

# MUSIC THERAPY IN PARKINSON'S DISEASE

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Master's Thesis

Music Therapy

Faculty of Humanities

17 June 2014

University of Jyväskylä

# JYVÄSKYLÄN YLIOPISTO

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|---|---|
| Tiedekunta – Faculty<br>Humanities  | Laitos – Department<br>Music Department |
| Tekijä – Author<br>Irimi Ioannou  |   |
| Työn nimi – Title<br>Music Therapy in Parkinson’s Disease   |   |
| Oppiaine – Subject<br>Music Therapy   | Työn laji – Level<br>Master’s Thesis    |
| Aika – Month and year<br>JUNE 2014  | Sivumäärä – Number of pages<br>39       |
| Tiivistelmä – Abstract<br><p>Parkinson’s disease is an incurable disease where music therapy appears to be beneficial as a part of patients’ treatment. Mobility, as well as psychological and emotional changes, affects the quality of life of elderly people as a result to seek for effective treatment. There are two kinds of treatment, medical and non-medical treatment. Music therapy is one of the non-medical treatments, which is beneficial for the treatment of Parkinson’s disease.</p> <p>This study focus on a review of previous studies about music therapy in Parkinson’s disease. Different interventions have been used during the years as a part of patients’ treatment where in each case the results were different. The methods and music interventions which have been used are analyzed in this paper as well as the results of each of it. Additionally, a case study of author’s personal clinical experience is stated and described at the end of this work gives evidences about the beneficial effect of music therapy with a Parkinson’s disease client.</p> <p>Music therapy improves the quality of life of Parkinson’s patients as well as their emotional state. Music is used as a tool of calming the tremor and assists the ease of movement of the patients. Memories and important meaningful moments of their lives emerge with the use of music in the therapy setting. Moreover, music therapy can be a supportive tool in Parkinson’s disease treatment as it has been mentioned in researches.</p> |   |
| Asiasanat – Keywords<br>Parkinson’s disease, Music Therapy, elderly   |   |
| Säilytyspaikka – Depository   |   |
| Muita tietoja – Additional information  |   |

# CONTENTS

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>Introduction</b> .....   | <b>1</b>  |
| <b>2</b> | <b>The definition of Parkinson’s disease</b> .....  | <b>3</b>  |
| 2.1      | Symptoms .....  | 4         |
| 2.2      | Pharmacological and non-pharmacological treatment.....                                      | 7         |
| <b>3</b> | <b>Neurological Rehabilitation</b> .....  | <b>8</b>  |
| 3.1      | Art Therapies in Neurological rehabilitation .....  | 8         |
| <b>4</b> | <b>Clinical research and anecdotal reports in Music Therapy for Parkinson’s disease ...</b> | <b>10</b> |
| 4.1      | Rhythmical Auditory Stimulation (RAS) .....   | 11        |
| 4.2      | Active Music Therapy with Parkinson’s disease patients.....                                 | 17        |
| 4.3      | Music and Movement in Music Therapy .....   | 22        |
| 4.4      | Vibroacoustic Therapy.....  | 24        |
| <b>5</b> | <b>Case Study: Individual Music Therapy with a Parkinson’s disease patient</b> .....        | <b>27</b> |
| 5.1      | The client .....  | 27        |
| 5.2      | The music interventions .....   | 28        |
| 5.3      | The Therapeutic Process .....   | 31        |
| 5.4      | Outcomes of the therapy .....   | 31        |
| <b>6</b> | <b>Conclusion</b> .....   | <b>33</b> |
| <b>7</b> | <b>References</b> .....   | <b>34</b> |

## 1 Introduction

Parkinson's disease (PD) is a neurological movement disorder which caused by the low amount of dopamine which is produced in the brain which is responsible for movement. It appears in men and women in the age of 60 but people can be diagnosed with a Parkinson's disease from early age. At this time more than five million people worldwide are affected by Parkinson's disease which has no cure but several ways of treatment. The disorder is called Young-Onset Parkinson's disease (Young Onset Parkinson's section, n.d, para. 1) when people younger than 60 are diagnosed by Parkinson's disease. However, the cause of the disease is unknown as well as the reason of its development in some population. Genetics and environment could be some factors of Parkinson's disease cause (Kemp, Buxton, & Porter-Buxton, 2013).

“The symptoms of PD are mainly motor symptoms including tremor, bradykinesia (slowness of movement), rigidity, and postural instability” (Subramanian, 2009, p. 13). A detailed description of the symptoms will be found later on in this paper. Additionally, the diagnosis of the disease can cause lot of emotional changes to patients' lives and as the age of the most of the patients is old, it may lead them to isolation. Moreover, the bodily changes and impairments which normally appear in Parkinson's disease can affect not only the mobility but also the psychological stage of the patients.

“Rehabilitative therapies” (Montgomery Jr., 2004, p. S87) such as speech therapy, physical therapy, occupational therapy as well as complementary therapies such as music therapy, contribute to the Parkinson's disease treatment providing better quality of life to the patients. Physical therapy is an option for treatment as it had been observed in Pacchetti, Mangini, Algieri, Fundaro, Martignoni and Nappi (2000) research. Complimentary therapies are alternative therapies which can be effectively used alongside medicine in the treatment of Parkinson's disease. Music therapy is one of the complementary therapies which are beneficial for the treatment of PD. Researches had shown that music and music therapy can be effective for people with Parkinson's (Pacchetti et al., 2000; Haneishi, 2001; Aldridge, 2005; Sacks, 2007; Tomaino, 2008; Evans, Canavan, Foy, Langford & Proctor, 2012; Elefant et al., 2012).

This thesis will be focused on the description of each music intervention or technique which is used in the treatment of Parkinson's disease. However, limitations of the studies, as well as

future investigations will be suggested at the conclusion but also during the study. A collection and analysis of a number of current literature and researches can be found in this work which supports the fact that the use of music therapy in the treatment of Parkinson's disease is beneficial.

Moreover, during my clinical training in the University of Jyväskylä I have been giving music therapy to a male individual who was suffering by Parkinson' disease. He was in the age of 70 in a severe stage of the disease. The duration of the therapy was 10 sessions, one per week with duration of 45 minutes. The client had high level of music background and he was a pianist. Moreover, he was familiar with music therapy as he attended in some series of music therapy two years ago which were offered by the students of the University.

Although the amount of the meetings was limited, however, according to the patient, music therapy was beneficial for him and his disease as he gave a positive feedback at the end of the progress. Different music techniques have been used in this clinical practice and are based on previous researches about music therapy and Parkinson's disease. These techniques will be discussed and analyzed below.

The results are based on my point of view and also on my client's feedback during the sessions and at the end of our process. Additionally, the music interventions which have been used in each research and will be discussed later on in this paper, have been also applied in my practical clinical training and according to client's feedback they seemed to be beneficial for his disease.

## 2 The definition of Parkinson's disease

Parkinson's disease (PD) is classified in the Neurological disorders and it appears in women and men over the age of 60. "The average age of PD diagnosis is 62 and when an individual is diagnosed with PD before the age of 50, the disorder is called Young-Onset Parkinson's disease" (Young Onset Parkinson's section, n.d, para. 1). Moreover, PD is a neurodegenerative chronic disorder and it has a gradual development as the symptoms grow worse over time. According to Chen (2010), Parkinson's disease is the second most common neurodegenerative disorder after Alzheimer's disease with a prevalence of approximately 1% in people over 60 years of age in industrialized countries (p. S87). "The number of persons with Parkinson's disease worldwide is expected to double by 2030 due to the aging of the population" (Surguchov, 2013, p.116). As the disease has no cure, there are other treatments which can regulate the symptoms of the patients and provide them a better quality of life.

Jonathan Bruce Barber (2012) in his article *Music for Dementia and Parkinson's disease in the Elderly* gives a definition of PD as

[the] consequence of degeneration of the substantia nigra, a nucleus that supplies the neurotransmitter dopamine to the basal ganglia which have a major role in controlling body movements. The resultant imbalance between dopamine and another neurotransmitter, acetylcholine, impairs basal ganglia functions (p. 267-268).

