Music-Listening as an Intervention for Chronic Pain Relief:

A Case Study

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Tiivistelmä – Abstract The field of audioanalgesia is vast. Research shows a combination of pharmacology and music interventions helps to reduce anxiety and stress, resulting in lower levels of pain, pre- and post-operatively. This study is an exploration of the use of music-listening as a method of pain relief with the knowledge that certain types of music aid in reaching altered states of consciousness. In reaching this state of relaxation, the realisation one's own methods of pain management and goals towards better health are easier. This paper also discusses the importance of collaboration between various ways of practicing medicine, as well as how vital it is to be aware of one's body and external stresses which can affect well-being. Taking time for oneself is shown to be extremely beneficial for those suffering from chronic pain, but also for the participant of this study in particular.	
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Pain has a way of clipping our wings and keeping us from

being able to fly ... and if left unresolved for very long,

you can almost forget that you were ever

created to fly in the first place.

- WM. PAUL YOUNG

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1 INTRODUCTION

The area in which this study lies is that of pain. It is undeniable that pain is prosaic in our lives, yet this should not lead one to conclude that it cannot be alleviated. This field is extensive, and directing attention towards one area is a difficult task. The aim of this study is to assess whether music can be used as a method of relieving chronic pain, and whether the effects of the intervention would be long-lasting. Pain management is a complex topic and extremely subjective. Two patients suffering from the same illness or condition may experience the symptoms differently; due to its subjectivity, the extent of discomfort felt may vary greatly. However, pain is often controlled by the use of analgesics or narcotics; perhaps this solution may not be – or more importantly should not be - the only method one employs to reduce and manage pain.

The use of alternative methods of pain relief would be ideal, because the possibility of experiencing side-effects is always present with medications. Being aware of what one is ingesting is an important part of one's recovery; when one knows exactly how they are being treated, one can begin to feel empowered, leading to a faster recovery. Choosing to take medication may not be the most suitable treatment plan for everyone. If one's recovery can result from combination of methods, with the amount of medication being reduced, the patient may be in a better position to live a fuller, more vibrant life.

1.1 Relevant Previous Findings

The most relevant previous findings in this area are diverse and fascinating. Many researchers have approached this topic and cumulatively have come to some conclusions as to the effectiveness of music as an intervention for pain relief.

Research has shown that music listening is a helpful tool in the reduction of anxiety (Richards et al, 2007; Chaput-McGovern & Silverman, 2012; Siedliecki & Good, 2006 Good et al., 2010). In the argument regarding whether participant-preferred music yields more results than researcher-chosen music, Hekmat & Hertel (1993) argued that preferred music afforded a higher pain tolerance. Overall this did not matter; the fact that the chosen music was based on research (i.e. that it was between a certain range of beats per minute (BPM) and the intervention lasted for a certain amount of time per day) was more important. Chi & Young (2011) showed that a tempo between 60 - 80 BPM and interventions of between 20-30 minutes, twice per day, were the most effective elements in reducing pain. They, in addition, advocated the cultural importance of participant-chosen music.

Holmes (2007) has shown that by altering one's state of consciousness by hypnosis, chant, or by other methods, one's brain waves are slowed down. This could be a way of creating harmony in the body, resulting in lower pain levels.

1.2 Overview of Current Position of Music and Pain Research

Currently, music as a method of pain relief is not prescribed as an analgesic. A reason for this may be a lack of knowledge as to how effective it can be, leading to fear of switching to an uncertain path of treatment. If one has been ill for quite some time and has become dependent on analgesics, it is difficult to envisage no longer using this method. There are no steadfast conclusions as to whether music can be used as a pain reliever over a longer period of time and still obtain the same results

as those in short-term studies. This fact can be frightening for those contemplating lowering dosages of drugs. However, music can be used in conjunction with usual medical care and should not cause any adverse effects. It cannot cause adverse effects when mixed with other medications and is something which one can choose to suit their own taste. The fact that the patient would be pro-active in their own recovery would be an important factor in their achieving a state of well-being. However, the end result is the only aspect of importance; if the level of pain is reduced, the intervention has been a success. Not only can music can be used in conjunction with other tools as a way of reducing drug intake, it can also be used to address parallel symptoms such as depression and feelings of powerlessness.

1.3 Benefits of using Music as an Audioanalgesic

Music listening to ease chronic pain may be a huge step forward in the development of health care worldwide. Many benefits could be quickly observed:

- A drastic reduction in post-operative recovery time
- The patient could use music in their own home and/or on their own time
- It may mean that the general health of the populous would be better due to a more holistic approach in the medical field
- The amount of medication that would be ingested could be reduced
- Mental health would be better due to the increased pro-activity of the patients
- It could afford a more open-minded perspective on alternative methods of care as regards health care professionals

The long-term effects of this method are unknown as of yet. Nevertheless, the results from preliminary studies about music and pain are indeed relevant sources and

resources fuelling the exploration of the matter. Understanding how music could be used as a long-term intervention is vital if it is to be accepted as a viable method. Not only should music be advocated as a way of raising one's tolerance of pain, reducing tension and anxiety is also paramount in the search for a clearer understanding of how music affects us physically. If music is to be promoted as a way of reducing tension and anxiety as well as raising one's level of tolerance to pain, understanding how long these effects should last is paramount. Considering all factors previously researched as well as aiming to study the long-term effects of a music listening intervention, the results from this study could help to advance the knowledge about pain research and its implementation in a medical setting.

1.4 Personal Motivation

This topic is one which is often overlooked by those in the medical profession. I believe it to be cardinal that this area be further researched and a way found to implement audioanalgesic in a more wide-spread manner in a medical setting.

The evolution of my thought process during this study began as a secondary thought to how people process daily struggles. As a young adult, coming to terms with the type of person one wants to become and the obstacles which hinder one in the process, is intriguing. In learning how to interact with others, certain factors are constantly at play. What factors influence our decisions? Through which adverse situations must we battle to reach our ultimate goals? How do we deal with hardships? These questions are universal and extremely subjective. It led me to contemplate how one deals with such an arbitrary concept as pain. It is individual and unavoidable.

Wanting to combine this urge for an answer and my belief that music can be used for a multitude of scenarios, the thought of music being an integral part of pain management came to mind.

Upon reflection of the process as a whole, I have been intrigued by the reflections of the participant on pain as a phenomenon and the emotional rollercoaster on which she was riding. I believe this to be an important documentation of how one can experience dealing with pain, and how there are constantly so many factors at play. Finding the correct method for oneself is a complicated journey and being able to witness the participant's path of self-discovery has been fascinating.

1.5 Research Method in Brief

The experiment is divided into two phases. Phase one consists of a music-listening setting in which the participant listens to experimenter-chosen music for 30 minutes biweekly. During this time, correspondences with the participant will be taken note of by the experimenter, and the participant will be writing a diary of her experiences during this period. At the end of this phase, the participant will be invited to complete an evaluation form assessing the initial three months in terms of: preconceptions, first impressions, music choices, noticing changes, influences on pain during this time, and the general setting of the experiment.

The second phase, or the washout period, begins directly after this. During this time, there will be no contact between the participant and experimenter. The participant will continue diary writing and pain tracking during this time. This is to assess pain levels after the music-listening has ceased. After this month-long period, the participant will again be asked to complete an evaluation form. This time, it will address the changes in pain, routine and sleeping patterns, writing the diary and tracking pain during the wash-out period: December to January.

1.6 Structure of the Report

The literature review covers various topics within the field of pain research. These areas include how pain affects one's emotions; mentality as a factor and symptom of chronic pain; music as an intervention for pain relief; the way and genre of music to be chosen for an intervention; alternative methods of pain relief; and trance, hypnotherapy and entrainment with the use of music. It is an attempt to bridge the gap between disparate areas of knowledge and enlighten the reader as to which areas should be expanded upon.

Following this, chapter 3 outlines of the origins of this knowledge. Its purpose is to give the reader a broader understanding of where the field of pain research stands now and from where this understanding has emanated. The method section proceeds from this and explains the reasoning behind the experimental design, as well as a describing of how the pilot study and the main experiment were carried out.

Chapter 5 gives an account of the outcome of the diary and evaluation form analyses using Interpretative Phenomenological Analysis (IPA), in addition to the results from the pilot study. This is succeeded by the discussion about methodology, results, reliability and validity, ethical considerations, and propositions for further study.

The conclusion is a summation of the study, including an outline of the findings, other important developments, and how these results are relevant in advancing the field of study.

2 LITERATURE REVIEW

Certain topics within pain research can be identified and cross-referenced within the existing literature. General themes include:

- Music in association with negative feelings or emotions. This encompasses the influence one's mindset has on pain within certain situations
- Music therapy and various types of music utilised for relieving pain
- Alternative methods, such as biofeedback, trance, hypnotherapy and entrainment, as tools for relieving pain
- Self-administered and distractive qualities of active or passive methods of pain management

These are a select few of the many areas of pain research which have been broached. Music therapy has been implemented for various ailments and in very different situations. Pain research in this field has become an important area of enquiry in the last decades due to the populous' need for an organic means of physical, emotional and psychological relief. Of course, not all research in which music is the dependent variable is considered music therapy. However, specific interventions could be used within a music therapy setting. Studies examining interventions such as those for the relief of pain (Bernatzky, 2011; Mitchell, 2007), dealing with the mentality and circumstances which surround pain (Richards et al., 2007), as well as papers dealing with the use of non-western musics to regulate pain (Jovanov and Maxfield, 2011) are examples of research that has been undertaken in the last decade alone. Although the use of music for non-recreational purposes has been common, the knowledge has been disparate.

2.1 Pain and Emotion

Playing or listening to music has been proven to be beneficial. Blood & Zatorre (2001) highlighted that music activates the same regions of the brain as euphoria-inducing substances, such as cocaine, and triggers the release of dopamine (cited by Fachner, 2012). The engagement of sensory processes such as attention, memory-related processes, perception-action mediation, multisensory integration, activity changes in core areas of emotional processing, processing of musical syntax and musical meaning, and social cognition have also been proven to be beneficial (Koelsch, 2009). McCraty et al. (1998) have shown that four different types of music - Grunge Rock, Classical, New Age and Designer - have had varying effects on mood. The first yielded negative feelings, such as hostility and tension, whereas New Age afforded relaxation, and a decrease in tension. Designer music showed a significant increase in caring and relaxation. Bittman et al. (2001, 2003, and 2005) also found that recreational music causes a modulation in the human stress response. Brennan & Charnetski (2000) have shown that listening to music in a hectic newsroom situation reduces stress and has positive effects on the immune system. Given that music can bring positive change into effect during emotional processing, the use of music as a way of alleviating anxiety is fitting.

Anxiety can have a debilitating effect on one's perception of pain, as was reported by Richards et al. (2007) and Siedliecki et al. (2006). Researchers have undertaken many projects to evaluate the effect of active or receptive music on those suffering from chronic pain.

McCaffrey and Freeman (2003) have found that a significant issue among the elderly with chronic pain is the maintenance of bodily functions and independence. They observed that many previous studies have proven music can heighten motivation,

raise mood levels and promote feelings of control within the aforementioned demographic.

The field is undeniably broad and it is cardinal to narrow the scope and focus on specific aspects of pain, such as one's methods for dealing with it. Music used to generate positive responses was seen in the following studies: Lynn Snow-Turek et al. (1996) in which methods included passive or active coping mechanisms; Bernatzky (2011) where music was a tool for distraction; Siedliecki et al. (2006) in which power is described as an element which affects one's ability to control pain; and Richards et al. (2007) in which the ability to alter one's perception of pain under certain circumstances, e.g. hospitalisation, is explored. One must contemplate whether it is possible to affect our mentality towards pain or one's situation if it is possible to affect our emotions and bodily functions.

2.2 Mentality and Chronic Pain

In order to understand pain in its entirety, one must comprehend that the term pain encompasses many individual components. To treat the disease, one must understand the symptoms. Thus, one must be aware of both the psychosomatic - as well as the somatic - elements which underpin the concept. Chaput-McGovern and Silverman (2012) examined patients of an oncology unit in a hospital suffering from symptoms such as pain, anxiety, nausea and saw how they find it difficult to relax. They attempted to discover the effects of music therapy on post-procedural oncology patients. The hypothesis was that by altering the environment to make the patient feel more comfortable and to generate a feeling of control over their well-being, a swifter recovery with less need for medical intervention is likely. In a comparison between pre- and post-tests, Chaput-McGovern and Silverman showed findings of anxiety, pain and relaxation being affected in a positive way after the music therapy intervention. The disappointing result of this study showed that there seemed to be

no significant improvement between the post- and follow-up tests, although the effects of the single session were indeed maintained. It is nevertheless stated in the article, that it would be erroneous to make generalisations about the long-lasting effects of the music therapy session due to the fact that this was only a pilot study.

Economidou et al. (2012) reviewed whether music reduces postoperative pain. In this review, they found that six studies had found a significant difference between post-operative patients who listened to music and those who did not. Holmes (2007) tells of a report made by Dr Raymond Bahr described in Don Campbells' book, *The Mozart Effect*. According to Bahr's observations of patients in critical care units who had listened to music, half an hour of music listening had had the same effect as 10 milligrams of Valium. If such a short intervention has such a strong effect on pain, it may not be a large leap in logic to presume that music listening over an extended period would have a monumental effect.

