of anxious suffering because of this cognitive sensitisation to her medically unexplained symptoms. As she explained in the member check interview, she was trying to re-train this response.

Four themes related to suffering are noted by Reed (2003, in Deal, 2011): isolation, hopelessness, vulnerability, and loss. Essential to alleviating suffering is a sense of hope, with a focus on a realistic future. Our perceived reality becomes clouded when one loses hope, as it results in a lack of desire to survive the experience (Rolley, Chang, & Johnson, 2014). Jane's experiences can be categorised under these themes of suffering such that she was alone in her suffering and initially felt hopeless and helpless, struggling for control, leading her to a feeling of vulnerability. She greatly disliked being out of control in all situations and since her sudden health issues, she had lost the life she had once led and was lost in her own sphere of anxiety, trapped in her own thoughts.

Yet, Hart (2018) discussed two types of suffering: one in which one feels worried, hopeless, miserable, angry, and worthless with the "stressful anxiety of loss and responsibility" (p. 142), and the other in which one glimpses hope, learning to see things

optimistically and gratefully. The act and experience of suffering is not only a solitary state but also one in which one learns to see the way forward; it is both dissonance and consonance. Music listening - and the choice to listen or not - was a marker of both of these types of suffering for Jane. First, having sessions without music listening were impossible in this worried, hopeless, and miserable state, but later, in choosing to *not* listen to music in Session 8 - thereby listening to her own needs - she was able to see things optimistically, leaving the sessions with a “free feeling” and getting over her fear of silence (“I think I beat my fear”). Music is widely used to increase one’s sense of wellbeing and act as a distractor from thoughts and feelings, improve mood and reduce anxiety, and decrease pain (Kemper & Danhauer, 2005; Nilsson, 2008), which was certainly the case for Jane. Hanser (2014) describes the role of music in framing the experience of pain as “an ever-changing phenomenon that rises and falls as the music changes in synchrony. As these dimensions shift, the perceptual path of pain ebbs and flows, and it is possible for pain to dissipate in the mind of the listener” (para. 15). This was also the case for Jane and her anxiety; as the music played, the perceptual path of her anxiety ebbed and flowed so that it dissipated and she was able to relax, reducing her bodily tension and pain.

Listening

Due to Jane’s isolated suffering, she lamented having no one with whom to talk and thus resorted to suppressing her emotions, spurring more anxiety. One’s attempts to understand and endure one’s suffering are eased by the sharing of this experience with others, so a listener is an important aspect of any therapeutic process (Deal, 2011). Listening to and conveying that the client has been heard and understood are important elements in building up a supportive environment (Pinto et al., 2012). In the case of VA treatment, the practitioner takes on a supportive role for the client’s self-exploration in a client-centred approach by providing the client the opportunity to make choices supporting their own healthcare. Patient empowerment and self-efficacy are essential for eliciting change and clients taking control of their own lives and wellbeing; further, there has been increased emphasis on the identification of patients’ healthcare wishes and an increase in patient autonomy (Laugharne & Priebe, 2006). One way in which practitioners can support patient empowerment is to assume a guiding or coaching role (Chamberlin, 1997). In Jane’s case, this involved affording her the possibility to make the choice to listen to music through listening to her own needs. Jane listened to and expressed her own needs, which the practitioner heard and acknowledged. Choice has been shown to have positive consequences in educational, workplace, and health contexts (Patall, Cooper, & Robinson, 2008), leading to a sense of personal control (Taylor, 1989, cited in *ibid.*). When a choice has important implications (i.e. eliciting relaxation for anxiety reduction), it may be more difficult to make (e.g. choosing whether to listen to music or not), particularly when the options are equally attractive; individuals experience increased motivation, perseverance, performance, and production when they assert their autonomy through choice-making (Patall, Cooper, & Robinson, 2008). Choice has also been suggested to influence patients’ commitment and motivation for attending therapy (Rokke, Tomhave, & Jovic, 1999). In the case of providing choice of music to which patients could listen for managing pain, their preference was important as there was ultimately no difference in the pain outcomes between patients choosing Taiwanese or American music (Huang, Good, & Zauszniewski, 2010). The authors wrote that preference is integral when one employs music listening on a long-term basis for pain management. Jane’s choice was a pivotal moment in her treatment process, as it opened the door towards exploring the meaning and use that she could herself attribute to the music listening.