The factors of causing this disease vary and it is still unclear why the disease develops in some population. "Some of the factors that cause Parkinson's disease could be the genetics and exposure to toxins in the environment, such as herbicides and pesticides, may also play a role in causing Parkinson's, but again the risk appears small" (Kemp, Buxton, & Porter-Buxton, 2013, What is Parkinson's disease section, para. 3). Although the symptoms of PD are well known, each person can develop some of them or in a different strength. As the disease develops gradually, patients can have variety of symptoms as there are primary and secondary symptoms (Kemp et al., 2013) which will be discussed below.

## 2.1 Symptoms

“The symptoms of PD are mainly motor symptoms including tremor, bradykinesia (slowness of movement), rigidity, and postural instability” (Subramanian, 2009, p. 13). The disease has non-motor symptoms which can be visible to the patients or their families. As Parkinson’s disease has gradual process, the early motor symptoms can begin on the one side of the patient and during time to be spread on the other side too. “Tremor is often the first symptom that people with Parkinson's disease or their family members notice” (WebMD, 2012, Parkinson’s Disease-Symptoms, Tremor section, para. 2). The parts of the body which can be affected by tremor are the hands, fingers, feet, mouth and forearms. There are two types of tremor, the “essential tremor” which is noticeable when the person is moving and the “resting tremor” which occurs when the body is relaxed (Tremor and Parkinson’s section, n.d. para. 6-7).

Bradykinesia is the second main symptom in people with Parkinson’s disease. The *American Heritage Stedman’s Medical Dictionary* (n.d) defines bradykinesia -brad·y·ki·ne·sia (brād'ē-kī-nē'zhə, -kī-) - as the extreme slowness in movement. Slowness of movement can affect people with Parkinson’s as they appear to have difficulties in the time of any kind of performance. The daily indoor or outdoor activities take more time than usually as well as walking. “A fundamental problem in parkinsonism is the inability to initiate movement spontaneously; parkinsonian patients are always getting “stuck” or “frozen”” (Sacks, 2007, p. 255). Kemp et al. (2013) also write in their article about the “freezing episodes” which may be caused once [the patient has] begun walking (Primary symptoms of Parkinson’s disease section, para. 3).

Furthermore, rigidity is another symptom of people with Parkinson’s disease which affect the muscles. Muscles become inflexible and stiff, and sometimes cause pain and cramps (Kemp et al., 2013). “The parts of the body which are usually affected are the arms but rigidity can also affect the muscles of the legs, face, neck, or other parts of the body” (WebMD, 2012, Parkinson’s disease- symptoms, Other common symptoms section, para. 1). Additionally, rigidity can cause a fixed, “mask-like” facial expression (Rigidity section, n.d., para. 4). The fourth common motor symptom in Parkinson’s disease is the loss of balance, which according to Kemp et al (2013) can often lead to falls, as well as poor coordination (Primary symptoms of Parkinson’s disease, para. 4). The reason of patient’s fallings is related to the two symptoms,

rigidity and freezing, but also to the medicine that Parkinson's people take, which may cause low blood pressure as a result dizziness and fallings ("Falls and dizziness", n.d.).

Being diagnosed with PD, patients have to face not only the bodily and motor impairments but also the emotional and psychological changes like depression and anxiety, which sometimes lead to strange changes in their behavior and isolation. Patients can also sometimes have hallucinations and delusions ("Mental health and Parkinson's", n.d.). People with Parkinson's can experience anxiety because of worry about living with the condition or because of possible changes in brain chemicals (Anxiety section, n.d. para. 1). They can be affected by anxiety and being in tension all the time causing fast beatings to their heart, sweating but also being in a constant fear keeping them away from their normal daily life ("Anxiety", n.d.). Each person can experiences anxiety in a different way but for better quality of life patients or family members should recognize it and ask for help. Drugs are playing an important role in the anxiety of Parkinson's people because "some people with Parkinson's have anxiety when they are "off"" (Anxiety and Parkinson's drugs section, n.d., para. 1).

Another symptom in the mental health of Parkinson's people which may experience during their disease is depression. Depression is defined as "a psychotic or neurotic condition characterized by an inability to concentrate, insomnia, and feelings of extreme sadness, dejection, and hopelessness" ("depression", n.d.). Nevertheless, some of the symptoms of depression are common with the symptoms of Parkinson's disease "such as feeling tired, lacking in energy and sleep and night-time problems (Depression and Parkinson's section, n.d., para. 3). The possibilities of a person with PD to suffer from depression rise when for an individual the diagnosis of an illness or disease can cause lot of questions, stress, feelings of sadness, thoughts of death as a result to lead to the social isolation. Hallucinations and delusions in Parkinson's disease are common especially in people who have had Parkinson's for a long time and the symptoms may be caused partly by Parkinson's and partly by some Parkinson's medication (Hallucinations and delusions section, n.d., para. 2-3).

Furthermore, a minority of those with Parkinson's will eventually experience dementia as their disease progresses, including loss of memory and other cognitive functions (Kemp et al., 2013, What is Parkinson's disease section, para. 1). When a Parkinson's patient experiences dementia he/she might have problems of concentration or usually is confused as it is difficult to

remember things like for example everyday tasks. Though, it's rare that someone under the age of 65 will develop dementia (Dementia and Parkinson's section, n.d.). Furthermore, some other secondary symptoms which can appear according to Kemp et al (2013) are that speech may become slow, whispery or slurred, handwriting may become small, cramped, sleep problems, including waking up frequently during the night or suddenly falling asleep during the day, excessive sweating, sexual dysfunction, aches and pains, trouble chewing or swallowing, risk of choking (Secondary symptoms of Parkinson's disease section, para. 2).

Parkinson's disease like all the diseases has stages which begin from the time of diagnosis and it is growing until an advanced level. One commonly used scale neurologists use for describing how the symptoms of PD have progressed in a patient is the Hoehn and Yahr scale (NIDS, 2013, What is the prognosis section, para. 2). The Hoehn and Yahr scale presents five different stages of Parkinson's disease. The first stage of the disease is when the patients have mild symptoms and the disease affects only one side of their body (Holland, n.d.). The very first symptoms of the disease such as loss of balance or tremor can be noticed by the family or friend environment of the patients easily and they appear only on the one side of the body (NIDS, 2013). In the second stage of Parkinson's disease, the patient's symptoms are bilateral, affecting both limbs and both sides of the body (WebMD, 2012, The stages of Parkinson's disease section, para. 4). In that point it is possible that the patients start taking medicine such as dopamine agonists which according to Holland (n.d.), make the neurotransmitters move more easily (Stage two section, para. 2).

However, when the symptoms become worse, patients move to the third stage of the disease where the difficulties of walking or possibilities of falling increase. This stage is considered moderate Parkinson's disease but [the patients] can still function without assistance (Holland, n.d., The stages of Parkinson's section, Stage Three, para. 1). In the stage four usually patients need assistance to do physical movements like walking or standing and the "stage four Parkinson's disease is often called Advanced Parkinson's disease" (Holland, n.d., The stages of Parkinson's section, Stage Four, para. 1). Finally the most severe stage of the disease is stage five when patients need assistance and usually they are living with a caregiver or a nurse as they are unable to live alone (Holland, n.d.).

## 2.2 Pharmacological and non-pharmacological treatment

Although the disease is chronic and severe, there is still no cure but only pharmacological and non-pharmacological treatments. Medication is an important part of Parkinson's patients' life as it is one way to control their symptoms. "Dopamine agonists" and "Levodopa" (Isaacson, 2010, pp. 65-66) are some of the main drugs which are applied in the treatment of Parkinson's disease. However, Isaacson (2010) gives an alternative treatment by stating that non-pharmacological therapies are important to incorporate early in the treatment plan. Daily exercise may help optimize mobility, flexibility and stability. Good nutrition and stress management will augment coping strategies needed to help deal with having a chronic progressive neurological disorder (pp. 67-68). Occupational therapy, Speech and language therapy and physiotherapy are according to Erwin B. Montgomery Jr., "rehabilitative therapies" (p.S44) can be helpful for Parkinson's rehabilitation providing a better quality of life. A part of the disease's treatment which it is used alongside conventional medicine ("Complementary therapies", n.d.) is the complementary therapies. A list of 21 complimentary therapies for Parkinson's disease is provided in the booklet of Parkinson's disease society of UK where the benefits and drawbacks are listed as well (Parkinson's Society of United Kingdom, 2009).