In comparison, Mitchell and MacDonald (2007) also conducted a survey to ascertain the effects of music listening on chronic pain. In this study, music was utilised as a method for reducing pain, as well as the additional negative symptoms which surround it. It emerged that it was only the female participants who perceived a significant reduction in pain symptoms. Pain intensity was evaluated by the use of questionnaires and interestingly the factor which led to pain relief was an improvement in mood. In fact, it was the agent for relieving the perception of pains overall. This psycho-somatic aspect, which was directly influenced by the music, is comparable to the results found by Chaput-McGovern and Silverman (2012). Both studies found that upon relieving the emotional and psychological associations - or changing one's mindset - one's 'felt pain', that is, the physical pain, is diminished. This raises the issue of whether the pain is still present but simply not felt due to better mood. If music is so effective and accessible, it begs the question: why is it not more widely implemented?

Mitchell and MacDonald posited that music therapy would be capitalised by those who had a personal or sentimental association with music. Indeed, for patients who listened to music more frequently, music was seen as an important and vital part of their lives. Furthermore, the study unearthed that music was not only used as a method of bettering one's mood, but also a way of generally dealing with difficult situations. Again, it was predominantly females who employed music-listening as a coping skill. In contrast to Chaput-McGovern and Silverman's study, Mitchell and MacDonald broach the topic of gender and how it affects pain perception, and coping mechanisms wielded more frequently by females than males.

Richards et al. (2007) also addressed the themes of anxiety and post-operative recovery times in a hospital setting. Due to the unfamiliar surroundings in which patients find themselves, the likelihood of feeling anxious is high. Creating an atmosphere in which the patient would feel at ease was detailed. Results showed that those who were exposed to music therapy as an intervention reported less anxiety and pain and, in some cases, the music had had a positive effect on their blood pressure and heart rate. Upon creating a serene environment, the patient perceived less pain and experienced less anxiety than those who were part of a control group in which no music therapy was implemented. This can be correlated with Chaput-McGovern and Silverman's research.

Again, in a study conducted by Siedliecki and Good (2006), the effect of music on negative emotions was explored. The authors wished to discover whether the use of music to empower patients and reduce depressive symptoms and pain was possible. The results were compatible with those uncovered by Richards et al., Mitchell and MacDonald, as well as Chaput-McGovern and Silverman. Divergently, Siedliecki and Good added the variable of choice to their study. To find out if pain, and the negative feelings associated with it, can be reduced when in control of their situation, they gave the patients the option to choose their own music. In the other

group, the therapists themselves had chosen the music. Proof from the study showed that patients felt vitalised and empowered by the fact that they were able to control their well-being. This, the researchers concluded, was a way in which patients' depression could be influenced; control over one's illness leading to a sensation of elation.

Siedliecki and Good's research is encouraging because it, like those mentioned previously, urges one to consider the emotional elements of pain. These concepts should be viewed in a capacious manner; pain does not stand alone as a single factor in one's illness – body and mind are connected and should be treated as one entity.

2.3 Audioanalgesia as an Intervention for Pain Relief

Cepeda et al. (2009) wished to evaluate the effect of music on acute, chronic or cancer pain intensity, pain relief and analgesic requirements. They found that music listening indeed reduced pain intensity and analgesic requirements, however the benefits appeared to be small. Kwekkeboom (2007) found, in a comparison between music and distraction tasks, the three conditions (normal treatment as control) were equivocal. MacDonald et al. (2003) investigated the anxiolytic and analgesic effects of music. In the two experiments they conducted, the results were conflicting. The researchers concluded that one must understand the complexity of music listening and take into account the social setting in which the experiments are conducted.

Mitchell et al. (2005) discussed the possibility of preferred music in regards to pain but also the accompanying negative experiences. The use of preferred music was found to significantly increase pain tolerance when compared to an arithmetic task. Interestingly a significant increase in the participants' perceived levels of control, when compared to humour, were observed. Mitchell et al. (2006) again studied the effects of music listening with preferred or relaxing music listening on pain

perception. Both genders were able to tolerate the painful stimulus significantly longer than during the relaxing music or the control white noise settings, meaning that preferred music listening appears to have both a positive effect and distractive qualities when tested using painful stimuli.

Korhan et al. (2013) also conducted a study which deals with the topic of relieving pain – this time neuropathic pain. The aim was to provide nurses with a tool for lowering patients' pain intensity. As with Mitchell and MacDonald (2007), a pain intensity scale was used. In this instance, Classical Turkish music was played to participants for 60 minutes. Pain scores were taken directly before, mid-way and immediately after the intervention. Results seemed to indicate that music therapy could be used as a complementary therapy in routine care for patients with neuropathic pain.

Neuropathic pain is that which is 'caused by a primary lesion or a temporary disorder in the peripheral or central nervous system' (Meskey & Bogduk, 1994; as cited by Korhan et al., 2013, p. 1). It is described as 'multifocal pain with severity that increases over time' (Korhan et al., 2013, p. 1). Ultimately, the aim is to raise patients' quality of life, as well as reduce the amount of time spent in hospital. Korhan et al. also acknowledged that experiencing a lower quality of life - physically, spiritually and socially- is expected within this target group. Siedliecki and Good (2006) have also addressed this aspect of the healing process; it can only be viewed as a positive change in the medical field that these factors are also taken into account.

As mentioned by Korhan, Roy, Peretz and Rainville (2008; as cited by Korhan et al. 2013), pain alleviation was found to be the most obvious effect among the many benefits of music therapy. Chlan, Tracy, Nelson, & Walker (2001) and Chlan (2002) expressed that music therapy plays an effective role in 'physical, psychological, social, emotional, and moral recovery; it is easy to apply and to use; it is cost-effective; and it does not have adverse effects' (cited by Korhan et al., 2013, p. 2).

Korhan et al. reported that 'pain scores decreased over time for the subjects in the music therapy group' (2013, p. 5). Siedliecki and Good (2006), as previously mentioned, reported a decrease in chronic pain by participants who also listened to music for 60 minutes. The many benefits of using music as an audio-analgesic are obvious from the afore-mentioned studies.

In Korhan et al.'s study, one of the limitations mentioned was the fact that the choice of music – and the fact that the participants could not choose the music for themselves – may have had an influence on the effect of the intervention. Chi and Young (2011) reviewed literature which dealt with the process of choosing music intended for inducing relaxation and alleviating pain. Reported was that 'music pieces with the greatest potential for relaxation embody several characteristics.' A tempo of 60 to 80 beats per minute (the adult heart rate) is considered soothing (Johnston and Rohdaly-Davis, 1996; Robb, Nichols, Rutan, Bishop, and Parker, 1995; as cited by Chi and Young, p 127; 2011). Chi and Young also delved from Johnston and Rohdaly-Davis (1996), Robb et al., (1995), Dunn (2004) and Allen and Good (2000), that the optimal amount of listening time is 20 – 30 minutes twice daily without interruptions.

2.4 Choosing Music for Therapeutic Implementation

Some research has been undertaken in an attempt to understand what type of music would be suitable for various interventions. Florence Nightingale had recognised the influence music had in aiding the healing process of injured soldiers. Wind instruments, she noticed, when playing continuous sounds, had a beneficial effect on patients. She also observed the opposite effect from non-continuous sounds (Nightingale, 1992; as cited by Nilsson, 2008). The accepted theory about the positive effects music has on pain, anxiety and stress explicates that music acts as a method of distraction – the negative feelings or sensations are reduced because the patient is

no longer focusing on them (White, 2000; White, 2001; Beck, 1991; Thorgaard et al., 2005; as cited by Nilsson, 2008).

A cross examination by Chi and Young (2011) of different types of music thought to be useful in various interventions suggested that designer music was the most influential regarding all aspects of positive affect. Designer music has been developed to influence listeners in various ways and is characterised as being bright sounding, easy to listen to and requires very little concentration (McCraty et al, 1998; as cited by Chi and Young, 2011). Stratton and Zalanowski (1984; cited by Chi and Young, 2011) found that there were significant correlations between liking music and relaxation, concluding that personal preferences should be taken into account when choosing music for relaxation purposes. Voss et al. (2004; cited by Chi and Young, 2011) and Sendelbach et al. (2006, cited by Chi and Young, 2011) reported that music listening allowed for significantly less anxiety and pain in health care settings. Voss et al. used music with a tempo of 60 to 80 beats per minute, while Sendelbach et al. played music at a tempo of 60 – 70 beats per minute. Wolfe et al. (2002; cited by Chi and Young, 2011) suggested that music experts can act as guides to individuals when they choose their music with the aim of optimising relaxation. McCaffrey and Freeman (2003) conducted a study of elderly patients with chronic pain listening to 20 minutes of music daily with a tempo of 60 – 80 beats per minute. The control group sat in silence for 20 minutes daily. Results showed that pain was significantly decreased among those in the intervention group. Thaut and Davis (1993) reported that music which had been commercially claimed to have relaxing effects was as effective as, yet not more than, participant chosen music. Indeed, in a study conducted by Hekmat and Hertel (1993), in a comparison between preferred and non-preferred music, that which was preferred enabled a higher pain tolerance. Overall, studies found that it did not particularly matter whether the music was self- or specialist-chosen. Generally, music which was listened to over extended periods

caused the participants to feel relaxed and a have a higher tolerance to pain. However, results showed that music which had been chosen based on research gave better results than a choice based solely on individual preference. Chi and Young (2011) suggest, however, that 'the importance of preferred music [due to aspects such as cultural background] should be considered, but the first consideration in selecting music should be based on research' (citing Pelletier, 2004, p. 133). It should, however, also be taken into account that when taking part in a study, the added variable of expectation and the element of partaking in a new activity, are possible influences on the results.

In regards to the use of complementary and alternative treatments for pain, Cassileth et al. (2007) and Pujol (2007; as cited by Running and Seright, 2012), reported that integrative therapies used in conjunction with other practices were able to reduce the patients' perception of pain as well as improve their quality of life. Li et al.'s (2011) findings show there was a significant reduction in pain post-therapy for women who had undergone mastectomies. Music therapy can be used as a complementary therapy and results deemed from studies have been proven successful not only in pain, but also anxiety levels.

2.5 Alternative Methods of Pain Relief

Becoming increasingly common is the search by both doctors and patients alike for alternative methods of pain relief (for example Mastnak, 1993, discusses the possibility of using indigenous methods of pain relief and healing in our modern society). Arsenault et al. (2013) have addressed the use of biofeedback in the elicitation of immediate responses to bodily functions. This is an 'effective means to gain control over a physiological function typically considered involuntary' (Arsenault et al., 2013, p. 102). The aim of the study was to assess whether visual

feedback of nociceptive flexion stemming from short, painful shocks applied to the sural nerve could be used to lead the participants towards utilising strategies aimed at changing their pain perception

The ultimate objective was to help healthy participants to improve their own ability to self-regulate pain. The RIII-reflex is described by Skliarevski and Ramadan (2002) and Sandrini et al. (2005, cited by Rhudy and France, 2007) as a 'polysynaptic spinal withdrawal reflex' that stems from the activation of A-delta afferents. The biceps muscle is tracked using electromyogram (EMG) as electrocutaneous stimulation is applied, in various intensities, to the sural nerve. The nociceptive threshold (and the intensity required to elicit a response) is abstracted from the observation of the EMG readings.

As explained by *The Association for Applied Psychophysiology and Biofeedback, Inc.*,

> 'Biofeedback is a process that enables an individual to learn how to change physiological activity for the purposes of improving health and performance. Precise instruments measure physiological activity such as brainwaves, heart function, breathing, muscle activity, and skin temperature. These instruments rapidly and accurately "feed back" information to the user. The presentation of this information — often in conjunction with changes in thinking, emotions, and behavior — supports desired physiological changes. Over time, these changes can endure without continued use of an instrument'.

In understanding what Biofeedback and RIII-reflex are, one can comprehend exactly how they can be used collaboratively as a tool for teaching one how to manage one's own pain. Arsenault et al. (2013) hypothesised that the biofeedback training would enable the participants to control the RIII- reflex amplitude. As well as this, the possibility of gaining the ability to modulate pain would ensue from the learned skill of RIII-reflex modulation. Participants used strategies such as direction of attention toward, or away from, the pain stimulus and focusing on breathing. Mental imagery was also used as a technique. Results showed that pain perception and RIII-reflex amplitude can in fact be modulated voluntarily using various strategies. However, it

is also stated that biofeedback signals may increase the participant's perception of control by giving an objective and a definite measure on which participants can rely to gauge the effectiveness of their strategy. In this sense, if it is possible to use such techniques as distraction, music may also be a viable method.

A topic stemming from this is the use of non-Western music as a means of relieving pain. More frequently in modern Western society, there is a demand and an ongoing frantic search for better and faster ways to treat illness. However, recently, holistic approaches to healing have been considered a method for curing illness and pain; in particular, the exploration of methods which engage all facets of the being. Mastnak (1993) engaged with this topic; a combination of non-western practices of healing-music and uses of it in psychotherapy yielded an investigation into the beginnings of music. Upon delving into this complex subject, the author connected the beginnings of the phenomenon of music to the environment which surrounded it in an attempt to understand the cultural connotations which are linked to non-Western music. The aim was to comprehend the meanings behind non-familiar musics, adjust them to one's own culture and implement them in a western psychotherapeutic setting. He proposed that we can alter indigenous healing methods to complement our own psychotherapeutic practices. Furthermore, he suggested that we have merely repressed our own ancient healing methods over the years in our swiftly developing society.