Implications for practitioners

The results and findings from this study suggest VA treatment in general may be beneficial for improving pain, mood, anxiety, and relaxation for a client with medically

unexplained symptoms. As such, when comparing the influence of music within the treatment protocol, an important finding of this research is that the client's preference for listening to music should supersede the theoretical understanding of the physiological and psychological effects music has on us (discussed in the section *Music interventions for relieving pain and mood*). The practitioner's role within the treatment sessions to support a client's therapeutic process and safely deliver VA treatment also means the practitioner should help the client to make an informed decision on whether music listening could be used; this would be based on the needs and goals of the overall process as well as a single treatment session. Therefore, this study supports the use of goal-directed music listening rather than delivering music listening solely based on research evidence.

Limitations of the research

The study design employed here, the single case experimental design, was chosen to evaluate how one client receiving VA treatment sessions would respond to both the presence and absence of the music listening element. Therefore, carryover to other patients – even those with a similar configuration of symptoms – is problematic (Charness, Gneezy, & Kuhn, 2012). In general, the disadvantages of exposing one participant to multiple treatments relate to the confounding elements inherent in an individual's experience, especially in a more naturalistic setting (ibid.). As such, the results presented here are to be interpreted with caution, as the treatment process over time – regardless of the specific condition of each session per se – influenced the overall effects of the music listening element. AB designs as such can be useful in exploring the feasibility of an intervention, but do not provide definitive indications of the effectiveness of a treatment (Manolov, Gast, Perdices, & Evans, 2014). On the other hand, the varied treatment responses also highlight the difficulty in managing medically unexplained symptoms and the many external factors influencing a therapeutic process.

Another potential limitation of this study is the fact that EAC filled two roles, one as the VA treatment practitioner and the other as a researcher. She collected all data in the role of practitioner and also conducted all data analysis and interpretation; despite the qualitative and quantitative data being analysed separately in their entirety before the integrated analysis, this process could not be completely separate as a result of this role overlap. This nevertheless may also be seen as advantageous, as EAC had a complete picture of the process from a practitioner's perspective from the sessions to the member check interview as a result of the dual roles (as discussed in section *Roles of the researchers / practitioner*).

Finally, Visual Analogue Scales may have been too simplistic a measurement tool to assess Jane's nuanced experiences. The verbal processing / qualitative data were therefore extremely important in supporting the quantitative results. The broader topics of discussion between the client and practitioner during the sessions allowed for a more complex examination of Jane's contextual therapeutic experiences, but the integration of diverse data sources – the quantitative as specific and qualitative as more general explorations – was more complicated as a result. Although it may have potentially been beneficial to conduct more formalised interviews of her experiences pertaining directly to the variables under examination, this would have compromised the integrity of the therapeutic context. The research process and outcomes of this study therefore support the use of mixed methods as a means of exploring how a client may respond to a therapeutic intervention when having diverse symptoms of no discernible medical source, despite the potential pitfalls of single case research in general.

Areas for further exploration

The client's specific connection to their preferred music may be important in sensation perception. Having a clearer idea of how an individual responds to certain music would be an important step in further understanding the interaction of the VA treatment elements. This supports the necessity of the therapeutic and supportive role of

the practitioner in planning and executing the therapy process, with the client sharing the responsibility in how their treatment progresses. Understanding more closely the individual benefits and cumulative effects of each arm of the VA treatment triad works towards more effective and safe utilisation of VA. More research is also needed to explore how the VA treatment elements work together for various target groups such as patients with complex and interacting symptoms.

Conclusion

Music listening with low frequency sound vibration and therapeutic interaction was beneficial for reducing anxiety, improving mood, and reducing pain with potential implications for improving quality of sleep for a client with medically unexplained symptoms. Low frequency sinusoidal sound vibration and therapeutic interaction with and without music listening was beneficial for relaxation. Music ultimately became an opportunity for Jane to learn how to both actively and passively self-regulate her anxiety, and the choice of not listening to music was equally important as it enabled her to address and engage with her own needs. Choosing to listen to music or not was supported and reinforced by the practitioner, as the choice was based on Jane's current needs and served to empower Jane, important for therapeutic change. Although more research is needed, music in this case was an important pivotal point of change in the therapeutic process, enabling the participant to make positive choices for her own wellbeing. The choice of whether to listen to music or not, or indeed the music to which one listens, within VA treatment can play an important role in the effect music listening may have within a process.