Music therapy is one of the complementary therapies which are beneficial for the treatment of PD. It is proven that it can be effective for people with Parkinson's. According to Carolyn Dobson (n.d) research in both music therapy and in neuroscience has shown that music can affect function in profound ways (Neurologic music therapy Group Helps People with Parkinson's Disease, para. 1). Music is being used in physical medicine and rehabilitation setting as well as assisting other rehabilitation therapies like occupational therapy or physical therapy. Moreover, music therapy and rehabilitation medicine are starting to find a common niche in working together with clients who have various neurological, orthopaedic and paediatric conditions (Paul & Ramsey, 2000, p. 111). In the following pages, the use of music and music therapy in the environment of rehabilitation and especially in the neurological rehabilitation will be discussed and analyzed.

### 3 Neurological Rehabilitation

Neurological disorders are caused because of the nervous system dysfunctions where the brain, spinal cord and nerves are situated. When something affects the nervous system or a part of it, you can have trouble moving, speaking, swallowing, breathing, or learning [but] you can also have problems with your memory, senses, or mood (Neurologic diseases, n.d.). However, there are numerous neurological diseases which are not so familiar. According to World Health Organization (WHO) (2014), these disorders include epilepsy, Alzheimer disease and other dementias, cerebrovascular diseases including stroke, migraine and other headache disorders, multiple sclerosis, Parkinson's disease, neuroinfections, brain tumors, traumatic disorders of the nervous system such as brain trauma, and neurological disorders as a result of malnutrition.

The time which a person needs to recover after a nervous system injury or illness and surgery is long and needs patient and assistance. Usually patients need help from specialists to regain their strength and their skills to be able to perform as they were performing before. This process is rehabilitation (Rehabilitation, n.d.). There is a variety of definitions for the rehabilitation. According to Aldridge (2005), the center of the word constellation rehabilitation is from the Latin *habere*, which is a fit state or condition within which we can dwell (p.12). Rehabilitation also means to restore to a condition of good health, ability to work, or the like (rehabilitate, n.d) and to restore (someone) to health or normal life by training and therapy after imprisonment, addiction, or illness (rehabilitate, n.d).

The duration of the process of rehabilitation depends from the client's needs but also from the type of illness that he/she has. Also, the goals of each rehabilitative therapy vary as each person has different needs according to the age, life or environment. Physical therapy, Occupational therapy and Speech-language therapy are some of the therapies which are used to the rehabilitation of different target groups.

#### 3.1 Art Therapies in Neurological rehabilitation

Patient's main goal during the rehabilitation period is to have results as soon as possible but as the physical strength is limited; motivation is what a person needs to perform any kind of task and achieve its independence (Scheel-Sailer, 2005). There are different treatment options which

provide motivation to the patients such as sports, joint social activities but also arts-based therapies (Scheel-Sailer, 2005, p. 232). Art therapies are effective to neurological rehabilitation and they can motivate and support patients during their process.

This statement can be confirmed by the study of Scheel-Sailer where she includes art therapies in the treatment of paraplegic patients attempting to learn more about the influences of them. Painting therapy and music therapy were the two Art therapies which have been examined in the specific study (Scheel-Sailer, 2005). The results of this study showed that art therapies were effective to patients by improving their quality of life but also controlling their memory, communication and mood. Music therapy is located in Art therapies and it is used in the rehabilitation setting long time ago. Particularly, in 1966 when there was no medication for parkinsonian treatment, music was the most potent tool for helping the patients' movements (Sacks, 2007).

This paper will be focused only on music therapy in the neurological rehabilitation and specifically in music therapy on patients with Parkinson's disease. According to Bruscia (1998) Music therapy is a systematic process of intervention wherein the therapist helps the client to promote health, using music experiences and the relationships that develop through them as dynamic forces of change (as cited in Grocke, 2012). A qualified music therapist is able to use different kinds of music interventions depend on the client's or group needs. Music therapists assess patient needs, identify goals, and then translate and apply the qualities of music in a focused, intentional manner to plan and facilitate interventions, which improve the quality of life and optimize the functioning level of the people with whom they work (Holten, 2005, p. 810).

In addition, music therapy has been applied successfully to patients with Neurological dysfunctions. Some of the diseases where the benefits of music therapy is evidenced based are chronic neurological illness (Magee, 1999), chronic aphasia (Jungblut, 2005), Paraplegic patients (Scheel-Sailer, 2005), Dementia (Ridder, 2005), Multiple sclerosis (Schmid, 2005) and Parkinson's disease (Pacchetti et al., 2000; Sacks, 2007; Tomaino, 2007).

#### 4 Clinical research and anecdotal reports in Music Therapy for Parkinson's disease

According to researches that have been done music therapy is beneficial in the treatment of Parkinson's disease patients as the evidences shows improvements on the motor performance (Pacchetti, Mancini, Algieri, Fundaro, Martignoni, & Nappi, 2000), in the emotional functions (Pacchetti et al., 2000), in the vocal intensity and mood of patients (Haneishi, 2001) but also in the laryngeal phonation and respiration (Evans, Canavan, Foy, Langford & Proctor, 2012) and providing better quality of life (Pacchetti et al., 2000). However, the main focus of the most researches is on the effects of music therapy on the motor treatment of the patients with Parkinson's disease with a small number of papers which focused on the emotional state of the patients.

Active Music Therapy (Pacchetti et al., 2000), singing (Evans et al., 2012; Haneishi, 2001), relaxation (Tomaino, 2008), rhythmic auditory stimulation (RAS), as well as auditory rhythmical cueing (Thaut et al., 1996; McIntosh, Brown, Rice, & Thaut, 1997; Rochester, Bum, Woods, Godwin & Nieuwboer, 2009) and music based movement therapy (Hackney, Kantorovich, Levin & Earhart, 2007; Signorini, Marchetto, Lynch & Morris, 2013) are music-based methods and interventions which have been applied to patients with Parkinson's disease as a part of their treatment and they will be analyzed and discuss in this paper as well as personal experience with applied Music therapy to an individual suffering from Parkinson's disease.

The major problem that a patient with Parkinson's disease faces is the slow or fast movements and perception. The movements and perceptions of people with parkinsonism are often too fast or too slow, though they may not be aware of this- they may be able to infer it only when they compare themselves to clocks, or to other people (Sacks, 2007, p. 253). Rhythm is important in Parkinson's patients' lives. Rhythm and melody are necessary in a musical piece or performance too. In music therapy, music, particularly rhythm, can become a template for organizing a series of movements (Tomaino, 2000, p.169).

#### 4.1 Rhythmical Auditory Stimulation (RAS)

A typical design of the effects of the rhythm on the motor function and gait of Parkinson's disease patients was the use of Rhythmical Auditory Stimulation (RAS) which was found in five studies. The RAS design was applied in the study of Thaut et al (1996), McIntosh et al (1997), Hausdorff, Lowenthal, Herman, Gruedlinger, Peretz & Giladi (2007), Ma, Hwang & Lin (2009) and Rochester et al., (2009). Concurrent music as a self-pace has been used in the study of Brown, de Bruin, Doan, Suchowersky and Hu (2009) for gait improvement in single- and dual-task contexts. The aim of the use of RAS in Parkinson's disease patients was the examination whether Rhythmical Auditory Stimulation can be effective on the modulation of gait includes gait velocity, cadence, stride length and symmetry (Thaut et al., 1996; McIntosh et al., 1997; Rochester et al., 2009) and gait variability of Parkinson's patients (Hausdorff et al., 2007), on the functional arm movement (Ma et al., 2009) but also on the cognitive impairment (Rochester et al., 2009).

What is more, the subjects of the four studies were diagnosed with idiopathic Parkinson's disease (Thaut et al., 1996; McIntosh et al., 1997; Hausdorff et al., 2007; Ma et al., 2009) as in the study of Rochester et al (2009) participants were diagnosed of idiopathic Parkinson's disease and cognitive impairment (PD-CI). Patients with visual or hearing impairment or any other orthopedic conditions were excluded from three of the studies (Hausdorff et al., 2007; Rochester et al., 2009; Ma et al., 2009). The participants were volunteers between 61 to 79 years old (Thaut et al., 1996; McIntosh et al., 1997), 40 and 75 years old (Ma et al., 2009) and 85 or less (Rochester et al., 2009). However, in the study of Hausdorff et al the age of the participants is not provided.