2.6 Trance, Hypnotherapy and Entrainment using Music

The concept of altered states of consciousness is also a prominent theme of research concerning the practical uses of music (Mastnak, 1993; Becker, 1994; Riley and Newton, 2001, as cited by Holmes, 2007; Jovanov and Maxfield, 2011; and Oohasi, 2002). Mastnak (1993) addresses the matter of internal energy flows. 'Reception' and 'participation' are keywords when dealing with the matter of healing, because some

of the body's main organs are influenced by these, namely the lungs, liver, kidneys and heart. Through aligning one's internal unrests, the physical and psychological, and correcting energy flows within a psychotherapeutic session, one can achieve a calmness and control. Also discussed by Mastnak is the implementation of Gregorian chant as a method to affect the relationship between these organs and has been described as often being combined with processes for inducing trance. It may be possible that, with the use of trance, one can alter one's attitude towards, and perception of, pain.

Trance is also explored in research conducted by Becker (1994). She posited that it is, in fact, only the cultural expectation associated with the music which leads one to be induced into a trance-like state. Upon hearing certain musics repeatedly, the music elicits particular responses in the listener. One could associate this with the example of Gregorian chant suggested by Mastnak. If change generates a flowing energy between organs in the absence of a culturally accurate setting, this factor may not be as influential as Becker had posited. This type of chanting is very specific and due to the background, the setting in which it is sung, and the high esteem that is given to those who perform it, one can understand how it creates a very specific mental image for the listener. Considering this in relation to Shamanistic music-making, the intended response, i.e. a triggering of trance, would be achieved regardless of setting. The setting or background from which music stems is irrelevant in regards to inducing altered states of consciousness if such a culturally and historically defined music can be so powerful when removed from it.

Riley and Newton (2001, as cited by Holmes, 2007, pp. 12-13), describe hypnotherapy as an 'altered state of consciousness in which the critical faculty is bypassed (mind in the conscious mode) and acceptable selective thinking established.' Addressed in this paper is how hypnotherapy has been used on a

holistic level in an attempt to trigger an altered state of consciousness to generate positive change.

Holmes writes that one can lower the rhythm of music in order to relax or use the higher frequencies to revitalise one's self, all depending on the rate and pitch of the frequency. Explained is that the three rates of frequencies which induce trance are Delta, Theta and Alpha. Returning to Mastnak's example, Gregorian chant has been used to create a harmony in the body and used in conjunction with other methods for triggering trance. This taken into account, one can recognise Holmes's claim that chanting slows down the brain waves to the above-mentioned frequencies. Stated in the article is that sound and song are tools which can be used for trance induction. 'They can be used as a form of self-hypnosis and can be self-prescriptive, used for positive change on a holistic level for many issues in psychotherapy, counselling or coaching, ranging from surgery to palliative care and addictions' (2007, p. 17).

Holmes uses the term *tranceformation* as a way of communicating a change of state in consciousness. She claims that 'resonance and entrainment are the basic principles of tranceformation with sound' (2007, p. 15). However, entrainment using a non-musical tool, a non-auditory stimulus, i.e. a flashing light, at a rate close to the alpha brain wave, also caused an alteration in brain waves. This led Becker (1994) to state that music can also be explained as a phenomenon which can induce trance due to its ability to stimulate neurons in the brain. If the brainwaves can be manipulated and altered via non-musical stimuli such as a flashing light, perhaps it is logical to question whether the cultural significance of music is truly something which may inhibit the entrainment of one's wavelengths. In contrast to Mastnak's observations, Becker does not believe the cultural context can be eliminated from the equation.

Jovanov and Maxfield (2011) have also conducted research in the field of entrainment. In their study, they found the participants still experienced attributes of a trance-like state although three different drumming styles were used. Suggested is

the theory that monotonous drumming may be a way to induce trance, regardless of the cultural background from whence it came. Jilek, as quoted by Jovanov and Maxfield, found that drumbeats between 4-7 beats per second were most effective at stimulating a change in brain waves to the theta bandwidth. This is, indeed, the same frequency as the theta brain waves (4 – 7 Hertz) at which the brain is considered to be in a trance-like state. The hypothesis posed by Jovanov and Maxfield claims that stabilizing physiological rhythms could help one reach a deeper self. Corresponding to Mastnak's claims of controlling internal energy circuits, both articles explain that music (or at least the rhythmic elements of music) from non-familiar cultures has, indeed, the ability to alter one's state of consciousness.

Pertinent to this topic is Oohasi's account (2002) of the measurement of brain waves via Electroencephalography during a trance ceremony in Bali. Although this example is one of Balinese subjects entering trance in a traditional ceremony, this article validates the fact that, generally, it is possible to enter trance. Fundamentally, even though the other two subjects in the observation were moving their bodies in the same way as he who was in an actual trance, the EEG results showed two things: firstly, it is not possible to falsify a trance; and secondly, although the EEG was taken in the field, the artifacts from the scan were not reported as being a major problem in the research.

By focusing on altered states of consciousness, it appears one can gain a greater control over one's body using methods to manipulate the brain or brainwaves. This hinges on the ability to find the physiological balance and could be accessed through the manipulation of the consciousness via entrainment or self-induced trance, leading to a deeper level of health.

2.7 Conclusion

The subjects that have been addressed here are quite diverse. Most of the above sources are oriented towards using music as something which is much more than a pastime. Approaches are varied, for example; EEG of Balinese men in trance; lowering or raising brain waves to elicit various responses by utilising Gregorian chant, which can also be seen as a form of entrainment; and listening to recorded music in settings such as hospitals to illicit responses including relaxation and lower heart pressure. In choosing the music one needs to be sure that the act of doing so will not be considered a factor in the research. One should take the cultural context of the participants into account. Interestingly, cultural context in terms of music listening seems to be important when not attempting to induce trance.

The research encompassing the theme of using music as an alternative or complementary intervention is extensive and comprehensive. There are, however, certain aspects of this research which have been inconclusive or have not been extensively studied, such as the lasting effects of an intervention. As of yet, there have been no concrete results which show that the effects of said intervention are permanent or have been utilised by the patient thereafter. Taking this into account, the aim of the study I wish to conduct would also be focused on the impressions, attitude and reactions of the participant before, during and after the experiment has been conducted.

3 FIELD OF STUDY

Pain is a phenomenon which is neither unnecessary nor wanted. It is not audacious to claim that the feeling of physical or emotional pain is one which is less than desired. However, physical pain should not be considered something which prohibits humans, but a catalyst, as something which propels us. Melzack and Wall (1988), (as cited by Grahek, 2007, p. 8), explain the importance of pain for the purposes of protection and recovery in the human body.

> All of us quite frequently stumble, fall or wrench a muscle during ordinary activity. After these trivial injuries, we limp a little or we protect the joint so that it remains unstressed during the recovery process. This resting of the damaged area is an essential part of its recovery. But those who feel no pain go on using the joint, adding insult to injury.

Grahek continues to explain the benefits of being able to feel pain and he describes the two ways in which our bodies protect themselves from harm. These two systems are described as '(1) the avoidance system and (2) the restorative or repair system' (Grahek, 2007, p. 9). In layman's terms, these systems could be imagined as (1) the passive and (2) the active approaches to self-healing in a psychological manner. In this way, in terms of potentially avoiding a conflict, a passive approach would entail avoiding a person, whilst an active approach would be to intentionally address said person. In the same way, with the avoidance system, the body tries to protect itself by avoiding potentially harmful situations, while the repair system tries to actively inhibit movement through manipulation of the affected areas (Grahek, 2007, p. 13). Although these methods are diverse, one cannot deny this function is necessary in preventing lasting damage and illness.

Of course, the system may function, or dysfunction, to the extent of causing extreme discomfort to the sufferer. When pain becomes chronic, it no longer serves the purpose of warning the person to avoid harm but rather becomes a 'symptom of

disease' (Grahek, 2007, p. 15). Mitchell (as cited by Grahek, 2007) emphasises that pain, when experienced unnecessarily over long periods of time, causes undesirable effects – not only in the body, but also the mind. Under such circumstances, one can agree that the biological reasons for feeling pain are no longer valid, rather are counter – productive.

3.1 Examples of Solutions to Chronic Pain

One cannot help but wonder how to achieve the supposed middle ground between 'too much' and 'too little' pain. Cases of patients suffering from intense, uncontrollable pain yet being indifferent toward it have been documented. In one case described by Brand and Yancey (1997; as cited by Grahek, 2007), in an attempt to relieve her never-ending pain, one British woman underwent a lobotomy. She described some time after the operation that she was still in agony, but was no longer bothered by it. Brand and Yancey discovered that lobotomized brains can no longer recognize pain as the main priority and therefore one is able to live comfortably whilst still feeling the pain.

Similar cases occurred after cingulotomy surgery (Grahek, 2007). This is another invasive surgery which evidently creates a similar aftermath to that of a lobotomy in regards to pain. The patient can still feel pain after the surgery but is able to carry on with their daily lives; they are essentially living with the pain.

Some researchers have described the effects felt by the use of Morphine as a pharmacological equivalent to a lobotomy. The patient claims to be able to still feel the pain as such, but the common factor with surgical solutions of being unconcerned by it exists (Grahek, 2007).

If these strategies are (in terms of indifference towards pain) successful, perhaps it is possible to emulate such a state of mind without the aid of surgery or analgesics.

Indeed, cases of patients undergoing surgery without the use of anaesthesia were published in 2008 when Briton Alex Lenkei underwent hand surgery after entering self-induced hypnosis. Documented in *News Medical* and various newspapers such as *The Daily Mail* and *Neurologica Blog* is the case of this 61 year old, who refused general anaesthesia and opted instead for self-induced hypnosis. According to *News Medical*, he was still conscious throughout the 83 minute surgery, yet felt no pain. The induction into the state of hypnosis took between 30 to 60 seconds after which the patient was in a deep state of relaxation. The article explains that the anaesthetist Dr. Richard Venn believes the patient to have been able to increase the amount of pain-killing chemicals in his own body to inhibit the feelings of pain (*News Medical*, 2008).

In this case, Lenkei was not feeling the pain as opposed to the previously mentioned cases of feeling the pain but being indifferent towards it. However, it may be possible to use another stimulus to create a similar, lowered state of consciousness to achieve indifference towards pain or to allow the patient to be oblivious to any discomfort at all.

3.2 How is Pain Categorised?

There are several types of pain; nociceptive (musculoskeletal), which results from injury; neuropathic, which is due to dysfunction of nerves; and psychogenic, which is purely psychological in nature and for which no true physical pathology is evident. These can be categorized into branches of pain; acute or chronic. Acute pain is that which lasts within a specific healing time-frame for specific injuries, whereas chronic pain lasts longer than this expected healing time-frame (Winterowd et al., 2003). Yet, how can one diagnose these types of pain? Cousins and Gallagher (2011) outline a method of classifying and assessing pain.

3.3 Classification of Pain in Western Medicine

Pain can be classified by duration, etiology or intensity. The authors explain that it is widely accepted that 'three domains contribute to the human experience of chronic pain: biological (nociceptive and neuropathic); psychological; and social (environmental) (Cousins & Gallagher, 2011).

In Western medicine certain steps are followed in pain assessment. A general medical history, physical examination, psychosocial assessment and diagnostic testing (such as imaging) are basic procedure in any diagnosis. Of course, the reasons for taking these steps are clear. For example, obtaining a medical history allows the doctor to ascertain possible causes of the pain. The location of the pain may help in the classification thereof; identification of pain radiation may assist in this process. Defining the character of the pain may indicate whether it is somatic, visceral or neuropathic.

An evaluation of pain intensity is described as the most commonly assessed dimension and within this criterion there are various methods. Cousins and Gallagher clarify that there are three types of tool which are most commonly used to gauge pain intensity; the visual analogue scale (VAS); the numeric rating scale (NRS) and the adjective rating scale (ARS). Of course, these scales are dependent on the rating the patient gives prior to any treatment and this intensity acts as a baseline pending improvement after treatment. A full neurological and musculoskeletal examination is also vital information in an assessment situation.

The mental health of the patient is important because pain can sometimes be a physical manifestation of a psychological issue. The evaluation should include the examination of mental status, motor system, sensory perception, deep tendon reflexes and cranial nerve function. Also documented should be any alleviating factors, as well as previous treatments. Psychosocial assessment may also be

considered; factors to take into account are the mood, coping skills, emotional support structure, symptoms of depression/anxiety, and the expectations the patient has regarding the management of their pain with the use of a quality-of-life questionnaire (Cousins & Gallagher, 2011). These tools allow the doctor to create a rounded picture of the type of pain the patient is experiencing, as well as helping him/her to formulate a treatment plan.

3.4 Interdisciplinary Approaches to Recovery

Medical institutions have advocated and aim towards an interdisciplinary approach to dealing with chronic pain which 'consists of assessing and treating the physical, psychosocial, medical, vocational and social aspects of chronic pain' (Cousins & Gallagher, 2011). Of course, this research and application is based on Western medicinal practices as opposed to integrating alternative methods and can therefore not be truly considered an all-encompassing approach. The intention is nevertheless to provide a method of working towards restoration of quality of life for those suffering from chronic pain.

Associations and institutions such as *The International Association for the Study of Pain* (IASP), the *American Academy of Pain Medicine*, *The Faculty of Pain Medicine of the Australian and New Zealand College of Anaesthetists* and *The American College of Rheumatology* are encouraging such multidisciplinary approaches. The geographical location of these bodies emphasise that an attempt is being made in North America, Australia and New Zealand to promote a holistic approach to well-being. However, this method still lacks the integration of hypnosis or acupuncture, which may significantly increase rehabilitation in addition to traditional Western methods. Presently, the advances made in this field focus on improving analgesics and pharmacotherapy, and not only this, but also attempting to tailor pharmacotherapy for the individual patient: pharmacogenetics (Cousins & Gallagher, 2011). Although

these are advances in medicine, they may not necessarily be advances in health care. To call an approach interdisciplinary it may be prudent to incorporate alternative methods in the hope of creating a truly comprehensive health plan.