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Notes

1. These values are inverted.

References

- Ahonen, H., Deek, P., & Kroeker, J. (2012). Low frequency sound treatment promoting physical and emotional relaxation qualitative study. *International Journal of Psychosocial Rehabilitation*, 17(1), 45-58.
- Ala-Ruona, E., & Punkanen, M. (2017). Multidisciplinary applications of vibroacoustics – from clinical practice and research to future directions. *Music and Medicine*, 9(3), 149-150.
- Ala-Ruona, E., Punkanen, M., & Campbell, E. A. (2015). Vibroacoustic therapy: Conception, development, and future directions. *Musiikkiterapia*, 30(1-2), 1 48-2 71.

- Benson, H. (1975). *The relaxation response*. New York, NY: Harper Collins Publishers.
- Bradt, J., Dileo, C., & Shim, M. (2013). Music interventions for preoperative anxiety. *Cochrane Database of Systematic Reviews*, 6, <https://doi.org/10.1002%2F14651858.CD006908.pub2>.
- Bradt, J., Potvin, N., Kesslick, A., Shim, M., Radl, D., Schriver, E., Gracely, E. J., & Komarnicky-Kocher, L. T. (2015). The impact of music therapy versus music medicine on psychological outcomes and pain in cancer patients: A mixed methods study. *Supportive Care in Cancer*, 23(5), 1261-1271, <https://doi.org/https%3A%2F%2Fdoi.org%2F10.1007%2Fs00520-014-2478-7>.
- Braun Janzen, T., Paneduro, D., Picard, L., Gordon, A., & Bartel, L. R. (2019). A parallel randomized controlled trial examining the effects of rhythmic sensory stimulation on fibromyalgia symptoms. *PloS One*, 14(3), e0212021, <https://doi.org/10.1371%2Fjournal.pone.0212021>.
- Brosschot, J. F. (2002). Cognitive-emotional sensitization and somatic health complaints. *Scandinavian Journal of Psychology*, 43(2), <https://doi.org/10.1111/1467-9450.00276>.
- Buchbinder, E. (2011). Beyond checking: Experiences of the Validation Interview. *Qualitative Social Work*, 10(1), <https://doi.org/10.1177/1473325010370189>.
- Campbell, E. A., Hynynen, J., & Ala-Ruona, E. (2017). Vibroacoustic treatment for chronic pain and mood disorders in a specialised healthcare setting. *Music and Medicine*, 9(3), 187-197.
- Chamberlin, J. (1997). A working definition of empowerment. *Psychiatric Rehabilitation Journal*, 20(4), 43-46.
- Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of Economic Behavior and Organization*, 81(1), 1-8, <https://doi.org/10.1016%2Fj.jebo.2011.08.009>.
- Clark, I. N., & Tamplin, J. (2016). How music can influence the body: Perspectives from current research. *Voices: A World Forum for Music Therapy*, 16(2), <https://doi.org/10.15845%2Fvoices.v16i2.871>.
- Clements-Cortés, H., Freedman, M., & Bartel, L. (2017). The potential of rhythmic sensory stimulation treatments for persons with Alzheimer's disease. *Music and Medicine*, 9(3), 167-173.
- Côté, P., Cassidy, J. D., & Carroll, L. (2000). The factors associated with neck pain and its related disability in the Saskatchewan population. *Spine*, 25(9), 1109-1117, <https://doi.org/10.1097/00007632-200005010-00012>.
- Deal, B. (2011). Finding meaning in suffering. *Holistic Nursing Practice*, 25(4), 205-210.
- Dworkin, R. H., Turk, D. C., Wyrwich, K. W., Beaton, D., Cleeland, C. S., Farrar, J. T., & Zavisic, S. (2008). Interpreting the clinical importance of treatment outcomes in chronic pain clinical trials: IMMPACT recommendations. *Journal of Pain*, 9(2), 105-121, <https://doi.org/10.1016%2Fj.jpain.2007.09.005>.
- Eriksen, H. R., & Ursin, H. (2004). Subjective health complaints, sensitization, and sustained cognitive activation (stress). *Journal of Psychosomatic Research*, 56(4), 445-448, <https://doi.org/10.1016%2FS0022-3999%2803%2900629-9>.
- Esch, T., Fricchione, G. L., & Stefano, G. B. (2003). The therapeutic use of the relaxation response in stress-related diseases. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, 9(2).
- Ezenwa, M., Yao, Y., Nguyen, M., Mandernach, M., Hunter, C., Yoon, S., Amador, A., Sylvera, A., Lamonge, R., Lyon, D., & Wilkie, D. (2018). (170) – The effects of relaxation intervention on pain, stress, and autonomic responses among adults with sickle cell pain in the outpatient setting. *Journal of Pain*, 19(3), S32-S33, <https://doi.org/10.1016%2Fj.jpain.2017.12.083>.
- Folkman, S. (2013). Stress: Appraisal and coping. In M. D. Gellman & J. R. Turner (Eds.), *Encyclopedia of behavioral medicine*. New York, NY: Springer.