Also, the participants in the four researches were able to walk without assistance (Thaut et al., 1996; McIntosh et al., 1997; Rochester et al., 2009; Hausdorff et al., 2007; Ma et al., 2009) although in McIntosh et al (1997) and study some participants needed assistance as the stage of the disease severity was varying from II to IV Hoehn & Yahr comparing with the other studies where the subjects were in stage II-III. However, no reference to the stage of the participants have been provided in the study of Rochester et al (2009) though it is stated that the participants were independently mobile indoors using a stick if necessary so the assumption is that the stages

of the patients were I-III as in stage IV assistance is often needed for walking, standing or moving (Holland, n.d).

The participants of three out of the five studies were all Parkinson's disease patients (Thaut et al., 1996; Rochester et al., 2009; Ma et al., 2009). Thaut et al (1996) were divided the patients into three groups. The groups consisted of an experimental group (EX) of 15 subjects and a control group, divided into a self (internally)-paced group (SPT) of 11 subjects and a no-training group (NT) of 11 subjects which during the study were on medication but not dopamine-receptor agonists (Thaut et al., 1996, p. 194). Likewise, two groups of Parkinson's patients were designed in Ma et al (2009) study and one group in Rochester et al (2009) study. A small number of subjects is presented in the study of RAS application with Parkinson's disease and Cognitive Impairment patients (Rochester et al., 2009) and a number of 20 individuals was assigned to the examination of the effect of auditory stimuli on people with Parkinson's disease (Ma et al., 2009).

On the other hand, the division of the participants in the other two studies consisted of two groups where the participants in the control group were healthy elderly (McIntosh et al., 1997; Hausdorff et al., 2007;). The subjects of McIntosh et al (1997) study were 31 Parkinson's disease patients and 10 healthy elderly people. 21 patients were on medication during the experiment and 10 patients were off medication 24 hours before the experiment except one man who was off medication for 48 hours by his decision. Participants were on medication during all the studies excluding the one control group of McIntosh et al (1997) study. Moreover, as it has mentioned above, the experimental group of Thaut et al (1996) was on medication but not dopamine-receptor agonists (Thaut et al., 1996, p. 194).

Furthermore, the procedure of one study lasted 3 weeks as it was training with Rhythmical Auditory Stimulation (Thaut et al., 1996). In the training period, the use of RAS was applied to the EX subjects following an exercise program which consists of 30 minutes waking mainly (Thaut et al., 1996). The RAS program consisted of walking on a flat surface, stair stepping, and stop-and-go exercises to rhythmically accentuated music at three different tempos (Thaut et al., 1996, p. 194). Likewise, the design of McIntosh et al (1997) study consisted of 30 minutes walking in each four gait trials which were instructed. Firstly subjects were instructed to walk in: (1) their own maximal speed with no external rhythm (baseline); (2) in time to RAS matched in

tempo to each patient's baseline cadence; (3) in time to RAS set at a tempo 10% faster than baseline; (4) with no external rhythm to check for immediate carry over effects (McIntosh et al., 1997, p. 23).

Comparing the two studies, it is obvious that McIntosh et al (1997) were based on the methodology of Thaut et al (1996) but not as a training period and with a variety of Parkinson's patients' level of disease severity. The level of the exercises' difficulty which they were instructed to perform, was different to each person as they were not in the same stage of the disease. Moreover, in this case the study could be focused only in one or two stages of Parkinson's disease patients or only with patients who could walk with or without any assistance.

A group of Parkinson's disease people with Cognitive Impairment was examined with and without auditory cueing while they were walking (Rochester et al., 2009). A dual task was also examined in Parkinson's patients (Rochester et al., 2009; Ma et al., 2009; Brown et al., 2009) while they were marching to the music (Brown et al., 2009) or walking and carrying a tray with two cups of water (filled to a standardized level) on it (Rochester et al., 2009, p. 840) asking them to step in time of beat where they were receiving auditory cue with the use of metronome (Hausdorff et al., 2007; Rochester et al., 2009). A cognitive dual task consisted of serial subtractions (3's) while subjects were listening to preferred concurrent music (Brown et al., 2009) and also listening to marching music or listening to the weather forecast while they are eating with one arm (Ma et al., 2009).

It has been observed that in the studies of the use of RAS in Parkinson's disease patients, *music* had been used as an auditory stimulus (Thaut et al., 1996; McIntosh et al., 1997; Ma et al., 2009; Brown et al., 2009). Music was selected according to the subjects' preferences (Thaut et al., 1996; Brown et al., 2009) within a four different styles familiar to their age (Thaut et al., 1996). Instrumental music in Renaissance style was chosen by the researchers and was embedded with a click tone as a RAS (McIntosh et al., 1997) as well as marching music because of its strong steady rhythm (Ma et al., 2009; Brown et al., 2009). Additionally, the compositions of the instrumental music were in 2/4 (Thaut et al., 1996; McIntosh et al., 1997) or 4/4 meter and there were three different tempos of "normal", "quick" and "fast" (Thaut et al., 1996).

What is more, the arousal effect of music was noticeable (Thaut et al., 1996; McIntosh et al., 1997) as one subject of the study appeared to have increased walking speed but no synchronization while he was using RAS (McIntosh et al., 1997). Although motivational factors through the music cannot be excluded as a reason for enhanced gait performance, their effects were minimized by the fact that each subject had to train with the same musical selection for 3 weeks (Thaut et al., 1996, p. 199). According to the subjects of Thaut et al (1996) study, music was repetitive during the 3 weeks of listening to it but it was also reported that some of them were singing to the music as a result to an easier synchronization with the pace.

On the other hand, music had been used in the studies where Parkinson's disease patients were performing dual tasks while they receive rhythmic auditory stimulation. Because daily life is filled with various sounds, it is important to determine whether these sounds act as external auditory cues that facilitate performance, or as distracters that divert attention from the primary task and thus hinder performance (Ma et al., 2009, p. 230). Although music worked as an arousal tool in previous studies, it seems that marching music had small or no significant effect on the movements of Parkinson's participants (Ma et al., 2009). Also, the gait patterns of PD patients were altered in concurrent music trials, interestingly in a manner similar to the dual-task effect imposed by performing a secondary cognitive task (Brown et al., 2009, p. 1581). The presence of music during the tasks added a cognitive demand for the patients even though the instructions were not focusing on the music attention (Brown et al., 2009; Ma et al., 2009). Thus, music was being a distracting tool in the primary goal of the studies (Ma et al., 2009; Brown et al., 2009).

Furthermore, the results of the study of Ma et al (2009) concerning the effect of music particularly in the movements of patients with Parkinson's disease shows that marching music distracted the participant's attention from the task and the marching music experiment fails to support the notion that music has a beneficial effect on movement in people with Parkinson's disease (p. 234). Also, additional task was the music listening during the experiment even though the instructions which were already provided to the subjects were not music focused based (Ma et al., 2009; Brown et al., 2009). Although people were focusing attention to the marching music according to the results of Brown et al (2009) and it is possible that the selection of preferred music was the reason of their attention to music, it is important to state that Ma et al (2009) found a minimal or none focus attention to music at all. The reason of the negative effect of

marching music in the task which was instructed in the experiment of Ma et al (2009) was that the food transfer movement is not as rhythmic as finger tapping or walking (p. 234).

In the study of Ma et al (2009) it is cited that listening to musical passages globally or holistically apparently imposes a smaller attention demand than does listening with focused attention to any particular instrument, or by listening selectively and tracking the part played by a single instrument (p. 234) which gives a reasonable answer to the question of why there was no effect of music in Parkinson's disease patients during the dual task which was instructed in this study. The subjects however, were listening to marching music globally or holistically without giving any specific attention to it (Ma et al., 2009) in contrast with the participants in the study of Brown et al (2009) where the familiarity of music affected the tasks' performance.

“The nature of self-selection makes it probable that the music would be meaningful and would have strong extra musical associations, factors that [they] considered would lead to both groups experiencing greater affective arousal” (Brown et al., 2009, p. 1582). Furthermore, the interpretations of the results of this study (Brown et al., 2009) were that Parkinson's disease patients' attention can be disturbed by music as a result for some patients to be a risk of one or more tasks' failures. Also, for some patients, external sounds or busy complex environment may cause a higher risk of fallings while they are walking or performing any other task (Brown et al., 2009).