3.5 From Hippocrates to Melzack: Concepts Leading to Contemporary Theories

From the beginning of philosophical discussion, the senses, and all that term encapsulates, have been under discussion. In order to understand the current school of thought on medicine and its definition of pain, one must understand the origin of this knowledge.

As described by Lloyd and Sivin (2002, p. 162) the ancient views during the time of Hippocrates were contrasting; one side supported the ideas of the 'purifiers', and the other, Hippocratic concepts. According to the former, if one were to cry out in a certain way, the mother of the gods is to blame. However, uttering a sharper cry would mean Poseidon were responsible. The Hippocratic writer insisted disease is natural and has a natural cause, i.e. is not caused by the gods.

One interesting development in medicine with which music is connected is that of *Pulse Theory*. Writers such as Herophilus connected bodily pulses to musical pulse. Galen reported (cited by Lloyd and Sivin, 2002, p. 168) that 'just as musicians establish rhythms according to defined sequences of time units, comparing the *arsis* (upbeat) and the *thesis* (downbeat) with one another, so, too, Herophilus supposes that the dilation of the artery is analogous to the upbeat, whereas the contraction is analogous to the downbeat.' He argued that elements in medicine and in physiology should be certain and as exact as those in geometry.

Dallenbach (1939) outlines a systematic review of the history of pain perception from the time of Aristotelian views up until the 20th century, describing various theories, how they were formulated and eventually discarded for the modern definitions.

Aristotle defined pain, as had Plato before him, as a passion of the soul. Dallenbach elaborates on this by explaining that it makes sense the ancient philosophers would separate pain from the other five senses owing to the fact that it does not belong to nor is influenced by a specific organ. Aristotle raised the question of querying whether touch is a single or group of special senses; this was discussed after Aristotle's time for another thousand years. Once the concept of a plurality of senses was decided upon (approximately in the 10th Century AD), major thinkers each added their own concept of what touch should encompass. From the 2nd Century AD and the hypothesis that touch was a single sense, to the 16th Century where it was a plurality divided into four senses (Cardano 1501 – 1576) and to the addition of sexual appetite as a sixth sense in the 15th Century AD, the concept of touch was always under scrutiny (William Hamilton, 1879, p. 155; as cited by Dallenbach, 1939).

Descartes was the first philosopher to be influenced by the scientific method that was prominent in the 17th century. He propelled the notion that the body works like a machine which can be studied using the experimental methods of physics invented by Galileo and others (Melzack, 1996). Descartes' findings suggested that 'injury activates specific pain receptors and fibers that, in turn, project pain impulses through a spinal pain pathway to a pain center in the brain' (Melzack & Katz, 2006, p. 129). However this theory did not explicate factors associated with chronic pain. As is to a certain extent still true today, it is the short-term success stories with regard to pain that are emphasized, not the knowledge of long-term effects.

Johannes Müller, in the 19th century, posited five different kinds of sensory nerves and the fifth class of which were said to yield different sensations such as tickle, itch, shudder, fatigue, and pain, among others. His discoveries were most important, because he showed that if a nerve is stimulated by various objects, it 'feels' the same pain and that various nerves give rise to various sensations (Dallenbach, 1939).

While Müller was part of the Specificity Theory movement, Erb - in 1874 - was the first to formulate the Intensive Theory of Pain. This concept maps that each sensory stimulus is capable of producing pain if it reaches sufficient intensity (Erb, 1874; quoted from G. W. A. Luckey, 1895, p. 109; cited by Dallenbach, 1939, p. 340). This theory was validated by Titchener in his first edition of *Outline* in 1896 when he explained that any excessive pressure of a sense organ or injury of a nerve results in a painful sensation.

From Aristotle until the 19th century, all theories fed each other and were either developed or disproven; the research that had been conducted throughout the centuries led to the development of the *Gate Control Theory*. In 1965, Wall and Melzack published a paper about their findings. The theory is described by Melzack (p. 132) as follows:

> 1. The transmission of nerve impulses from afferent fibers to spinal cord transmission (T) cells is modulated by a spinal gating mechanism in the dorsal horn
> 2. The spinal gating mechanism is influenced by the relative amount of activity in large- diameter (L) and small diameter (S) fibers [...].
> 3. The spinal gating mechanism is influenced by nerve impulses that descend from the brain
> 4. A specialized system of large-diameter, rapidly conducting fibers (the central control trigger) activates selective cognitive processes that then influence [...] the modulating properties of the spinal gating mechanism.
> 5. When the output of the spinal cord transmission (T) cells exceeds a critical level, it activates the action system – those neural areas that underlie the complex, sequential patterns of behaviour - and experience characteristic of pain

This theory enabled the development of transcutaneous electrical nerve stimulation as a method of acute and chronic pain treatment (Melzack, 1996). More important is the other opportunity to which the theory led; with the proverbial gates to the East being opened by Westerners, an understanding of acupuncture and its ability to relieve pain were unlocked. This was due to the assumption that the needles were used to 'activate large fibers that closed the gate to inputs from slowly conducting

"pain fibers"' (Melzack, 1996, p. 132). This theory could be postulated to be an important step towards an integration of Eastern and Western approaches to medicine.

According to the *International Association for the Study of Pain* (IASP), pain is defined as: 'An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage' (IASP, 2008). This definition, taken into account with Melzack and Wall's *Gate Control Theory*, highlights the importance of the emotional aspect of pain perception. Due to the fact that Aristotle and his contemporaries believed pain to be an emotional upheaval, the leap is not too distant between the views of our ancestors and those of which we hold today.

As has been previously mentioned, Herophilus believed bodily pulses to be synonymous with musical pulse. In this sense, music played at a similar pulse to our heart rate could indeed be used to become entrained. Music was an important aspect of helping people in antiquity to understand their bodies and well-being. In addition, the use of music for the same purpose is perhaps something that should be strongly considered as a useful resource.

4 METHOD

4.1 Basic Outline

The experiment to be conducted rested on the premise that music can help one to relax. I posited that, relaxing to the point of not being completely alert would decrease the participant's perception of their pain. Although it is not correct to claim that a method which alleviates the pain for one person could be applied universally, this experiment could be the first stepping stone towards creating a coping strategy for the wider community of chronic pain sufferers.

4.2 Criteria for and Research of the Music Stimulus

The first objective when searching for music for the experiment was to accumulate enough music for 12 weeks. There would be two 30 minute sessions per week, resulting in the total amount of music needed being 12 hours. I decided that this would be an incredible amount of audio material to collect and 6 hours of music could be sufficient. In this instance, each track would be repeated once; not too often to become decidedly familiar yet, still reducing the amount of tracks to be gathered by half.

The second requirement for this music as an experimental criterion was that each track should have a number of beats per minute lying between 60 and 80. Much of the research I had previously read indicated that music within this range was reported to be the most successful for inducing a relaxed state. I hypothesised that, if the participant's brain waves were lowered, experiencing an altered state of consciousness may be possible, resulting in the participant no longer feeling pain.

With this in mind, the BPM range became a criterion for narrowing the scope of the music. Another exclusion criterion was the disregarding of vocals as an instrument in the tracks. I wanted to make sure the lyrics – whether the participant understood them or not – would not be a factor in the analysis. Finally, another important aspect was that the music should be unfamiliar to the participant. As discussed in chapter two, the use of shamanic drumming was one possible method of trance induction. Since a *type* of trance was what I wished to achieve, I had considered using recordings of shamanic drumming as the sole stimulus. However, drumming as the only genre would undoubtedly become monotonous and may have a negative effect. The use of non-familiar, non-Western music remained the best option. Music as far removed as possible from the Western canon would be the least known and therefore appropriate; thus I researched various cultures and their music traditions.

Deciding on non-western music, I began searching the university library yet this yielded nothing substantial. Subsequently, I searched the audio section of the public library, which led me to quite a wide range of Compact Discs of various genres such as New Age and Eastern musics. Quite a few tracks from this library seemed to be potentially suitable. From this selection I was able to accumulate names and genres I wished to research further. It was from *Youtube.com* that I found many of the audio files. This vast resource not only yielded positive search results for the artists I had discovered, but also listed various other musicians who were also from the same genre. Using this, I was able to collect more than six hours of music.

4.3 Method of Gathering Music Data

The next step was to find a method of measuring the beats per minute. I wished to use an electronic device to make sure my own bias would not affect the data. Initially I used an automatic counter; when running tracks through this software as a test, I found that my natural instinct would have led me to register the beats as less

than what the automated counter was producing. It can be quite controversial to track the beats per minute of a piece of music when one cannot see the time signature. However, I felt that a systematic method, even if it were manual, would still be valid.

Following this, I searched for an online manual tapper which could be used whilst listening to the music. The website *ALL8.com* allows one to receive a reading of the average beats per minute, the nearest whole measured, as well as the amount of times one has tapped. This allowed me to receive an average reading for a piece of music whilst listening to it live, tapping along to the beat and counting the same amount of taps for every piece.

For each track, I tapped twenty times to get the average amount of beats per minute. If, after this, the BPM was either below 60 or above 80, the piece was not included in the final list to be piloted. If the piece lay between these markers, the other criteria were checked to make sure the music was suitable. During this process, I realised that another factor was becoming apparent. Some of the music I stumbled across was quite brash and loud; music that is too shocking could not be used in the study, because the objective was to relax. This resulted in a revision of the criteria for the tracks. I concluded that the instrument choice was also an important factor in the choosing of the music; if a loud brass instrument were included, it would not be consistent with the general mood of the pieces. It also emerged that a lot of music being chosen centred on Eastern music, therefore traditional Eastern instruments were the most frequently included. The traditional Chinese erhu was chosen quite often, as was a traditional Eastern wooden flute. The New Age music included a wider range of instruments and some traditional drumming was used.

4.4 Pilot Study

Fifteen people took part in the pilot study to evaluate the level of relaxation in listening to 30 second clips. Apart from being asked to evaluate the range of relaxation, participants were also asked to consider the valence of each clip.

The reasoning behind discovering the valence was to assess whether a higher level of relaxation was associated with a higher, or rather, more positive valence. If the inclusion criteria were uniform, one reason why a piece of music would not be as relaxing as the others could be linked to the valence of each piece.

Each participant was issued with a word document listing instructions for the pilot (Appendix A). It outlined how long the experiment was going to last and advised the listener to wear headphones or earphones. Most of the participants availed of one of these to complete the survey. The instructions stated that there would be 30 second clips that one should listen to and evaluate level of relaxation on a scale of 1 – 5 (1 being 'not relaxed at all' and 5 being 'very relaxed') as well as a separate question assigned to the same clip asking to evaluate valence on a similar scale of 1 – 5 (1 being 'negative valence' and 5 being 'positive valence'). The term valence was also described as encapsulating such emotions as 'joy' for positive valence and those such as 'anger' and 'fear' as negative valence.

4.5 Choosing a Method of Data Analysis

When confronted with the task of choosing a method to analyse the data gathered from any project, the first step one must take is towards defining the aims of one's study. Determining the research question is vital for laying the foundations for a valid and concise study. Secondly, the researcher should aim towards concisely

defining the depth into which the research question will delve. Ascertaining these allows one to proceed towards choosing which method is suitable for their study.

For my study, I felt that a more in-depth and personal approach from the participant would yield richer results; the use of a personal diary as a resource would allow the participant to divulge information at their own discretion. A participant may be more willing to write about personal aspects of their pain and the instances which surround it because the premise of a diary allows for candidness. Also, the fact that the participant has more time to consider what they wish to write about means the answer may be weighted with more meaning.

Generally, qualitative research allows for the researcher to engage in a more humanistic approach because the data is opinion-based and involves more human interaction. If one were to analyse quantitative data in a similar manner to qualitative, the process would be monumental. For this reason I chose to have a single participant as a test subject. Even understanding one person's approach to pain relief would be greatly beneficial in refining the method for further research. Of course, one person's opinion can in no way be generalized to cover a whole population, yet it is a stepping stone to furthering the understanding of health and well-being in this field. Haig phrased this concisely: 'Even though, strictly speaking, we cannot generalize from small-scale qualitative research of this type [IPA], it could be argued that, if 'a given experience' is possible, it is also subject to universalisation' (Haig, 1987, p. 44; as cited by Willig, 2008, p. 17).

The relationship between the researcher and the participant should also be regarded as an important aspect to the research process. As with any interaction a certain level of expectation is present. In the case of an interview, the participant may be attempting to please the researcher with 'the right answers'; simultaneously, the researcher may analyse the data in such a way that the answer he or she had hoped to find is, in fact, present. This method is therefore limited to the ability of both

parties to ask or answer questions in an unbiased way. The data is to some degree limited by the 'social and cultural discourses' of the researcher and participant (Frost, 2011, p. 44). Smith (2004; as cited by Frost, 2011), describes the process as a sort of analysis within an analysis; the term 'double hermeneutics' is used to depict the process of a participant analysing their own personal and social world in an attempt to understand it whilst the researcher is simultaneously attempting to comprehend the participant trying to interpret their own world. This double level of analysis concisely depicts the complexity of the qualitative method and explains, perhaps, why analysing quantitative data in a similar fashion would quite tedious.