- Gillen, E., Biley, F., & Allen, D. (2008). Effects of music listening on adult patients' pre-procedural state anxiety in hospital. *International Journal of Evidence-Based Healthcare*, 6(1), 24-49, <https://doi.org/10.1111%2Fj.1744-1609.2007.00097.x>.
- Goldberg, D. S., & McGee, S. J. (2011). Pain as a global public health priority. *BMC Public Health*, 11(1), 770, <https://doi.org/10.1186%2F1471-2458-11-770>.
- Grocke, D. E., & Wigram, T. (2007). *Receptive methods in music therapy: Techniques and clinical applications for music therapy clinicians, educators, and students*. London; Philadelphia: Jessica Kingsley Publishers.
- Hart, J. D. (2018). The living experience of suffering: A parse method study. *Nursing Science Quarterly*, 31(2), 139-147, <https://doi.org/10.1177%2F0894318418755730>.
- Hanser, S. B. (2014). Music therapy in cardiac health care: Current issues in research. *Cardiology in Review*, 22(1), 37-42.
- Hawker, G. A., Mian, S., Kendzerska, T., & French, M. (2011). Measures of adult pain: Visual analog scale for pain (vas pain), numeric rating scale for pain (NRS pain), McGill pain questionnaire (MPQ), short-form McGill pain questionnaire (sf-MPQ), chronic pain grade scale (cpgs), short form-36 bodily pain scale (sf-36 bps), and measure of intermittent and constant osteoarthritis pain (icoap). *Arthritis Care & Research*, 63(S11).
- Huang, S., Good, M., & Zauszniewski, J. A. (2010). The effectiveness of music in relieving pain in cancer patients: A randomized controlled trial. *International Journal of Nursing Studies*, 47(11), 1354-1362, <https://doi.org/10.1016%2Fj.ijnurstu.2010.03.008>.
- Jensen, M. P., Chen, C., & Brugger, A. M. (2003). Interpretation of visual analog scale ratings and change scores: a reanalysis of two clinical trials of postoperative pain. *The Journal of Pain*, 4(7), 407-414.
- Juster, R., McEwen, B. S., & Lupien, S. J. (2010). Allostatic load biomarkers of chronic stress and impact on health and cognition. *Neuroscience and Biobehavioral Reviews*, 35(1), 2-16, <https://doi.org/10.1016%2Fj.neubiorev.2009.10.002>.
- Katon, W., Sullivan, M., & Walker, E. (2001). Medical symptoms without identified pathology: Relationship to psychiatric disorders, childhood and adult trauma, and personality traits. *Annals of Internal Medicine*, 134(9 Part 2), 917.
- Kemper, K. J., & Danhauer, S. C. (2005). Music as therapy. *Southern Medical Journal*, 98(3), 282-288, <https://doi.org/10.1097%2F01.SMJ.0000154773.11986.39>.
- King, G. (2017). The role of the therapist in therapeutic change: How knowledge from mental health can inform pediatric rehabilitation. *Physical & Occupational Therapy in Pediatrics*, 37(2), 121-138, <https://doi.org/10.1080%2F01942638.2016.1185508>.
- Kreutz, G., Murcia, C. Q., & Bongard, S. (2012). *Music, health & wellbeing*. Oxford, GBR: Oxford University Press. pp. 457-476.
- Lai, H., Li, Y., & Lee, L. (2012). Effects of music intervention with nursing presence and recorded music on psycho-physiological indices of cancer patient caregivers. *Journal of Clinical Nursing*, 21, <https://doi.org/10.1111/j.1365-2702.2011.03916.x>.
- Larkin, M., & Thompson, A. R. (2011). Interpretative phenomenological analysis in mental health and psychotherapy research. In D. Harper, & A. R. Thompson (Eds.), In D. Harper & A. R. Thompson (Eds.), *Qualitative research methods in mental health and psychotherapy: A guide for students and practitioners* (pp. 101-116). Hoboken, NJ: John Wiley & Sons Inc.
- Laugharne, R., & Priebe, S. (2006). Trust, choice and power in mental health. *Social Psychiatry and Psychiatric Epidemiology*, 41(11), 843-852, <https://doi.org/10.1007%2Fs00127-006-0123-6>.
- Leech, N. L., & Onwuegbuzie, A. J. (2007). An array of qualitative data analysis tools. *School Psychology Quarterly*, 22(4), 557-584, <https://doi.org/10.1037%2F1045-3830.22.4.557>.
- Lerman, S. F., Rudich, Z., Brill, S., Shalev, H., & Shahar, G. (2015). Longitudinal associations between depression, anxiety, pain, and pain-related disability in chronic pain patients. *Psychosomatic Medicine*, 77(3), 333-341, <https://doi.org/10.1097%2FPSY.0000000000000158>.