RAS training application aimed to affect the gait velocity of Parkinson's disease patients while they were walking on different surfaces –flat and incline (Thaut et al., 1996, p. 199). Significant were the improvements in the velocity (Thaut et al., 1996; McIntosh et al., 1997; Rochester et al., 2009), cadence, stride length (McIntosh et al., 1997; Hausdorff et al., 2007) and swing time (Hausdorff et al., 2007). Also, the use of external cues can be effective to patients with Parkinson's disease and Cognitive Impairment as loss of attention is the most common problem which is caused by a cognitive dysfunction which appears in Parkinsonism (Rochester et al., 2009). According to Rochester et al (2009) findings, the potential use of external use to improve attentional control of movement may therefore be of specific benefit for people with PDD (p. 843).

Additionally, the finding of the study (McIntosh et al., 1997) about the patient who was off medication for 48 hours was significant as he seemed to freeze during the baseline and during the walk without RAS which shows that auditory rhythm is effective to the ease of movements and akinesia of Parkinson's patients. Furthermore, according to the subjects, RAS training had made their walking patterns more stable, had improved their speed, and had helped their walking in activities of daily life (Thaut et al., 1996, p. 197). On the other hand, the findings of Ma et al (2009) differ from the previous findings as their results of participants' motor performance were better when there the auditory stimulus was absent.

The six previous studies support the Rhythmic Auditory Stimuli as a tool of rehabilitation of Parkinson's disease patients. Although one of the studies disagrees with the beneficial effect of RAS to the tasks' performance of patients, the limitations of the study may cause the results of the experiment. The small number of the subjects which were participated in this research (Ma et al., 2009) is noticeable as well as the use of no control group to compare and contrast the final findings. Also, the instructions of the music listening offered to the participants the choice to either listen or ignore the music during their task which may influenced the motor performances if the examiners would give no specific instructions (Ma et al., 2009). Likewise, the number of participants in Rochester et al (2009) study was small too but the results were potential which justifies further work to evaluate the therapeutic application of cues (p. 844).

McIntosh et al (1997) study had a great variety of participants as they were in different stage of Parkinson's disease and some of them could not walk without assistance. Although this study had three groups (ON medication, OFF medication and healthy), there was one participant who volunteered to be OFF medication more time than the others. Because of the different stages of Parkinson's severity, the performance of the tasks did not have the same level of difficulty to all the patients. Therefore, the findings of the examiners are not 100% reliable. Even though the results confirmed and extended previous studies (McIntosh et al., 1997, p. 25), the study would better be focused on a specific target group with similar motor and cognitive ability levels.

#### 4.2 Active Music Therapy with Parkinson's disease patients

Rhythms are important to PD patients as some patients reported that by internalizing the rhythmic stimulus they can move, walk, or perform consecutive tasks where previously they froze (Tomaino, 2000, p. 169). Music must be chosen carefully by the music therapist according to patient's music preferences and needs as a result the patient will be able to "feel" the rhythm and be his/her supporter. Music has been proven to be beneficial in the control of unbalanced speed of PD patients or kinetic stutter as well as verbal stuttering (Sacks, 2000). [When] music is present, its tempo and speed take precedence over the parkinsonism and allow parkinsonian patients to return, while the music lasts, to their own rate of moving, that which was natural for them before their illness (Sacks, 2000, p. 254).

A case example is given by Tomaino (2000) about a young patient with Parkinson's disease who used to use an African slit drum during the music therapy sessions. During the rhythmic exercises he was using soft rubber mallets to play the drums as they transmitted the rhythm and vibrations first to his hands, arms and then to the whole body according to the patient (Tomaino, 2000). The same setting has been applied to a PD patient during my clinical training in the University of Jyväskylä. In this case the client was in his 70s and he had high level of musical background and perception. An analytical case study is provided in page 28 . The rhythmic exercises were accompanying by music which was selected by the therapist or the client and they had a steady normal beat which client and therapist were following by playing on the drums with the mallets.

The observations during the exercises' performance were significant as the tremor of the client disappeared during the performance but also the client's functions were controlled as long as the music was on. Moreover, Sacks (2007) agrees that music resists all attempts at hurrying or slowing, and imposes its own tempo (p. 254) by giving the example of the composer and conductor Lukas Foss who is a parkinsonian. He played a nocturne piano composition by Chopin with exquisite control and timing and grace but as soon as the music ended he lost his speed control again (Sacks, 2007).

To enjoy any real sense of freedom, a longer release, [Parkinson's disease patients] need something which can last over time, and the most potent unlocker here is music (Sacks, 2007, p. 255). Music can create an alternative form which is able to recover and practice the time failure which is common to patients with Parkinson's disease (Aldridge, 2005). Active music therapy is effective in the rehabilitation of Parkinson's disease patients improving motor and emotional functions according to the study of Pacchetti et al (2000), Haneishi (2001), Evans et al (2012) and Elefant et al (2012). The reported studies were based on Active Music Therapy consisting of choral singing, voice exercises (Pacchetti et al., 2000; Haneishi, 2001; Evans et al., 2012; Elefant et al., 2012), rhythmic and free body movements and music involving collective invention (Pacchetti et al., 2000). Improvements in the voice dynamics, mood (Haneishi, 2001; Evans et al., 2012; Elefant et al., 2012) and facial expressions (Elefant et al., 2012) have been also achieved in recent studies.

The duration of each study varies as well as the number of the subjects who participated in them. Evans et al (2012) have investigate the effect of singing in a group of Parkinson's disease patients which lasted two years and it seems to be the study with the longest period of examination comparing to Pacchetti et al (2000) where the duration was 3 months, Elefant et al (2012) 20 weeks and Haneishi (2001) 12-14 weeks. Moreover, the participants of all the studies were patients with idiopathic Parkinson's disease in Hoehn and Yarn stage 2 or 3. The number of each study differs and in Pacchetti et al (2000) study the number of the participants is 32, in Evans et al (2012) and Elefant et al (2012) the number is 10 and a small amount of four participants have been examined in the study of Haneishi (2001).

A lack of control group is one of the limitations which weaknesses some of the studies (Haneishi, 2001; Elefant et al., 2012; Evans et al., 2012) as Pacchetti's et al (2000) study had a group where Physical Therapy was applied to. However, because of the different variations of Parkinson's disease stages and the disease itself, patients sometimes were not able to attend all the assessments as a result the number of the reliable subjects to be decreased and therefore influence the final results. Also, travelling issue was stated as a limitation of the study (Evans et al., 2012).

The interventions that have been used in the studies consisted of general opening conversation (Pacchetti et al., 2000; Haneishi, 2001; Elefant et al., 2012), breathing exercises,

vocal exercises, singing exercises (Pacchetti et al., 2000; Haneishi, 2001; Elefant et al., 2012; Evans et al., 2012) and a closing conversation where the participants had the opportunity to give their opinion and comment about the whole procedure (Pacchetti et al., 2000; Elefant et al., 2012). The use of music for relaxation and image visualization (Pacchetti et al., 2000), as well as physical exercises (Pacchetti et al., 2000; Haneishi, 2001; Evans et al., 2012), were more interventions which have been applied during the sessions.

Furthermore, in the study of Pacchetti et al., 2000) the active music therapy which have been used involved improvisation by the therapist, who invites patients to play an active role using instrument and voice (Pacchetti et al., 2000, p. 388). Additionally, performing a rhythmic music instrument such as percussion could easily train the movements of the arms of Parkinson's disease patients but also to keep a steady beat to the rest of the group while they are marching to the rhythm (Pacchetti et al., 2000). By the adaption of the free improvisation of clients with therapist during the sessions, the communication, dialogue and any kind of interaction rise between client and therapist or in this case within the group.

According to Aldridge (2005), each individual human is a performed being whose purpose of living is to perform mentally, physically and socially, performances which fail to be fully achieved by people with neurodegenerative diseases. To put the "being" into human being we have to perform (Aldridge, 2005., p. 28). Music therapy for human beings who are very immature, damaged, very old or gravely handicapped brings direct support for the irreducible core of human life, the central source of rhythms that seeks to make the body do things, that generates awareness of a body-centered world in which there are places to go and things to be done (Trevarthen, 1999, p. 8). Communication and dialogue can be achieved with music therapy when speech fails (Aldridge, 2005). Music is social glue because it facilitated people coming together (Hays & Minichiello, 2005, p. 443).