I chose to utilise the method of Interpretative Phenomenological Analysis (IPA) to analyse the data from the participant's pain diary. This particular approach is defined as being a culmination of three knowledge areas: phenomenology (which is part of the title itself), hermeneutics, and idiography (Smith et al., 2009, p. 11; as cited by Frost, 2011). According to Heidegger, the basic meaning of hermeneutics is that the existence of the human race is interpretative (Moran, 2000; cited by Frost, 2011). On a more basic level, the three terms which encapsulate IPA are a perfect combination description. Phenomenology is defined as 'the study of phenomena', hermeneutics as 'the science of interpretation' or 'the study and interpretation of human behaviour and social institutions' and finally, idiographic is to 'compare nomothetic of or relating to the study of individuals' (Dictionary.com, 2013). All three elements of IPA outline that this method is aimed at observation on a humanistic level.

The structure of a single case study enables the researcher to examine these three areas in depth. The area of idiography can perhaps astutely confirm that focusing on one participant alone is not invalid. Frost (2011, p. 49) explains that the approach of IPA is idiographic in the sense that it is a 'detailed examination of particular instances'. She continues by explaining that, for example in a single case study or in

such qualitative studies with a small participant population, the researcher compares and contrasts his or her own case with previous accounts of similar research. This step is that which makes the single case study both a very deep analysis of one person but can also be seen as a study with a slightly broader scope.

Choosing the participant based on the method of purposive sampling, the researcher can ensure they are studying the characteristics or features that are intended (Frost, 2011, p. 49). Using this as a way of excluding other participants, the data can be more accurate and not simply conjecture on the participant's part. In this way, when one wishes to study the effects of a stimulus on pain, a participant would be chosen on the basis that they experience pain.

The actual analysis of the data takes form in various stages. These stages are described by Frost (2011) as taking the form of an hourglass. The first step is to write broad notes on the hypothetical transcript of an interview. Then, narrowing this scope, the researcher tries to whittle down the major themes, clustering them together in small groups. Next, these clusters are given labels which succinctly describe these super-ordinate and sub-themes. Broadening, finally, a table of themes as well as illustrative quotes are the result of the process.

4.6 Method of the Experiment

The experiment took place between September 16, 2013 and January 24, 2014 and was divided into two phases. The initial phase took place between September 16 and December 16; a total of three months, and 19 sessions. The second and final stage took place in the remaining time: December 16 until January 21, 2014. This phase was the wash-out period in which there was no contact between participant and experimenter and was planned to be a time in which the participant's personal

reflection on pain could be possible through diary writing. It was also a chance to measure the after effects of the music listening portion on the participant's pain.

4.7 Recruiting the Participant

The participant had applied for music therapy to be conducted as clinical training for the students of the International Music Therapy Master's Degree programme during the spring semester 2013. She had not been selected for sessions and had applied due to pain. The only specific criterion for partaking in my study was chronic pain. I contacted the participant by email and she replied that she was interested in participating and enquired about the details of the experiment. I explained that the sessions would be 30 minutes each, twice per week (Mondays and Fridays), and taking place during the winter semester, 2013, i.e. for 12 weeks. I also explained that there would be no active music making, would mostly require her to relax and listen to music. I informed her that a few questionnaires would need to be completed occasionally, and that a diary for tracking pain would be asked of her. She told me she would like to participate and we began to plan the exact timetable.

There were general introductions during the first meeting and we discussed altering the times. I gave her a consent form (Appendix B) to sign outlining that her personal details (including name) would be kept confidential, but any information taken from the experimental period would be included in the thesis. She willingly signed this and was also presented with guidelines for writing the diary (Appendix D). It was elucidated that the information written in the diary was a main source of data for the thesis.

The participant also completed a basic information (Appendix C) sheet which asked for details such as age, date and type of diagnosis, type of analgesics consumed, if pain inhibits daily life, and what type of music the participant listens to. Again, it

was confirmed that this information may be used in the thesis, but name would be changed to protect identity. The participant is a 37-year old female who was diagnosed with Ankylosing Spondylitis in May 2012 and had been taking Ibuprofen to control the pain. Henceforth, the participant shall be referred to as Henna.

4.8 Phase One

I asked Henna to complete a VAS pain scale rating before proceeding to the next portion of the experiment. Following this, we went to clinic II where the room had been set up for the music-listening. I had planned that she would sit in the vibroacoustic chair because the back could be adjusted, ensuring comfort. Blankets and cushions had been provided, the lights were dimmed and the music was to be played from a CD through the speaker system and listened to through headphones to reduce external stimulation. We checked the volume of the music; I left the room and returned 30 minutes later.

Session two was prepared for in a similar fashion. Arriving at the clinic 30 minutes before the experiment was due to begin, the room was set up as it had been previously using blankets, cushions, head phones, the session playlist on CD and dimmed lights. There was a slight tick on one of the tracks due to the equipment with which it had been originally recorded. Knowing that it had been piloted, I deemed it to be still valid. I checked all the tracks quickly and there seemed to be no problems. Henna arrived and we again tested the volume. After 15 minutes she came and informed me that the clicking was irritating her and we both returned to the clinic. The issue could not be resolved, so we decided to cut the session short.

Session three went smoothly; I had prepared two CDs in the event the malfunction had been with the CD and not the system nor the recordings. There were no problems with either.

The following session yielded, again, some issues with the speaker system. Therefore, I decided to play the music through my personal laptop. Due to a different input on the laptop than the CD player, the headphones needed to be changed. They were, however, similar in shape and as effective at blocking out external noise. Henna arrived and we continued the ritual of checking the volume. This was continued until the final session.

She informed me afterwards that the vibroacoustic chair was not particularly comfortable and inquired whether there were an alternative. I told her I would try to set up an alternative layout for the next meeting. Foam mattresses, blankets and cushions were laid out on the floor of the clinic as an alternative to the vibroacoustic chair. This seemed to be preferable to the chair and post-session she disclosed that she felt really relaxed, and would have liked to have stayed longer. She also commented that the set up was better this way and that there was one particular piece of music which was appealing to her.

The interactions between Henna and me were quite brief and formal; however, as time wore on, she became a little more open. I did not wish to be brusque with her but also was aware that interaction itself could be considered another variable in the experiment. By not having the relaxation and music listening as the focus of the study, I would not be able to control the stimuli. Upon contemplation, I realised this was unavoidable; the aim of the study was not only to understand how the music listening affected her pain but also how her routine and pain interacted with each other. Communications with others were a part of her daily life and therefore part of the experiment, too.

The succeeding sessions went without issues; the participant commented on several occasions that she felt very relaxed and would have liked to have stayed longer. The ninth session yielded an issue purely from an organisational point of view. Due to there being a problem with occupation of clinic I, I could not get access in order to

retrieve the extra blanket. It did not cause a problem, since the participant used her coat as a pillow. It was nonetheless quite irritating for there to be yet another issue with the set-up.

Session ten served as a quiet interlude for a work engagement. Henna had been awake since six a.m. and was therefore tired. She seemed to view the session as a positive experience during a stressful day.

Due to the fact that the sessions were taking place twice per week, the participant had the opportunity to both begin and end her week by listening to music. She reported this - especially the Friday meetings - to be something she looked forward to. This was time in which she could slow down and take for herself. During this session 11, the participant transmitted '*I think I went into a bit of a coma!*' (Personal communication, November 1, 2013). Upon general inquiry to her health, she admitted that she had been feeling really well on the gluten-free diet and had subsequently been feeling quite guilty about my research because her pain was so minimal. We discussed the diary entries being the most important part of the data collection and she explained that it might be difficult to keep writing it when she would be in England over the holidays in December.

Henna was late for the next session. She was quite tired as she had slept very little. Due to her daughter being ill she forgot to come to the next session. It was planned that directly before and after the thirteenth session the VAS scale would be taken. She seemed tired and actually fell asleep in the last few minutes of the session. After missing the next two sessions due to illness, she seemed quite eager to return. She reported: '*Could have stayed here for another half an hour!*'Again, she had not slept enough during the weekend and spoke of how unexpected and extreme the sleep deprivation is when one is a mother.

After being late for session 17 Henna informed me she was in a lot of pain, was under a lot of stress and was not sleeping properly. She commented after the session that half an hour goes so quickly. Again, the recurring remarks of not sleeping well and finding the music-listening to be going so quickly were common.

At the next session, she looked much more refreshed and rested as well as sporting a new haircut. Henna explained she had gotten a good rest over the weekend and also repeated how fast half an hour is. She added that when she is nursing her daughter to sleep it can feel like an eternity, but during the sessions, 30 minutes passes very quickly.

Session 17 coincided with an experiment in which I was to partake. Henna wished to come earlier and therefore, due to overlapping schedules, I knew I would be unavailable to speak with her after the session. I set up the layout in the clinic and when she arrived we checked the volume as usual and I proceeded to the other experiment. I sent her a text message afterwards to check if everything had run smoothly. The next day she replied with: '*Yes, everything was ok, no worries! Enjoyed myself as always!*'

For the penultimate session, Henna wished to begin a little earlier again. She arrived ten minutes earlier than usual, held up by traffic. I arrived to the room a few minutes before the session ended, she had her knees raised, was lying on her back, and seemed to be dosing. She voiced that it was a nice way end to the week again. She added that she was under stress, trying to wrap things up before the holidays.

The final session went smoothly and we discussed the second phase of the experiment in which the diary writing was of importance. I also explained that I would send her an evaluation form about the first phase per email and would contact her in a month's time to organise the final meeting. She sent back the completed evaluation form soon afterwards.

During the washout period, there was no contact between Henna and me. On January 14 I emailed her to inquire whether she would be available over the next few days to complete the experiment. I received an automatic reply that she was out of office until January 20. I also tried contacting her by telephone; I only had her work phone number and, again, received no answer. On January 21 she replied asking if the following Friday between 16:00 and 17:00 would be ok to meet.

4.9 Phase Two

We met on January 24, 2014 for the final time. I had sent her the second evaluation form which she completed online. This meeting was also an opportunity to get another VAS rating, for the diary to be returned and a chance for her to ask any final questions or make final comments about the process. We discussed the washout period, the holiday in England, and her gluten-free diet. Henna told me she felt guilty that the research was affected by her diet change. We discussed what I would do with the data. We said goodbye and I presented her with flowers and thanked her for participating.

4.10 Stages of Analysis

The analysis of the diary entries and evaluation forms I and II was conducted in several phases. I typed the diary entries into a Word Document, as the diary had been written on an A5 sized notebook. In order to gain a clearer view of the data and be able to correct mistakes, I felt an electronic version would be beneficial. I was careful to make an exact copy of the diary, leaving margins on the left- and right-hand sides for the analysis notes. I read the data several times to get an overall impression of the texts. Starting to make general notes in the left-hand margins, I applied a blue colour to the font in order to later be able to differentiate between the various phases.

During the first note-taking read-through, I took notes on her descriptions, condensing her comments to shorter sentences, single words and commenting on her level of pain. This seemed as though it would allow me to get a clearer overall picture of her pain and the circumstances surrounding it. For the second read-through, I made comments using a red colour, again so I would be able to distinguish between the first and second round. This yielded an attempt at basic interpretations of what she was saying; giving general themes, beginning to group certain comments together and show the emergence of patterns.

The next stage involved the identification of themes. The earlier attempt to name themes aided this process. Words or sentences were marked using the letters *E* (emotion), *SD* (sleep deprivation), *S* (stress), *SHT* (self-help tool), *IF* (impeding factor), *Q* (quality), *BS* (better sleep), *HF* (helping factor), *GF* (gluten free), *LS* (less stress), *WL* (weight loss) and *C* (condition). These served as a means of later being able to identify themes which could be grouped together.

After these had been tagged with the afore-mentioned abbreviations, it was simple to gather them into clusters and, finally, to be able to create the table of themes (Table 3). By constantly referring back to the original texts, I was able to make sure that the themes were indeed directly describing what the participant had written.

5 RESULTS

5.1 Pilot Study Results

The results for the 15 pilot study participants were entered into an excel spreadsheet. Participants were labelled as letters A-O and the music clips were denoted by the y-axis, classified as numbers. This enabled me to evaluate the mode for each participant on their overall answers as well as get a mode value for all participants' answers on a single clip. Only one clip was valued at a mode value of 2; I thought it best to replace this clip with another which was within the same genre as a piece which had been assigned a higher rating. 25% of the piloted clips were rated as 3 in terms of relaxation, 61.5% were rated as 4 and 13.4% were rated as 5. The following chart shows the mode relaxation value for each clip (1 – 52) as an accumulative value of all participants' ratings.

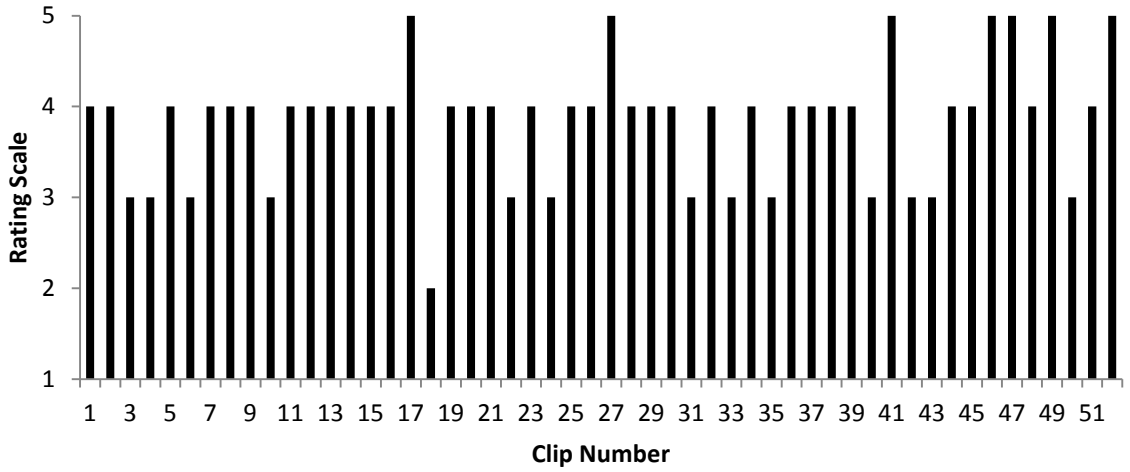

Figure 1. Mode relaxation values for each clip as an accumulative value of all participants' ratings

As can be seen by Figure 1, a rating of 4 is the most common rating assigned to all music excerpts. Figure 2 shows that on average the pieces piloted were neither very positive nor very negative (value 3).