- Lin, Y., & Payne, H. (2014). The BodyMind Approach™, medically unexplained symptoms and personal construct psychology. *Body, Movement and Dance in Psychotherapy*, 9(3), 154-166, <https://doi.org/10.1080%2F17432979.2014.918563>.
- Linton, S. J., & Shaw, W. S. (2011). Impact of psychological factors in the experience of pain. *Physical Therapy*, 91(5), 700-711, <https://doi.org/10.2522%2Fptj.20100330>.
- Liu, Y., & Petrini, M. A. (2015). Effects of music therapy on pain, anxiety, and vital signs in patients after thoracic surgery. *Complementary Therapies in Medicine*, 23(5), 714-718, <https://doi.org/10.1016%2Fj.ctim.2015.08.002>.
- Lonsdale, A. J., & North, A. C. (2011). Why do we listen to music? A usesand gratifications analysis. *The British Psychological Society*, 102, 108-134.
- Mansfield, K. E., Sim, J., Jordan, J. L., & Jordan, K. P. (2016). A systematic review and meta-analysis of the prevalence of chronic widespread pain in the general population. *Pain*, 157(1), 55-64, <https://doi.org/10.1097%2Fj.pain.0000000000000314>.
- Manolov, R., Gast, D. L., Perdices, M., & Evans, J. J. (2014). Single-case experimental designs: Reflections on conduct and analysis. *Neuropsychological Rehabilitation*, 24(3-4), 634-660, <https://doi.org/10.1080%2F09602011.2014.903199>.
- Manzoni, G. M., Pagnini, F., Castelnuevo, G., & Molinari, E. (2008). Relaxation training for anxiety: A ten-years systematic review with meta-analysis. *BMC Psychiatry*, 8(1), 41, <https://doi.org/10.1186%2F1471-244X-8-41>.
- Myles, P. S., Myles, D. B., Gallagher, w., Boyd, D., Chew, C., MacDonald, N., & Dennis, A. (2017). Measuring acute postoperative pain using the visual analog scale: The minimal clinically important difference and patient acceptable symptom state. *British Journal of Anaesthesia*, 118(3), 424-429.
- Naghdi, L., Ahonen, H., Macario, P., & Bartel, L. (2015). The effect of low-frequency sound stimulation on patients with fibromyalgia: A clinical study. *Pain Research & Management*, 20(1), e21.
- Navratilova, E., Morimura, K., Xie, J. Y., Atcherley, C. W., Ossipov, M. H., & Porreca, F. (2016). Positive emotions and brain reward circuits in chronic pain. *The Journal of Comparative Neurology*, 524, 1646-1652.
- Nelson, K., Adamek, M., & Kleiber, C. (2017). Relaxation training and postoperative music therapy for adolescents undergoing spinal fusion surgery. *Pain Management Nursing*, 18(1), 16-23, <https://doi.org/10.1016%2Fj.pmn.2016.10.005>.
- Next Wave World Wide. (n.d.). Retrieved April 1, 2019, from <http://www.nextwaveworldwide.com/>
- Nilsson, U. (2008). The anxiety- and pain-reducing effects of music interventions: A systematic review. *AORN Journal*, 87(4), 780-807, <https://doi.org/10.1016%2Fj.aorn.2007.09.013>.
- Nilsson, U. (2009). The effect of music intervention in stress response to cardiac surgery in a randomized clinical trial. *Heart & Lung*, 38(3), 201.
- O'Cathain, A., Murphy, E., & Nicholl, J. (2010). Three techniques for integrating data in mixed methods studies. *British Medical Journal*, 341(7783), 1147-1150, <https://doi.org/10.1136%2Fbmj.c4587>.
- Ohayon, M. M., & Stingl, J. C. (2012). Prevalence and comorbidity of chronic pain in the German general population. *Journal of Psychiatric Research*, 46(4), 444-450.
- Osborn, M., & Smith, J. A. (1998). The personal experience of chronic benign lower back pain: An interpretative phenomenological analysis. *British Journal of Health Psychology*, 3(1), 65-83, <https://doi.org/10.1111%2Fj.2044-8287.1998.tb00556.x>.
- Patall, E. A., Cooper, H., & Robinson, J. C. (2008). The effects of choice on intrinsic motivation and related outcomes. *Psychological Bulletin*, 134(2), 270-300, <https://doi.org/10.1037%2F0033-2909.134.2.270>.
- Payne, H. (2009). Pilot study to evaluate dance movement psychotherapy (the BodyMind approach) in patients with medically unexplained symptoms: Participant and facilitator perceptions and a summary discussion. *Body, Movement and Dance in Psychotherapy*, 4(2), 77-94, <https://doi.org/10.1080%2F17432970902918008>.