Facial expressions are important and necessary in every human communication as they represent the current situation or the emotions. Tempo, timbre, volume and pitch are essential in someone's speech to be able to interpret what people saying to us (Aldridge, 2005). Relationships within family, friends, work place and community can be affected because of the lack of the correct use of language, vocal tone (intonation), appropriate voice volume and rate of speech, as well as body language, including posture, gestures, and facial expression (Elefant et

al., 2012, p. 393). There are some of these elements which lack in Parkinson's disease patients as a result the failure of communication which leads to isolation. Quality of life can be affected by social isolation. Kremer and Starkstein (2000) stated that the elements' failure of Parkinson's disease patients is considered to be a general problem of timing (as cited in Aldridge, 2004, p. 29). Music is based on timing and music therapy is one path for Parkinson's disease patients to create a dialogue and communication by using music.

Music can bring out something in people that other things can't, according to a Parkinson's disease patient with who I have been doing music therapy during my clinical training. Likewise, quality of life can be influenced by the lack of communication (Evans et al., 2012), but according to Aldridge (2004) music therapy has the potential to promote communication, stimulate cognitive abilities and alert us to residual communicative abilities (p. 38). A study of Hays and Minichiello (2005) investigated the importance and meaning of music in the lives of 52 elderly people. The participants stated the importance of music in connection with themselves or others but also the power of music to provide them acceptance and communication when verbal communication failed (Hays & Minichiello, 2005).

Singing is evidence based music intervention which can be beneficial in the voice impairment of patients with Parkinson's disease (Pacchetti et al., 2000; Haneishi, 2001; Evans et al., 2012; Elefant et al., 2012). Increase in the vocal intensity (Haneishi, 2001), improvements in phonation and respiration but also in facial musculature (Evans et al., 2012) have been shown that singing benefits Parkinson's disease patients. Additionally, singing seems to improve the facial animation of the patients (Elefant et al., 2012) and also reduces the drooling of the patients because of the vocal exercises during the sessions (Evans et al., 2012). It is also proven that motor abilities (Pacchetti et al., 2000) and emotional state of patients have been improved within active music therapy (Pacchetti et al., 2000; Haneishi, 2001; Evans et al., 2012) and according to Evans et al (2012) quality of life may have been affected by attending a group event rather than by voice improvement (p. 93).

What is more, the improvements of the use of music therapy have been commented by the patients after the studies. Patients reported the functional impact of the treatment both on their daily speech and their musical experiences outside the treatment (Haneishi, 2001, p. 288). Possessiveness was achieved by a client who during a phone call with her grandson was well

understood as well as by her self-confidence of singing in the church for first time after two years (Haneishi, 2001). Many have said that they have noticed positive changes in their voices as a result have felt more confident (Evans et al., 2012, p. 93). Moreover, another client commented that after attending the Music Therapy Voice Protocol treatment she was able to read but also to have communication and be easily understood by the community or others while she was surrounded by noise in public spaces (Haneishi, 2001). In addition to the importance of continuing music therapy sessions or attending music communities, in the study of Pacchetti et al (2000) the improvements in the emotional functions returned to the baseline levels after two months of the active music therapy sessions.

Music has the potential to help participants align patterns of emotions and structures of consciousness, and increase levels of energy (Hays & Minichiello, 2005, p. 445). The arousal effect of music may be one reason of the positive emotions' process (Thaut et al., 1996; McIntosh et al., 1997; Pacchetti et al., 2000; Haneishi et al., 2001) as it works as a motivation tool to the successful performance of the clients during and outside Music therapy sessions and also working as a tool of relaxation. Emotions can change the breathing of an individual and as breathing is present from the beginning until the end of our life circle it is necessary to well maintain it. Singing is literally the intentional use of breath to heal, in a particular therapeutic form (Aldridge, 2005). Parkinson's disease patients have to cope with a variety changes in their body such as shape and posture which affect the normal breathing function and as breathing has a rhythm itself, music as a rhythmic music intervention could be beneficial to the control of the breath. Aldridge (2005) well states that by gaining control of the breath we gain mastery of mind and body (p. 14).

Active Music and Music therapy can be beneficial to mood changes and a better quality of life in Parkinson's disease patients according to the limited amount of studies which have been done (Pacchetti et al., 2000; Haneishi, 2001; Evans et al., 2012). However, more investigation with larger number of subjects is necessary concerning and focusing on the effects of music therapy in the emotions and better quality of life of patients with Parkinson's disease.

### 4.3 Music and Movement in Music Therapy

Parkinson's disease is a movement disorder which affects not only the bodily health of a patient but also his/her psychological and mental health. So far, a detailed discussion provided concerning the researches which have been done investigating the influences of rhythm, music and music therapy in Parkinson's disease. When a person is playing an instrument, listening to music or composing music, all of their cognitive processes are engaged according to the findings (Hays & Minichiello, 2005, p. 447).

Moreover, the importance of the selection of rhythmic music must be taken into account as music preferences of each patient differ. Tomaino (2008) writes that counting 1,2,3,4, 1,2,3,4, etc., over and over, may give a person a sense of pulse but it would not necessarily cause him/her to tap his/her foot or move his/her body; yet, add a march or Latin tune to it and a person may notice that he/she is spontaneously moving to the beat (p. 170). One of the suggested complimentary therapies for Parkinson's disease focusing to the movements of patients could be tango (Hackney et al., 2007) because of its strong and steady beat which can keep the pace for Parkinson's patients' mobility problems.

In addition to this, a research by Hackney et al (2007) compared the effects of tango classes and exercise classes in patients with Parkinson's disease. Furthermore, a later study with Argentine tango has been done where researchers focused on the methods for implementation of Tango classes for patients with Parkinson's disease (Hackney & Earhart, 2010). Furthermore, a recent study examined how effective is the Irish dancing compared with a routine physiotherapy for people with Parkinson's disease (Volpe, Signorini, Marchetto, Lynch & Morris, 2013). Also, the influences of Greek traditional dances in the old people's quality of life have been examined by Mavrovouniotis, Argiriadou and Papaioannou (2010).

Dancing is a popular mode of physical activity for many older people (Volpe et al., 2013, p. 2). It is proven that it can affect the mental, physical and emotional state of elderly individuals (Mavrovounioti et al., 2010) as well as being beneficial to patients with Parkinson's disease (Hackney & Earhart, 2010; Volpe et al., 2013). Twenty-four people with idiopathic Parkinson's disease were randomized in two groups took part in the weekly Irish dances and physiotherapy as a part of their movement rehabilitation (Volpe et al., 2013). Likewise, two groups of eight

subjects attended 20 sessions of tango or exercises classes (Hackney et al., 2007). The first limitation of both studies is the small number of the subjects comparing with the research of Greek traditional dances where the number of the participants was 76 and 36 as a control group (Mavrovounioti et al., 2010).

The music that has been used in each study was chosen by the dance teachers and no comparison between the genres, content or duration has been done by the researchers, concerning the effectiveness of each genre to elderly individuals. Moreover, because of the strong rhythm of Argentine Tango and Irish music, people with Parkinson's disease appeared to benefit from the dancing classes (Hackney et al., 2007; Volpe et al., 2013). Tango itself is characterized by a steady beat and it can be used as an auditory cue for the dancer as he/she has to be synchronized with it (Hackney et al., 2007). The benefits of auditory cueing in the mobility of Parkinson's patients had already studied. Rhythmic Auditory Stimulation can improve the gait variability (Hausdorff et al., 2007), velocity, cadence, stride length and symmetry in Parkinson's disease patients (Thaut et al., 1996; McIntosh et al., 1997; Rochester et al., 2009). Although, this is one reason of the selection of this specific music genre (Hackney et al., 2007) some Argentine tango recordings are very complex for beginners' ears, which may make it difficult to clearly distinguish beats (Hackney & Earhart, 2010, p. 49).