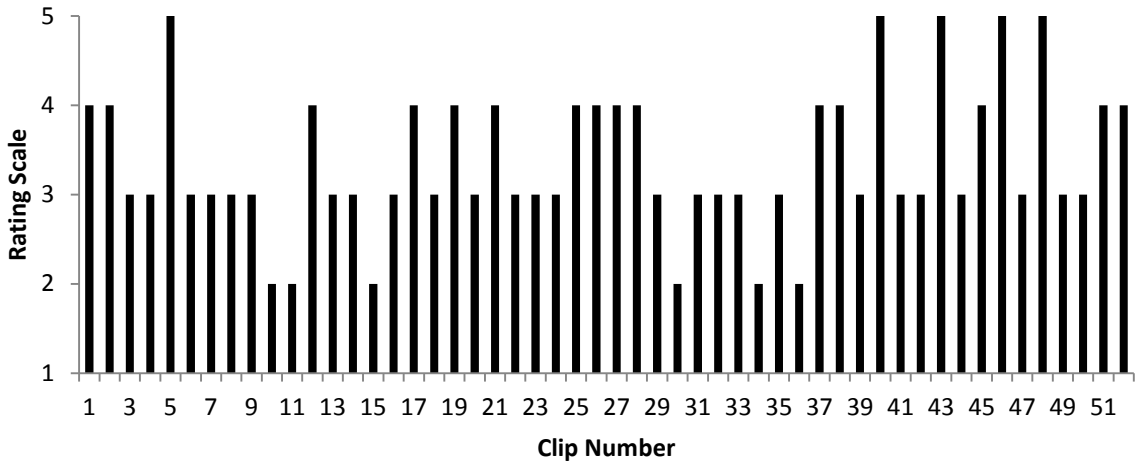

Figure 2. Mode valence values for each clip as an accumulative value of all participants' ratings

Looking at first at the relaxation chart (Figure 1), there was only one clip which, across the whole range of participants, yielded a 2 as the most common answer. When compared to the mode of the same clip in the valence chart (Figure 2), the answer was 3. This expressed that, in general, participants found that the clip was quite negative, yet neither particularly relaxing nor not relaxing. In instances where the clip was valued at 5 for valence, the level of relaxation was 4. In cases where the rating for relaxation was 5, the valence was no lower than 3. This indicates that participants felt they were relaxed but the music was not necessarily of high valence; in other words, the participants felt relaxed – in instances of high relaxation markings - regardless of whether the piece was positive or negative. Where a clip was graded as 4 for relaxation, the mode of valence for the same clip was only a 2 in several instances. Overall, the mode for all participants on their answers for all clips regarding relaxation was 4 and the mode for all participants on all clips regarding valence was 3. This suggests that overall the participants felt relaxed whilst listening to the clips even though the valence was neither positive nor negative; they felt relaxed regardless of the emotional aspect of the music.

Of course, it is a completely different matter to claim that one can feel relaxed whether they are happy or sad/angry. The results show that one can feel relaxed regardless of whether the *stimulus* is positive or negative. One can posit from seeing the data that the participants classed a clip as having average valence i.e. neither positive nor negative, even if they logged a clip as being high in terms of relaxation value. This means the ability of the music to create a relaxing atmosphere was not majorly affected by whether the piece was happy or sad.

5.2 Music Listening Results

Table 3

Themes from IPA Analysis of the Participant's Diary and Evaluation Forms from Phases One and Two

Super-Ordinate Themes	Sub-Themes	Illustrative Quotes
The effect of music listening on the participant	Realisation and tracking of current pain/health situation	'I have managed to notice through this tracking though, that my menstrual cycle does have an affect [sic]: during ovulation my pain was more intense.'
	A chance to relax and take time from busy schedule	'The best benefit of the sessions for me was the "permission" to relax and take my own time in my very busy life.'
	Awareness of being physical and	'[...] I had actual trouble getting up off the sofa for the stiffness of hip & back & leg joints.

	emotional stretched	At least I know why: been far too stretched physically and emotionally for a few weeks.'
	Becoming aware of various types of pain experienced	'The experiment has given me an opportunity to listen to myself and recognise the types of pain I experience more acutely.'
Factors which influenced Henna's pain	Hectic work and home schedule	'Been MAD busy with a schedule of a mad woman'
	Sleep deprivation	'Still. Very. Little. Sleep.'
	Dietary changes	'I am now pretty certain, it's my gluten free diet that is keeping the inflammation damped down!'
	Stress factors	'Stressful day; even music therapy couldn't relax me enough to let go work related thoughts. :('
Pain management and change	Controlling pain and taking better care of herself	'Feeling positive about pain management through diet?!'
	Discovery of pain management techniques	'[...] my SI joints hurt and get aggravated when walking even when they are pain free otherwise. ~~Dis-~~However, when I swivel my hips properly with every step (cat walk/Marilyn Monroe style), I can walk much longer distances with a lot less pain!'
	Coping with a new illness and	'Feel very happy for the first time for a long time; optimistic

	looking towards the future	about life and pain management and living with the AS.'
	Acceptance of circumstances out of her control	'For years I have had trouble going back to sleep in the night when my daughter wakes me up. Anyway, he [sic] sleep quality got finally so bad that I needed four different types of medication to get any sleep and now I am on sick leave from work for an extended period of time.'

Table 3. Table of themes from IPA analysis: Super-ordinate and sub-themes

The results of the IPA analysis of the diary and evaluation forms are shown in Table 3. Three super-ordinate themes emerged from the analysis through the designation of code names described in the Method section. These three super-ordinate themes *The effect of music listening on the participant* (I), *Factors which influence the participant's pain* (II), and *Pain management and change* (III) are sub-divided into four sub-themes, which highlight the meanings behind the classification of the theme clusters. The themes emerged from the reiterations of Henna's thoughts about her own pain in the diary, the possible reasons why it would decrease or increase, as well as the outcomes of her observations. Super-ordinate themes I and II focus on how the participant was affected by the tracking of her pain during the experimentation period and how she came to notice certain aspects of the pain she was experiencing more acutely. The final super-ordinate theme highlights how these observations have brought her to the present moment and how she is planning to integrate the new knowledge into her future healthcare.

Henna wrote 29 diary entries in total between September 16, 2013 and January 24, 2014. The entries were of varying lengths; at times she only wrote a few lines, for example on November 24: '*Very. Little. Sleep*.' However, on occasion, Henna was very forthcoming with information and wrote 3 – 4 pages (size A5). During the first meeting, Henna informed me that she had recently begun a gluten-free diet and was feeling much better. The diary entries reflect the impact this dietary change had on her.

The post-phase evaluation forms which Henna completed in December and January served as a summation of comments and observations she had made during the diary writing period.

When asked to comment on the music choices, Henna explained she had enjoyed them although they are different to what she would normally listen to. She found, on some occasions, that music with higher notes on woodwind instruments was less relaxing and, at times, irritating. The more 'traditional Western' music was perceived more relaxing; '*it felt like a warm, friendly surprise to hear those pieces in the midst of the other music and I enjoyed it better*.' Acapella music, sounds made by the human body, and music with nature sounds were also described as '*very peaceful and relaxing*.' She added that she found herself thinking that she should listen to more classical music as she tends to put too much emphasis on lyrics.

The setting of the experiment (dimmed lights, mattresses, blankets, cushions, and headphones) was rated as 4 out of 5 on a scale of importance in which 5 was *most important*. The vibroacoustic chair used at the beginning of the experiment was described as being '*so uncomfortable that it worked against the pain management*.' The lying position '*wasn't ideal*' due to the fact that the headphones meant she had to lie on her back. This contrasts the report she made in the diary in which she divulged that she could '*relax better*' and '*enjoyed it*.'

The pain was reported to be worse in the evenings, but is highly dependent on the types of activities engaged in during that day.

5.2.1 Super-Ordinate Theme I: The Effect of Music Listening on the Participant

Realisation and Tracking of Current Pain and Health Situation

At the beginning of the experiment, Henna was '*vaguely optimistic*' about her pain management after two weeks of having altered her diet. After September 19, the participant reported taking very few analgesics. She commented that she would try to manage her pain with dietary restrictions alone. Six days after this, she wrote: '*Feeling positive about pain management through diet?!*'

A positive attitude, increased mobility and a decrease in pain were recorded on 4th October. Henna reported she was sleeping better, was still on the gluten-free diet and had less stress and pressure in her personal life. On the same day, the participant commented that the music listening had been very enjoyable and relaxing. She also did yoga and wrote '*Feel like running?!!*' Through writing the diary the participant was providing herself with a way of keeping track of her pain and therefore was beginning to understand any connections or factors influencing her discomfort.

The participant made note of a pain increase and mentioned also that she was ovulating, but still ingested no analgesics. Mid-October she again had quite a low pain-rating (1½) and wrote that her child was staying at her parents' house and was therefore enjoying better, more continuous sleep. She had also lost more weight – '*less weight on joints!*'

On October 17, Henna explained that she was certain that the gluten-free diet was the main factor in keeping the inflammation on her joints reduced: '*Also, feeling much less stressed and sleeping better.*' At this stage, Henna had made major progress with

her illness. '*Feel very happy for the first time for a long time; optimistic about life and pain management and living with the AS*.' Her optimism was obvious in this diary entry due to her having drawn a stick-figure as a representation of herself doing Astanga yoga and commenting on this drawing with: '*me getting my legs over my head without significant pain!*'

On October 19, the participant wrote again that she was '*feeling happy and much more relaxed!*' Again, two days later, she wrote an ebullient entry accompanying the lowest pain rating to date: '*Very mobile!!! Feeling absolutely elated and happy and so normal! Have been swivelling my hips all day with joy – I can move and enjoy life without constant nagging pain!*' She continued this thread by advocating the importance of sleep and by communicating her newfound positivity; '*Feels like an upward spiral; feel less stressed & happier → feel less pain → feel less pain → feel happier & happier!*' An increased amount of sleep had had a major difference on her pain. In addition to this, Henna had enjoyed the music listening session: '*very enjoyable, very relaxing!*' She expressed her feelings of guilt for neglecting the diary writing.

Only the next day, her pain had increased to a score of 3 and this was accompanied by fatigue and feeling moody. The participant explained that she had only had three hours of sleep that night, had accidentally eaten some wheat, and was deliberating whether the cause of her pain increase was due to sleep deprivation or the ingestion of wheat.

An observation she includes is the relationship between her emotional state and her level of pain. The pain leads to frustration, irritability and anxiety. Yet, when she is feeling anxious, the pain is higher. Henna explains that the experiment has shown her that relaxation is also a possible tool for pain management; '*a tool that I must pay more attention to*.'

Through the diary writing and tracking her pain, Henna noticed that her inflammation is more intense during ovulation. She began taking the contraceptive pill and this factor was eliminated.

The changes in pain during the experimentation period were attributed to the consumption of gluten. Henna's routine was also different during this period as she had spent two weeks abroad with different food and sleeping arrangements. She was also not working for one month and as a result was not sitting down for long periods. She also noticed that fluctuating weather affects her pain quite intensely, however is not aggravating. Again, the importance of a gluten-free diet is reiterated as being the most important factor in controlling inflammation of her joints. Seeing her own comments written down may have been an important way for Henna to fully comprehend the illness she is suffering from and its influence on her life.

Being Afforded Permission to Relax

On November 1 Henna's pain was slightly lower than the previous entry. She noted that she was feeling positive, despite it having been a tightly scheduled week. It had '*been a very busy and hectic week with very little sleep*.' In addition, Henna commented that she found the music to be more relaxing and enjoyable as it was being repeated and becoming more familiar. At this point, she also wrote that the music listening had been '*very beneficial simply from relaxation point of view'*. Being '"*forced*"' to slow down and take time for herself without feeling the pressure of having to do something meant she was able to really relax. This in turn caused stress levels to be reduced. Also, the aspect of the experiment being an act to help someone else meant that it was not a case of her being '"*selfish*"' or '"*lazy*"'. Interestingly, she wrote: '*I didn't realise I've become such a martyr!*' Henna continued by explaining that after the sessions, she literally could not see clearly but felt '*calm and relaxed*.'

The most beneficial aspect of the music listening sessions is described as being the '*permission*' to relax '*and take my own time in my very busy life*'. Henna explained that she did not feel able to take a whole hour for herself and that the experiment showed her that she could and should take it. During the 19 weeks in which the experiment took place, there were many changes in her personal life. Due to sleep deprivation over a period of three years, she outlined that it is difficult to explicate what the sessions have actually provided for her. From an outside perspective, having a place to relax while experimenting with her diet may have led to her ability to manage her inflammation. Her dietary alterations have been a radical change in her life; being able to find a place where solitude is possible amidst so many changes can be important.