- Pietkiewicz, I., & Smith, J. A. (2012). Praktyczny przewodnik interpretacyjnej analizy fenomenologicznej w badaniach jakościowych w psychologii. [A practical guide to using Interpretative Phenomenological Analysis in qualitative research psychology]. *Czasopismo Psychologiczne*, 18(2), 361-369.
- Pinto, R. Z., Ferreira, M. L., Oliveira, V. C., Franco, M. R., Adams, R., Maher, C. G., & Ferreira, P. H. (2012). Patient-centred communication is associated with positive therapeutic alliance: A systematic review. *Journal of Physiotherapy*, 58(2), 77-87, <https://doi.org/10.1016%2FS1836-9553%2812%2970087-5>.
- Punkanen, M., & Ala-Ruona, E. (2012). Contemporary vibroacoustic therapy. *Music & Medicine*, 4(3), 128-135, <https://doi.org/10.1177%2F1943862112445324>.
- Rokke, P. D., Tomhave, J. A., & Jovic, Z. (1999). The role of client choice and target selection in self-management therapy for depression in older adults. *Psychology and Aging*, 14(1), 155-169, <https://doi.org/10.1037%2F0882-7974.14.1.155>.
- Rolley, J., Chang, E., & Johnson, A. (2014). Spirituality and the nurse: Engaging in human suffering, hope and meaning. In E. Chang & A. Johnson (Eds.), *Chronic illness and disability: Principles for nursing practice* (2nd ed., pp. 60-80). Chatswood, N.S.W: Elsevier Australia.
- Rüütel, E. (2002). The psychophysiological effects of music and vibroacoustic stimulation. *Nordic Journal of Music Therapy*, 11(1), 16-26, <https://doi.org/10.1080%2F08098130209478039>.
- Rüütel, E., Ratnik, M., Tamm, E., & Zilensk, H. (2004). The experience of vibroacoustic therapy in the therapeutic intervention of adolescent girls. *Nordic Journal of Music Therapy*, 13(1), 33-46, <https://doi.org/10.1080%2F08098130409478096>.
- Rüütel, E., Vinkel, I., & Eelmäe, P. (2017). The effect of short-term vibroacoustic treatment on spasticity and perceived health condition of patients with spinal cord and brain injuries. *Music and Medicine*, 9(3), 202-208.
- Sandahl, C., & Wilberg, T. (2006). Researcher and therapist in the same person – a feasible combination? review of Steinar Lorentzen's doctoral thesis: 'Long-term analytic group psychotherapy with outpatients: Evaluation of process and change. *Group Analysis*, 39(3), 400-410, <https://doi.org/10.1177%2F0533316406066607>.
- Saldaña, J. (2009). *Coding manual for qualitative researchers*. Thousand Oaks, CA: SAGE Publications.
- Scott, E. L., Kroenke, K., Wu, J., & Yu, Z. (2016). Beneficial effects of improvement in depression, pain catastrophizing, and anxiety on pain outcomes: A 12-month longitudinal analysis. *Journal of Pain*, 17(2), 215-222, <https://doi.org/10.1016%2Fj.jpain.2015.10.011>.
- Skille, O., & Wigram, T. (1995). The effects of music, vocalization and vibration on brain and muscle tissue: Studies in vibroacoustic therapy. In T. Wigram, B. Saperston, & R. West (Eds.), *The art & science of music therapy: A handbook* (pp. 23-57). Chur, Switzerland: Harwood Academic Publishers.
- Smith, J. A., & Osborn, M. (2007). Interpretative phenomenological analysis. In J. A. Smith (Ed.), *Qualitative psychology: A practical guide to research methods* (pp. 53-80). London: SAGE Publications.
- Symreng, I., & Fishman, S. M. (2004). Anxiety and pain. *Pain: Clinical Updates*, 12(7), 1-6.
- Tunks, E. R., Crook, J., & Weir, R. (2008). *Epidemiology of chronic pain with psychological comorbidity: Prevalence, risk, course, and prognosis*. Los Angeles, CA: SAGE Publications.
- Van Diest, I., De Peuter, S., Eertmans, A., Bogaerts, K., Victoir, A., & Van den Bergh, O. (2005). Negative affectivity and enhanced symptom reports: Differentiating between symptoms in men and women. *Social Science & Medicine*, 61(8), 1835-1845, <https://doi.org/10.1016%2Fj.socscimed.2005.03.031>.
- Wigram, T. (1996). *The effects of vibroacoustic therapy on clinical and non-clinical subjects* (PhD Thesis). London: St. Georges Medical School, London University. <http://vibroacoustics.org/FrequencyInfo/Research%20Articles/Wigram.Vat.Thesis.pdf>.