The results of the effect of Argentine tango and Irish music dances in patients with Parkinson's disease proved that the dances can improve mobility, reduce disability and enhance quality of life (Hackney et al., 2007; Volpe et al., 2013). Improvements in the balance and mobility of Parkinson's patients dance group have been also observed (Volpe et al., 2013). Tango seemed to be more effective than other kind of movement approaches according to Hackney et al (2007) because it is based on music which as we have seen to previous studies music have an arousal effect or is served as an external cue to Parkinson's disease patients and it is progressive in nature. Moreover, as dancing classes are usually formed with a partner or group, they provide a community environment which improves the quality of life of Parkinson's disease patients and increase socialization preventing any kinds of social isolation (Hackney et al., 2007; Volpe et al., 2013).

The previous studies investigated the effectiveness of dance treatment to Parkinson's disease patients by the use of Argentine Tango and Irish music but also Greek traditional music with

healthy elderly people. A future research could extend the investigation concerning the “right” music of the dances. For instance, a possible research could be about the effect of different music genres in two groups of Parkinson’s disease patients where two different dances will be each taught to each group. The purpose of this setting is to investigate whether different genres can give different effect to the mobility and emotional state of the Parkinson’s disease clients. Nevertheless, a larger number of participants is suggested for more reliable and generalized results.

#### 4.4 Vibroacoustic Therapy

In the previous chapters, active music has been discussed as a method of stimulation of the brain and body in a therapeutic concept. In this chapter, a combination of receptive music and vibrations as an alternative method called Vibroacoustic therapy, will be analyzed and discussed as well as its beneficial use in the treatment of Parkinson’s disease.

Vibroacoustic Therapy (VA) started developing in the last 50 years when doctors and music therapists were attempting to apply music in patients’ treatment. The emphasis of Vibroacoustic Therapy is on the physical effect of the sound that is used as a stimulus (Wigram, 1997, p. 11). Relaxation and reduction of the muscle tone were the primary uses of VA therapy but its development is continuous (Skille, 1997). According to Wigram (1997), Skille’s definition about the vibroacoustics is the use of sinusoidal, low frequency sound pressure waves between 30-120hz, bended with music for use with therapeutic purposes (p. 11). Moreover, the setting of this application is based on a bed or chair which is programed to provide vibrations to clients and it is located in the receptive music therapy intervention.

Olav Skille as a founder of VA started his experiments of vibrations with physically and mentally handicapped children who were suffering from high muscle tones and pains. [He] was investigating whether sound vibration, transmitted through a bean bag on which children were lying, would be helpful in reducing muscle tone and relaxing the children (Wigram, 1997, p. 11). Low-frequencies can be relaxing for the body (Skille, 1997; Wigram, 1997; Puncanen & Alaruona 2012) as high frequencies can raise tension (Wigram, 1997); rhythmical music can

stimulate and loud music can provoke aggressive feelings (Skille, 1997, p. 235). Additionally, according to a minimum number of researches and anecdotal reports, VA seems to be beneficial to many clinical areas. Skille (1997) categorized these areas of effective VA application in pain disorders, muscular conditions, pulmonary disorders, general physical ailments and psychological disorders (p. 49).

Music can be a part of Vibroacoustic Therapy and it is important to be selected carefully depending on the patient's needs. Skille states that he created different kind of tapes with music specifically composed for VA which he divided into 3 categories of Music made for VA Therapy based on Overtone Fractals, Relaxation music with frequencies added and normal music for stimulative purposes (p. 240-241). It is important also that the therapist use music familiar with the client on the beginning of the treatment, which will provide a safe place for him/her and reduce the anxiety (Punkanen & Ala-Ruona, 2012).

Relaxation techniques such as Vibroacoustic Therapy were used during the treatment of Parkinson's disease (Wigram, 1997; Skille, 1997a; Skille, 1997b; San Vincente, de Manchola & Serna, 1997; Punkanen & Ala-Ruona, 2012). The use of low frequencies vibrations help to the relaxation of the body (Wigram, 1997), which is one of the patients' needs. Also, the use of music during the vibration is present as it can help for the relaxation's process.

The neurologist Jean-Martin Charcot is the first who applied vibrations to patients with Parkinson's disease as a method of treatment through the vibroacoustic chair in the 19 century (Punkanen & Ala-Ruona, 2012). Although improvements have been observed and reported, however, the procedure stayed incomplete as he died. Additionally, a study by Del Campo San Vincente, de Manchola and Serna (1997) investigate the effects of sinusoidal wave of 40hz on patients suffering from Parkinson's disease. The study consisted of 60 patients with idiopathic Parkinson's disease where they divided to two groups. Subjects were able to move without any assistance and they have no other impairment. Each group had 30 people and they were named as experimental and control group. The experimental group received music and a pulsed, sinusoidal low frequency vibration and the control group received only music (Skille, 1997).

The results of this study show that Vibroacoustic treatment is beneficial to patients suffering from Parkinson's disease. It can be a new technique that helps patients to relieve their symptoms.

Improvements in the language capacity, writing skills, salivations, swallowing, hygiene and ease of daily living activities have been observed in this study (del Capo San Vincente et al., 1997). Furthermore, “no significant differences revealed between the two groups concerning subjects’ Unified Parkinson’s Disease Rating Scale (UPDRS) but it was observed that subjects receiving vibroacoustic treatment improved UPDRS scores between the first and fourth assessments” (Skille, 1997, p. 129).

Vibroacoustic treatment has been used with my elderly Parkinsonian client during a series of music therapy sessions. While the vibrations started, the client started to relax and gradually the tremor and stiffness went away. The vibration treatment lasted 10 minutes while a classical composition of violin and piano was used as background music. Client reported that he was in a deep relaxed mode and also positive feedback was given for the music which was used. Since the vibrations stopped, it was about some minutes when the tremor and stiffness came back.

In conclusion, although some researches and clinical case studies have been done investigating the effects of Vibroacoustic Therapy for Parkinson’s disease symptoms’ relief, however, additional future research is needed. For more effective use of VA, comprehensive training is needed according to Puncanen and Ala-Ruona (2012).

## 5 Case Study: Individual Music Therapy with a Parkinson's disease patient

This case study describes the use of Music Therapy interventions with an old man aged 70 years old diagnosed with Parkinson's disease. The client participated in a total of 10 weekly music therapy sessions with duration of 45 minutes each. Moreover, the sessions were taking place in the clinic of the University of Jyväskylä every week. Prior the Music Therapy sessions, a private meeting with the client arranged where we discussed the whole procedure and a consent form have been signed by both. The sessions were video recorded and observed by the students for research and educational purposes. Moreover, each session was discussed during our group supervision where advices and important moments was discussed and analyzed by the teachers and students.

### 5.1 The client

The client was a 70-year old man with diagnosed severe Parkinson's disease. He has University educational level and it was based in music as he studied in this field. Additionally, he studied as a priest and he was working for a number of years but he retired because of the severity of his disease. At the time of his music therapy sessions he was living alone as he was divorced. Also, he has two children which are living with their families abroad. Although he was living alone, neighbors and friends were in contact with him and were spending time together during weekends. Writing books is one of his hobbies as he mentioned as well as composing and performing music, specifically piano. What is more, assistance was needed sometimes when he was really tired according to him.

Music therapy was familiar to the client because he had previous experience attending music therapy sessions offered by the University. However, he was willing to participate again. I did not have any references about his attendance to other therapies during the music therapy process but we were aware about his use of medication. The aims of the 10 weekly Music Therapy sessions were set by the client and therapist during the first session. Relaxation and slow movements were the main goals of this procedure as the client had high levels of tremor and stiffness.

## 5.2 The music interventions

The therapeutic process consisted of 10 music therapy sessions with the duration of 45 minutes each week. The time of the sessions were the same every Wednesday as well as the place. This scheduled sessions resulted to keep the client familiar with the environment and reduce any possible anxieties. The structure of the sessions was different each time on the beginning as I wanted to try some music interventions to examine whether or not are effective to the client. Each session has an opening discussion on the beginning following by movement exercises with music. Other musical activities such as free improvisations, singing, dancing and music listening were part of our sessions and will be analyzed below.

The *movement exercises* with music started firstly with music listening and physical exercises while both client and therapist were in a sitting position or standing posture. Movements of his arms, hands, fingers and legs would help to the reduction of stiffness and while music has an arousal effect, it would give more motivation for the performance of the exercise.