Awareness of Being Physically and Emotionally Stretched

On November 11 Henna recorded a pain rating of 3½ as well as the fact that she missed the music listening session. She had completely forgotten as the day had been hectic. She wrote: '*I just hope everything would stop for just a week?! In need of a holiday?!*'

At the mid-way point of the music-listening phase, Henna wrote quite a long entry explaining that she had been extremely busy. Her husband had been away so she had had to contend with looking after her daughter, house-hold duties, the '*bed time resistance*' of her daughter and a hectic work schedule. She added that before the session she was exhausted and had a lower belly ache as a result of her menstrual cycle. Henna marked the pre-session VAS scale as 4 and the post-evaluation was marked as 3. She noted that it was only after she had cycled to collect her daughter that she noticed the absence of the belly ache. She therefore expressed her wish to change the post-session rating to 2. She extended this entry by writing that she had fallen asleep in the last few minutes of the session, which she described as '*very*

welcome', yet after the cycle home and her daughter's temper tantrum, she was exhausted.

The participant missed the following two sessions because she and her daughter were ill and her husband was away. She had been off work and had not slept well. She wrote that it was the first time since the summer that her stiffness had caused her trouble getting up of the sofa. She added '*At least I know why: been far too stretched physically and emotionally for a few weeks. The cold also always makes joints worse*.' At this point, she took 1000mg of analgesics two nights in a row.

Henna came to realise how exhausted and '*close to a burn-out*' she was. She added that she would not have agreed to partake in the experiment had she known this beforehand. She nevertheless described the experience as beneficial: '*However, I have personally gained a great deal from the experiment. I thoroughly enjoyed the sessions and they gave me a moment of relaxation during the time I was too blind to take the time for myself on my own. Thank you for the experience!*'

Choosing not to, or rather allowing herself not to, write the diary was described as a release. Her normal routines were unavoidable, yet writing the diary was one factor in her life which she chose not to let exacerbate her stress. Becoming aware of and defining her boundaries seems to have been important for Henna at that time.

Awareness of Different Types of Pain

The experiment had afforded Henna the chance to listen to her own body. She described the experiment itself as an '*opportunity to listen to myself and recognise the types of pain I experience more acutely'*. Becoming aware of the fact that there are different types of pain which she was experiencing is an invaluable discovery. In addition, getting to know one's physical limits and triggers of discomfort is vital when striving for better health.

5.2.2 Super-Ordinate Theme II: Factors which Influenced Henna's Pain

Sleep Deprivation

Sleep deprivation and insomnia have had a huge effect on Henna's general well-being. In her final diary entry dated January 24, 2014, she named the most crippling factor in her life as sleep deprivation. She described the lack of sleep as '*unbearable*' and that it directly correlated with the stress hormones which affect the inflammation of her joints.

The participant mentioned on many occasions the fact that she was not getting enough sleep at night. In a diary entry dated September 25, she wrote: '*Stress, lack of sleep (3 wakes last night)*'; this was written under the title of *Aggravated/Alleviated*. The participant also noted that spending a long time sitting down, i.e. in a car for an extended period, exacerbated her discomfort.

She showed signs of frustration when she wrote: '*Very. Little. Sleep*.' The next day, November 25, she explained that she had been looking forward to the music listening session and found it very relaxing. She claimed she had been neglecting herself; '*no sessions, no yoga, too much sugar*.' Looking forward to the music listening session is positive. It shows that the participant was enjoying the time for herself and was feeling the negative effects of not attending sessions, nor doing yoga, and eating too much sugar. A break in routine can be a powerful way to become aware of how important certain acts are for one's health.

As evidence of the importance of sleep for the participant and its correlation with pain levels, October 21, she marked her pain as ½, writing: '*Feeling absolutely elated and happy and so normal! [...] I can move and enjoy life without constant nagging pain!*'; *'If only people appreciated the importance of sleep !!! 3 → 5-6h per night → what a difference !!!*' The next day, after only 3 hours sleep, her pain was 3 and she wrote: '*feel extremely tired and moody*.' She got very little sleep during the wash-out period (i.e.

during the Christmas holidays) yet was able to sleep for longer in the mornings. Due to the quality of sleep deteriorating in the period before the Christmas holidays, the participant finally needed to take four different types of medication to get any sleep. This level of exhaustion led to her having to take sick leave from work. The pain remained at a constant 2 during this time, except for two occasions when it rose to 4 – 5 and was equated with eating gluten.

Hectic home and work schedules

During the first phase of the experiment Henna was under an immense amount of pressure, both at work and at home. '*Been MAD busy with a schedule of a mad woman*'. This entry was recorded after the mid-way session. She marked 4 pre-session and 3 post-session, however after leaving the room and being more mobile, she realised that her pain was actually 2.

Describing her life as a '*rollercoaster*', in the final evaluation form she could not express for certain if the experiment had brought about any changes to her pain. Many elements such as diet, sleep and '*a whole host of other factors*' were attributed to the inflammation and general quality of life. The gluten-free diet is labelled as having the greatest influence on her pain, as well as the amount of sleep and stress. She expressed her remorse for not writing the diary and explained that life had '*been too busy and I've simply forgotten'*.

Stress Factors

The first session was described as being '*exciting*', as the music played was different from her usual experiences and it '*took me for a journey through Asia; a journey that felt very real!*' Henna explained that the following sessions failed to take her on a journey but was also '*quite stressed'* at the time and found it more difficult to relax and '*be swept away by the music'*.

November 3 yielded an increase in pain and Henna feeling down. '*Feeling a bit low, as I've been so well...*' She continued by explaining that she had had a stressful weekend and was feeling worried and tense which in turn affected her muscles and aggravated the inflammation. She wrote that emotional difficulties and stresses have had a negative effect on her: '*An emotionally hard weekend has made its mark on me*.'

A week later, her pain level was at 4. Again, Henna disclosed feeling '*deflated and sad*.' She refused to take analgesics until she could not bear the pain, realising that the inflammation would not be helped by taking painkillers: '*I'd rather save myself from the side-effects of them (high blood pressure, stomach issues).*' Again, she had had a stressful weekend and suffered from sleep deprivation, as well as having sat in a car for four hours.

Henna wrote two pain ratings on November 23. At 20:00, the pain was 2 and she noted feeling quite surprised that her pain was so low because the cold weather was still on-going. However, she justified it by explaining that she had gotten more sleep the night before. Three hours later however, her pain had increased to 4 and she took 1000mg of paracetamol.

The diary-writing was described as a stress factor in her life, as it was an extra element on her already extensive to-do list. Henna suggested that music listening sessions may be better suited for someone living alone or more beneficial for someone with a less hectic schedule. For her, however, *'it really is just an extra task in my already full life'*.

5.2.3 Super-Ordinate Theme III: Pain Management and Change

During the experimentation period Henna underwent many changes. She had been exploring methods of pain management and one important discovery which emerged was the need for the elimination of gluten from her diet. Upon reading

about a diet targeted for Ankylosing Spondylitis sufferers, as well as reports from friends, acquaintances, and through social media, she was spurred on to try it out. She began a low-starch diet in August, 2013 and from October onwards had been on a completely gluten-free diet. One reason for beginning the gluten-free diet was to try the London AS diet to manage her inflammation, the other to lose weight. Henna wrote that this method of controlling pain and inflammation is ignored by medical practitioners but she had heard many positive reports: '[...] *so far I am very pleased with the results!*'

Henna described the negative effects the pain had on her life. She was suffering from constant pain in July 2013 and enduring levels of 6 – 8. It '*affected sleep, affected mood, affected my work & relationships and also, due to the fact that all exercise made it worse, I was very passive*.' After gaining a considerable amount of weight, having constant pain, and being sleep deprived, that period of her life was extremely difficult. She divulges that after only 3 months she began to feel like her old self again '*due to many factors in my life improving*.'

The lack of sleep she had experienced was described as out of her control, in contrast to her gluten-free diet. Henna wrote that when she eats well, she is able to manage the inflammation and this, she posited, in addition to better sleep and stress management, could lead her to eventually being pain free.

Henna made note of a discovery she made during the wash-out period; her hips become aggravated whilst walking, even when they had not been painful prior to exercise. However, when the participant swivelled her hips in a more exaggerated manner, she could walk for longer distances with a lot less pain.

During the experimentation period, although the drastic pain and inflammation decrease had more to do with reduced stress and a no-gluten diet, the participant learned to take a more pro-active role in her own well-being. Henna described her

attitude during the months preceding the experiment as '*passive'*. A change from being disinterested in taking care of oneself to actively trying to improve one's quality of life is a significant step towards overcoming one's illness and the cultivation of a positive perception thereof.

6 DISCUSSION

6.1 Methodology

Designing, conducting and analysing the data from a case study seemed to be a monumental task, yet one I was excited to be embarking upon. Understanding how one endures, comprehends, or manages their own pain is fascinating and even more so if their journey is also just beginning. A diary written by the participant seemed like the most valuable and insightful method of data collection for the kind of story I wished to tell. Although the participant herself did not feel the experiment gave her anything substantial in terms of pain relief, the thought processes and developments in her life during the recorded time-frame are a fascinating story of power struggles, empowerment and discovery. After having read the diary, I realised how rich the data was in comparison to simply having recorded verbal interactions or having been presented with a short evaluation form at the end of the process. I value the participant's the candidness of as well as the opportunity I have had to learn how to plan and conduct a study from beginning to end. I thoroughly enjoyed all elements of the case study's stages of fruition and have relished the chance to learn how to analyse data, even on a small scale.

6.2 Results

The aim of this study was to assess how music can be used as an intervention for the relief of chronic pain and observe the effects of the music post-exposure. However, the results yielded were far richer. This study shows the extent of damage that stress and sleep deprivation can have on the body. Despite the quite inconclusive results in relation to music having a direct influence on Henna's level of pain, the experience

was nonetheless invaluable. Taking time out and seeing that this is, in fact, essential for one's well-being, is as significant discovery.

The results of the VAS pain scales were not significant; i.e. there was relatively no difference between the first reading and the last. Also, the initial reading was extremely low and is most likely due to the fact that Henna had begun a gluten-free diet shortly beforehand. However, according to the diary entries, there was a lot more upheaval and change in her life than a simple pain scale could evaluate or present. In this study, the importance of richer data collection is evident; it would have been impossible to see the changes Henna went through had she not recorded them in her diary.

More essential than Henna's need for reduced pain levels was the necessity to give precedence to herself and her own health. Realising that she was physically and emotionally nearing burn-out was a crucial element in her journey to well-being. From her perspective, the experiment served as a means through which she could take time for herself, listen to her body and learn to recognise the various types of pain she experiences. Revelations such as the importance of eating healthily was one which became apparent during the experiment. Henna recognised that the most beneficial aspect the music listening sessions was that another person had afforded her the opportunity to take time for herself. '*The best benefit of the sessions for me was the 'permission' to relax and take my own time in my very busy life. I do not normally get (or feel I can take) a whole hour during a week just for my own relaxation and well-being*.'

Generally, the participant has understood the most debilitating element of her life to be sleep deprivation. Factors influencing this have been both insomnia, for which she takes medication, and her young child, who wakes up several times per night. The lack of sleep is described as '*unbearable*' and had a direct effect on her stress hormones, which then affected the severity of the inflammation in her joints.

She described her diet as something '*in my control'*. Managing the inflammation, or the feeling of power in being able to control this aspect of her illness, seems to have been vital. The empowerment aspect of healthcare, as was discussed in chapter two, seems to have influenced the way the participant deals with her pain. In instances where Henna was feeling positive about controlling her pain with her diet, it was minimal. However, when she was feeling low and life was too hectic and out of her control, her pain increased. This, although not directly connected to music listening as an intervention, did affect the experiment. It can be seen overall as another method of empowerment. Taking control of one's illness and trying various avenues in pain management, such as Audioanalgesia, can be viewed as an empowerment tool. Therefore, instead of the music listening having a direct influence on the level of pain by entraining the listener, the act of taking part would afford the participant the feeling of control, feeling less stress and leading to a more positive outlook. This, as has been explained before, directly affects her level of inflammation.

In regards to another element Henna is attempting to control, insomnia is often that which can be aided by the use of medication. However, her daughter waking her up several times per night is a hindrance and unavoidable at the present moment. This seems to have been a source of frustration for Henna.

The participant also acknowledged the importance of her emotional state in connection with her level of pain. '*The pain causes frustration and I feel irritable and anxious. Then again, when I am feeling anxious, the pains seem [...] stronger'*. The realisation of the connection between one's physiological, psychological and emotional states is critical. Henna understood that relaxation, i.e. reducing her anxiety, could be a tool for pain management and admitted that it was a method she ought to pay more attention to.

Another important discovery Henna made about her pain was the fact that walking small distances, even when her pain was initially minimal, caused discomfort. Yet, if

she over-extended her hips whilst walking, swivelling them in an exaggerated manner, she could manage to walk longer distances with much less pain. Finding ways in which one can cope with their daily stresses as well as their illness can be a means of creating a positive-reinforcement loop. Changing how one approaches pain psychologically creates more positivity and optimism about the future.

During the time Henna wrote the diary, the lasting effects seem to have been: a growth in the amount of time the participant takes for herself; an improvement in her understanding of her illness; and a realisation of her limits. These should be considered an invaluable addition to the participant's life.