- Wiklund, M., Malmgren-Olsson, E., Ohman, A., Bergström, E., & Fjellman-Wiklund, A. (2012). Subjective health complaints in older adolescents are related to perceived stress, anxiety and gender - a cross-sectional school study in northern Sweden. *BMC Public Health*, 12(1), 993, <https://doi.org/10.1186%2F1471-2458-12-993>.
- Wu, P. Y., Huang, M. L., Lee, W. P., Wang, C., & Shih, W. M. (2017). Effects of music listening on anxiety and physiological responses in patients undergoing awake craniotomy. *Complementary therapies in medicine*, 32, 56-60, <https://doi.org/10.1016%2Fj.ctim.2017.03.007>.
- Yehuda, R., & Seckl, J. (2011). Minireview: Stress-related psychiatric disorders with low cortisol levels: A metabolic hypothesis. *Endocrinology*, 152(12), 4496-4503, <https://doi.org/10.1210%2Fen.2011-1218>.
- Zeylemaker, M. M. P., Linn, F. H. H., & Vermetten, E. (2015). Blended care; development of a day treatment program for medically unexplained physical symptoms (MUPS) in the Dutch armed forces. *Work: A Journal of Prevention Assessment & Rehabilitation*, 50(1), 111, <https://doi.org/10.3233%2FWOR-141933>.