Furthermore, the exercise developed during the next session and the use of mallets and djembe drums added. Two djembes were placed on the right and left side of both client and therapist as they were sitting opposite of each other and one in the middle to give a place for more intimate communication and dialogue. While the client was sitting, he was able to reach the djembes with the mallets as a result to do some physical exercises while playing and listening to some music. The exercises were performed based on the background music which the therapist chosen beforehand which was related to the client's preferences. The provided music was keeping a pace and therapist was giving instructions by showing to the client movements with the mallets based on the beat of the music.

As it has been mentioned before, Rhythmic Auditory Stimulation and auditory cueing have been used in past studies for the mobility of Parkinson's disease patients (Thaut et al., 1996; McIntosh et al., 1997; Hausdorff et al., 2007; Ma et al., 2009; Rochester et al., 2009). Moreover, similar setting have been used by Tomaino and her client with effective results according to her client as the use of the mallets directly to the drum transmitted the vibrations to his hands and his whole body (Tomaino, 2000).

*Free improvisation* was a part of the most of our sessions as the client was musical and he was willing to play music with me. The instruments which were used by the client were piano, djembe drums, metallophone and Mallet-Kat. The musical instrument's choice was sometimes up to the client and other times up to the therapist giving space for the client to decide how he would like the session to be but also giving me the space too to control the session. The instruments that I used during the improvisations were usually the same like the client as he would always like and seeking for dialogue and communication through music. The high motivation of the client was visible during the improvisations as he had strong eye contact and he was present while we were both improvising.

Free improvisation by the clients and therapist can be a tool of emotional expression as the musical instrument can be the container of the negative feelings projected by the client and represents a 'safe intermediary object' (Wigram, Pedersen & Bonde, 2002, p. 132). According to researches, Active Music Therapy and Improvisation are evidence based music interventions which are beneficial for people suffering from Parkinson's disease providing them better quality of life (Pacchetti et al., 2000) as it had been already discussed above.

During our three last sessions *dance and movement* activities were added in the whole process. The music was chosen on the beginning by me and then by the client. The first song that was chosen was "Yellow submarine" by the group "The Beatles" which was effective to him as he started moving and humming. Moreover, I found out that he has done a research about this group while he was studying at the University. The selection of the rest of the songs was from the same band.

The aim of dance and movement intervention with this client was the physical exercise with the use of music and to relief the stiffness. The instructions that have been given to the client were free dancing with the combination of movement exercises for arms hands and shoulders. Additionally, client and therapist were moving and dancing following the beat of each song, as well as walking through the clinic and moving hands in different ways. During the walk in the clinic we were holding a tambourine which was used to play music while we were performing the arm exercises. The reason of using a tambourine was its handy shape which could motivate the client to play during his favorite songs and simultaneously exercise his hands and arms.

*Singing* is beneficial for the voice and breathing of Parkinson's disease patients according to researches (Pacchetti et al., 2000; Haneishi, 2001; Evans et al., 2012; Elefant et al., 2012). The specific music intervention was included in our setting while we were singing and playing the favorite song of the client or during the dance and movement part. However, the client was hesitating singing either because he mentioned that he does not have the proper voice or because he was focus on piano playing. Although his avoidance of singing the most of the times, I was trying to sing louder as a result to make him sing or hum with me which was always giving him a smile in his face.

Moreover, *music listening* is another music intervention which was used in the setting of music therapy sessions. Space was given to the client to listen to his favorite music and discussed it afterwards. In the description of his music and songs, client had the opportunity to share with me the importance of the music in his life especially the chosen songs.

On the beginning of the sessions the client was avoiding giving any personal information but during the last sessions he started sharing about his past. One goal of the use of music listening was to wake memories of special moments of his life which would be beneficial for him to share out loud. It is important for people who are living alone for years to share stories with others. My role in the clinic was to support my client and remind him that he has done lot of things in his life and he has to feel proud. Although the diagnosis of Parkinson's disease and his severity gradually restricts his daily activities, by listening to his favorite pieces he should remember what he has done in the past and be supported by them.

The *relaxation* technique was provided by the use of Vibroacoustic chair while the client was listening to improvised music on the beginning, following by pre-composed music. The client was familiar with the Vibroacoustic chair as the low frequencies vibrations were helping the client to relax as the tremor seemed to disappear. Also, Vibroacoustic Therapy according to researches is beneficial to Parkinson's disease patients (del Campo San Vincente et al., 1997). Clients can be benefit as vibrations can stop the tremor and relax the muscles of their body.

### 5.3 The Therapeutic Process

From the beginning of our first Music therapy session my client was really open to talk about different topics but also about music. He was usually asking questions about my personal goals through this process, general questions about University but when the question part was on my side he was answering with one word or even asking a question back to me. He was an intelligent individual and the most of the times he was avoiding giving verbally answers to my questions but he could start a conversation and dialogue through music. This ability of musical conversation and dialogue was one of his powers.

Furthermore, his participation in every activity was strong and present as he always had intensive eye contact. Music is important to his life as from our first session stated that “Music can bring out something in people that other things cannot”. However, his resistance of sharing his emotions with me turned my personal goals in a different angle as I decided that it would be beneficial for him to focus on the present moment by supporting him psychologically and bodily with the use of music because the time that we had was limited. Surprisingly, in the middle of our Music therapy process, during music listening of his favorite music he became too emotional as a tear came from his eye but immediately when the song ended he picked a new one giving me no space to make him any kind of question. That was the breaking point as he later on shared with me why specific songs are important for him and in which period of life he was listening to them.

It is also important to mention that even though his disease affects his speed, he was always staying at the clinic more than 45 minutes as he had to get himself ready by wearing his clothes and shoes but also use some extra minutes to ask me personal questions.

### 5.4 Outcomes of the therapy

According to our final discussion, the main goals about relaxation and slow movements succeeded. The bodily exercises which have been used in order to control the stiffness of the client seem to work only in the clinic as he was not using them at home. His active participation in the music was significant from the beginning comparing with his verbal participation which

improved in the middle to the end of the sessions. What is more, an interesting observation has been done during the Active Music making where the client's tremor disappeared while he was playing an instrument or listening and focusing to the music.

It is important to state that the time that we had was limited, even though the whole process appeared to be beneficial for the client. Music therapy is a place for elderly people to be supported, socializing and be creative. By offering to Parkinson's disease patients the opportunity to listen and be listened but also move with music and be moved by music, we can provide them a better quality of life as well as support which is what they need in this stage of their life.

This case study gives an image of Music therapy setting with Parkinson's disease client and what kind of different intervention would be beneficial to him depending of his needs. Moreover, a long term Music therapy is suggested for better and more obvious results. There is no doubt about the advantages of the therapeutic use of music in individuals with Parkinson's disease as it is an art which based on the researches can engage and influence people without harming them.

## 6 Conclusion

The purpose of this study was to collect and review the researches which have been done on Music therapy in Parkinson's disease patients. The provided literature was elaborated by the author have been also compared and contrasted. Also, the addition of the case study supported the initial idea of this study about Music therapy as a beneficial tool of Parkinson's disease treatment.

According to the review of the literature of this work, Music therapy is obviously beneficial to people suffering from Parkinson's disease. The investigations of the effectiveness of music to Parkinson's disease are low but they need more investigation. Patients' wellbeing and ease of quality of life should be on the goal of Music therapy. As the focus of the most of the studies is on the improvements of mobility, it is however suggested by the author that the focus should be on the emotional state of patients. In addition to this, a future investigation is needed concerning the use of Music Therapy to regulate the emotional changes which occur during the disease. It is normal and possible that the emotions change when someone is diagnosed with a disease and especially with a sever disease without cure.

Disappointment and negativity are common and sometimes lead to isolation. For instance, a study focusing on the use of Music therapy as a preventing tool of isolation and negative emotions during the Parkinson's disease diagnosis or in the early stages of the disease is suggested, as the researches that have been referred in this current work are focusing only on people in mild to advance level of Parkinson's. Patients' psychological support through Music Therapy in Parkinson's disease is one important field which has to have more emphasis.

Moreover, the current study did not refer and elaborate to all the clinical and non-clinical studies which have been done in the field of Parkinson's and Music Therapy, but the provided evidences support the principle idea of this work. Music therapy is beneficial to Parkinson's disease treatment and should be provided to the patients as a part of their treatment process.

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