6.3 Reliability and Validity

The plan for this study was to research the effects a music listening intervention would have for a participant suffering from chronic pain. Certain issues arose during phase one which could contest the overall validity of the study such as the participant being ill and missing some sessions. During the second session there were technical issues which resulted in the session being cut short. Later, it transpired that the Vibroacoustic chair in which the participant was sitting was causing pain. To alleviate this issue, some mats, blankets and cushions were placed on the floor. To eradicate the technical problems with the audio equipment, the music was played through my laptop. In order to do this, new headphones had to be used. Of course, some of these issues are unavoidable in research settings. Nevertheless, changes are considered variables and could affect the validity and reliability of the study as a whole.

In regards to the data collection, the participant did not write as often as had been suggested, however her honesty in taking a step back with that particular 'duty' makes the diary conceivably more accurate. In terms of influences on her pain, stress seems to have been a major factor. Deciding not to write it can be seen as a result of

her becoming more assertive in setting boundaries. Choosing not to write the diary was possibly one of the first steps towards actively trying to alleviate the stress in her life. In this way, the reduced amount of data is reliable and valid because it is a true representation of how the participant chose to protect her best interests during the months of September 2013 to January 2014.

One major influence on the study itself was Henna's dietary changes shortly before the start of the experiment. Even in a short time, she reported feeling much better and attributed this wave of better health to the exclusion of gluten. It is unfortunate that this began at approximately the same time as the beginning of the music-listening experiment; it was difficult to isolate the influence the experiment had on her condition when there was already a major change underway in her life.

Specifically in connection with reliability and reproducibility, due to the extremely individualised case which has been presented here, the exact results cannot be replicated, although the method of execution would be simple to repeat.

6.4 Ethical considerations

The study was planned months in advance of execution and discussed in a class presentation format as well as individually with my supervisor. The main objective was to have a participant who was suffering from chronic pain. Due to the fact that only very basic contact would be had between experimenter and participant, the issue of ethical considerations was minimal. The only concern in the preparation stages was that any friendly, informal conversation should be considered another factor in the study.

The plan of the experiment was explained the participant per email during summer 2013. Again, during the first meeting, the procedure was discussed. At this time, the participant signed a consent form (Appendix B) agreeing to take part in the experiment. It also highlighted that any and all data collected during this time

would be included in my Master's thesis, and her identity would be kept confidential.

During the first phase there was some casual conversation between the participant and me. Generally it was small talk but some valuable information also arose during these communications. When the diary was returned to me, I was finally able to get a more well-rounded impression of her. Had I not met Henna in person, it would have been difficult to try and understand the context. The opposite would also be true. If she had not written the diary and I had been using only our personal communications and the VAS pain scales, I would not have been able to understand how her pain works, how she deals with it, nor if the interventions had affected her condition.

6.5 Propositions for future studies

Future studies should focus on a more intensified music-listening intervention. Familiarity in the music seems to have been quite important in this case and helped the participant to relax more. Longer interventions, i.e. 45 – 60 minutes per session, could allow the recipient to become more easily entrained which could result in a more relaxed state and the focus being taken away from the pain itself.

Previous research (Hekmat & Hertel, 1993; Chi & Young, 2011) has indeed shown that in the issue of choosing music, the main factor is that it is chosen based on research. However, if the participant has very particular musical interests, the music choices may be more significant than is believed to date.

It may also be interesting for future studies to experiment with a larger population. In this instance, the results were extremely individual and the hectic lifestyle of the participant played a huge role. It may be possible to find out whether others with a similarly busy work- and home-life would react to the experiment in a similar fashion.

7 CONCLUSION

7.1 Findings

Although Henna felt guilty for not fully committing to the experiment, the results showed that she somehow benefited from the experience. Understanding that a chronic illness has many adverse effects on one's mental health, it has been interesting to see the process of dealing with a recent diagnosis. Juggling responsibilities and making new discoveries about her illness, as well as discovering coping strategies, have been important steps during this process.

One aim of this study was to further understand the impact entrainment could have on the participant under the experimental conditions and whether this would affect her level of pain. As was discussed in chapter two, entrainment has been previously used as a means of pain relief, or indeed, anaesthesia. With this in mind, any opportunity to become engrossed in the music would have been an interesting encounter for the participant. In the first evaluation form, Henna described her experiences in the first few sessions. It was described as '*exciting*' and that the music, due to its exotic nature, took her on a '*journey through Asia; a journey that felt very real!*' She experienced unduly amounts of stress during the experimental period, which influenced the way in which she was able to mentally prepare herself for the music-listening. Initially, the excitement of taking part in something new, i.e. the experiment, and pro-actively working to improve her quality of life, could have aided Henna in being able to become more easily entrained during session one.

Generally, the effects of relaxation are described as being changes in physical states such as slower heart beat, lower blood pressure, or better concentration. Indeed, Henna reported on the most part that she felt very relaxed post-session. In her case, the fact that she experienced blurred vision and a '*fuzzy feeling*' would suggest that

this was the physical manifestation of her relaxed state. She may have been unable to reach the feeling of being transported on a journey after the first session because of her hectic schedule and the sessions being too short.

Music listening as an intervention to be utilised in a medical setting was not the primary concern of this study. Nevertheless, the implications this study has for implementation in conjunction with pharmacological methods are relevant. Henna agreed that music listening was relaxing for her, even though the music may not always have been to her taste. Despite the fact that she was almost at burn-out stage and was suffering greatly from insomnia and high stress levels, Henna was grateful for having the opportunity to relax for one hour per week. Music has been shown to reduce anxiety levels in stressful situations e.g. in a hospital (as explained in chapter 2). The importance of good sleep and time off were discovered by Henna during the experimentation period and the realisation of this was important. If relaxation through music listening is a way to reduce the physical attributes of stress it should be used universally in addition to other methods of pain relief.

Henna had altered her diet to exclude gluten shortly before beginning the experiment. Due to the positive effects being pro-active with one's health can have, she became healthier and happier. She experienced a change in her mentality during the process; from feeling low and passive in terms of taking care of herself to being elated with her progress and increased mobility. Her shift in perspective afforded Henna a more optimistic outlook towards living with Ankylosing Spondylitis.

The effect of the type of music that was used in the experiment was also evident in the diary entries. Although the genre was exciting and surprising during the initial sessions, it was reported that a state of relaxation was more easily reached as the music was repeated and became more familiar. Previous research (chapter two) about the effectiveness of preferred over experimenter-chosen music has been somewhat unclear. However, these results show that using participant-chosen music

(or at least a genre with which the participant would be more familiar) could be more beneficial as a means of relaxation.

Another issue which was found in previous research of music and pain was the fact that the lasting effects of such an intervention have been inconclusive. The participant did not write in the diary during the washout period (except for the last day), so it is difficult to speculate whether the absence of the music session had a lasting effect on her pain, or perhaps more relevant, her stress levels. She attributed the increased pain levels during this time to gluten. This was a gradual variable parallel to the experiment, i.e. she was only gradually excluding it from her diet as the experimentation process began. She gave a low final pain rating meaning that the effects of the music listening could appear to be positive and long-lasting. However, due to the many other factors at play (i.e. dietary changes, reduced stress levels from being on sick leave, and better sleep due to medication), the influence the music listening had on her pain is impossible to account for.

7.2 Important developments

The most important developments for Henna during this time were that she was pro-active in improving her quality of life and grew to understand her illness. Improvement of mental health and attitude towards illness can be extremely beneficial in heightening coping skills and this, in addition to music relaxation, can help to create a more emotionally stable, healthy individual. Henna got to know her limits and came to understand that pushing herself physically and emotionally can lead to burn-out. Getting to know one's own boundaries is an important element in well-being. Relaxation, although not conclusively directly related to pain relief, allows one to take the time to listen to one's own body, recognise how it functions, and discern the helpful from the unhelpful tools.

Due to the level of stress Henna was under, it would have been intriguing to observe the effects of a longer session on her ability to fully relax or become entrained on a steady basis.

7.3 Advancement of the field

The results from this study, as previously mentioned, uphold the findings of previous research in terms of music inducing a state of relaxation. However these results were unable to advance the knowledge in the field due to the amount of extraneous factors influencing the study. In addition, a longer intervention would perhaps be more beneficial. 15 – 30 more minutes per session may allow for a deeper level of relaxation and therefore to have a more direct influence on the pain level. It is clear from the mid-session point at which a VAS scale was recorded pre- and post-session that the relaxation intervention had a positive immediate effect on the pain. Therefore, finding a way of implementing a music listening exercise either on a daily basis or more frequently than biweekly, may lead to more visible long-lasting results.

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APPENDICES

Appendix A

Pilot Study

Thank you for agreeing to participate in this pilot study! It should take approximately 40 minutes to complete and any feedback you can give will be gladly taken into consideration. For better results, please listen to the following clips whilst wearing headphones/earphones.

Please listen to the following 30 second clips and rate on a scale from 1-5 in terms of a) how relaxed you felt whilst listening to the clip and b) positive or negative valence. Positive valence encapsulates emotions such as "joy", whilst negative valence denotes emotions such as "anger" and "fear". The criteria will be rated independently of each other.

The scale: 1 is "I did not feel the music relaxed me at all" and b) "negative emotional valence"; 5 "I felt this music relaxed me very much" and b) "positive emotional valence".

Gender: _____

Age: _____

Occupation: _____

Level of musical training:

Music listener; no formal instrumental training:_____

Amateur: _____

Semi-Professional:_____

Professional:_____

Are you wearing earphones/headphones? _____

Rate each clip individually on a scale of 1-5:

Clip 1:

Not relaxed at all	1	2	3	4	5	Very relaxed
Negative valence	1	2	3	4	5	Positive valence

Please feel free to add any feedback or comments.

Again, thank you for your participation!

[The same format of two scales (1-5) for relaxation and valence were used for all clips piloted].

Appendix B

Consent Form

September, 2013

I, ... (Participant's name)....., agree to take part in this experiment during the time period September 2013 to December 2013 at the University of Jyväskylä, Finland. I understand that my information will be kept private and confidential but that the data (including testimonials before, during, or after the experiment, the written diary and the VAS pain scale measurements) collected from this experiment will be included in the Master's Thesis of Elsa Campbell.

.....	.....	.....
(Participant's Signature)	(Participant's Name in Block Capitals)	(Date)
.....	.....	.....
(Experimenter's Signature)	(Experimenter's Name in Block Capitals)	
(Date)		

Appendix C

Participant Information

Name:

Age:

Occupation:

Diagnosis:

Date of diagnosis:

Medications taken:

Location of pain:

Frequency of pain (daily/weekly/monthly):

Does your pain inhibit your daily life? If so, how?

Previous methods used to relieve pain:

Genre(s)/type(s) of music you listen to:

Note: This information is considered part of the data collection process for the Master's thesis of Elsa Campbell. When included in the paper, your name will be changed for privacy purposes.

Appendix D

Guidelines for Diary Writing

1. Choose a time of day which is most convenient for you and write the diary always at this time so it is easy to remember. If you cannot write every day, try to write as often as possible. Entries do not have to be long!
2. Write the **date and time** at the beginning of each diary entry.
3. Keep track of the pain level and location. If it is convenient, use a scale of 0-10 (10 being *most painful*) to keep track of levels. Add how you feel **emotionally** when you do this.
4. Mention if you have taken **analgesics** (painkillers).
5. Mention is anything you did that day **relieved or aggravated** your pain.
6. Describe your **feelings/emotions/sensations/level of pain** as soon as possible after the actual music listening.
7. Write any other information which you feel is relevant.

Appendix E

Visual Analogue Scale

Please indicate, with the use of a vertical line, the intensity of your pain at this moment.

No Pain|_____|Very Severe Pain

Time and Date:

Signature:

Appendix F

Evaluation Form - Phase One

Evaluation of the experimentation period September →December

The music listening portion of the experiment has taken place from 16.09.2013 to 16.12.2013. There have been 19 sessions in total consisting of 30 minutes of pre-selected music accompanied by a diary written by the participant as supplementary data collection to verbal communications with the experimenter.

Please write about how you have **found the process** under the following **headings**:

- What preconceptions did you have about the experiment?
- What were your impressions after the first few sessions?
- Please comment on the music choices. Have you enjoyed the genres? Did you find the music was conducive to relaxation in comparison the music you normally listen to? Add something else if it is appropriate.
- Have you noticed any changes overall since the music listening portion of the experiment began?
- In your opinion, during the process, what have the greatest influences on your pain been during this time?
- On a scale of 1-5 (5 being very important, 1 being not important at all), how important was the setting of the experiment?
- Is the time of day a factor that you take into consideration with your pain, i.e. is it worst in the morning or evening? If there is a difference, have you noticed a difference in the evenings post-experiment?
- Additional information that you would like to add can be written here:

Appendix G

Evaluation Form – Phase Two

Evaluation of the experimentation period December → January

The non-music listening portion of the experiment has taken place from 16.12.2013 – 16.01.2014. During this time, there has been no communication between participant and experimenter.

Please write about this period under the following headings:

- Have you noticed any changes in your pain during the wash-out period (Dec-Jan) since the discontinuation of music listening?
- Would you say that your routine has changed a lot than the previous few months, i.e. were you walking/sitting more, were there any changes in your diet? Did the weather have an impact on your pain?
- Did your sleeping rhythm/routine change during this time? Would you say the quality improved or got worse?
- During this time when you were not at work, did you find the act of keeping a diary useful or more of a hindrance?
- Do you normally try to keep track of the pain intensity or do you avoid thinking about it too much?
- Please add any other relevant information.

Thanks again for your participation, it is greatly appreciated!