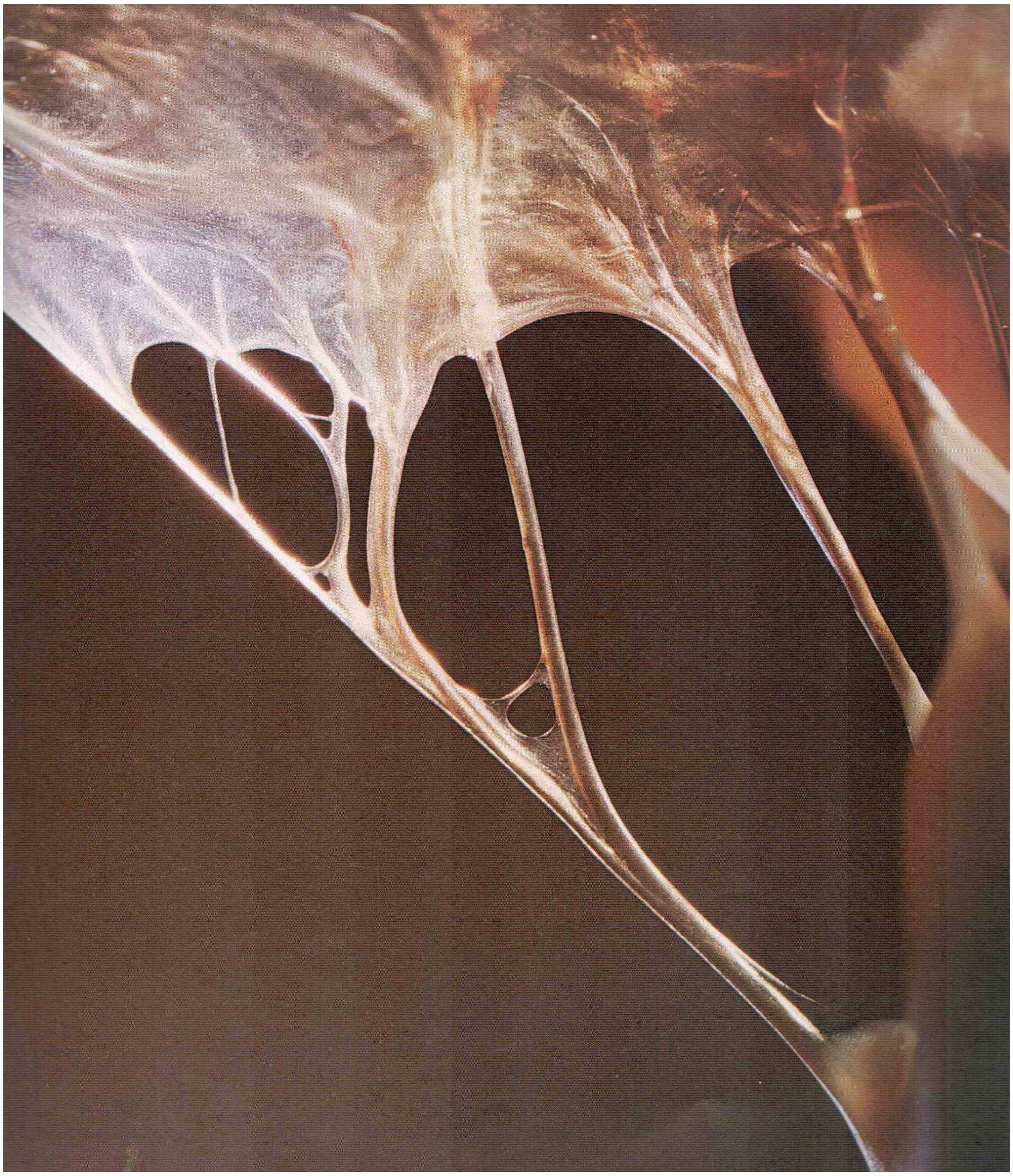
Music Therapy for Post Operative Cardiac Patients

A Randomized Controlled Trial Evaluating Guided Relaxation with Music and Music Listening on Anxiety, Pain, and Mood

Schou, Karin

KARIN SCHOU

MUSIC THERAPY FOR POST OPERATIVE CARDIAC PATIENTS



A Randomized Controlled Trial Evaluating Guided Relaxation with Music and Music Listening on Anxiety, Pain, and Mood

2008

MUSIC THERAPY FOR POST OPERATIVE CARDIAC PATIENTS

A Randomized Controlled Trial Evaluating Guided Relaxation with Music and Music Listening on Anxiety, Pain, and Mood

KARIN SCHOU

Submitted for the Degree of Doctor of Philosophy

October 2008

Supervisor: Professor, Dr. Tony Wigram

Department of Communication
Aalborg University

Mitral valve. Photo: Nilsson & Lindberg (1973)

If our hearts provide us with the pulse of life, then music connects us in a direct way with our own natural rhythmical instrument - the body.

Mehmet Oz (1999, p. 98)

Abstract

Background

This study is the first controlled research study undertaken in the early phase of rehabilitation after cardiac surgery investigating the effect of a receptive music therapy method. Various forms of music therapy interventions including both active and receptive methods were reported to be significantly more effective than music treatment with music medicine. Music listening and receptive music therapy (such as Guided Imagery and Music) have been proposed to help patients both before heart surgery and during the recovery phase. This study therefore intended to explore both a music therapy and a music medicine intervention. Guided Relaxation with Music was considered potentially helpful for post operative cardiac patients in order to induce relaxation and facilitate recovery involving listening to relaxing music as a background while systematically guiding patients through a process of bodily relaxation.

Method

Participants were 68 patients (following randomization the operation was cancelled for five of these participants), age range from 40 to 80 years, who had a heart valve operation as a single procedure, or as part of a double procedure including a concurrent coronary artery bypass surgery (CABG). The participants were randomly assigned to one of three groups: Guided Relaxation with Music (GRM), Music Listening (ML), or a control group of rest with No Music (NM). Participants in the GRM and ML groups chose their preferred music style using four examples from which they could choose: (1) easy listening, (2) classical, (3) specially composed (MusiCure) and (4) jazz. The participants were given one session before and three after their operation, while they were still hospitalized in the heart-lung surgical unit. Each session lasted 35 minutes. Repeated measurements were made of participants' self-reporting of anxiety, pain and mood before and after surgery. Data were also collected on length of hospital stay, participants' satisfaction with the hospitalisation, and on participants' intake of analgesic medication. Participants self-reported through questionnaires on the importance of rest/ relaxation, music and the guiding procedure. Participants in the GRM and ML groups prioritized which elements of music and the guiding procedure had an impact on their benefits of the rest/ relaxation.

Results

There were quite variable results, lacking significance when comparing between groups, at different time points. Some significant results were found when looking at change over time. During hospitalization the GRM group reported the importance of their sessions with a higher mean score than did the other two groups (ML and NM). Participants in both intervention groups, GRM and ML, prioritized 'melody' and 'tempo' as important elements in choosing their preferred style of music. Voice quality was of high priority for participants to benefit from the GRM intervention. Attrition in the study was caused partly by difficulties participants experienced postoperatively in supplying data before and after treatment.

Conclusion

The sample was relatively small reducing the statistical power. However, the results tend to support findings from previous studies that have involved interventions with post-operative patients. Future research should investigate whether GRM would prove beneficial for wider populations. GRM is non-invasive, relatively economical, and may be an attractive and non-demanding procedure for patients. In future research the potential of this intervention could be considered as a preventive therapy to reduce the stress factors that can lead to heart disease.

Acknowledgements

This doctoral research has been developed, explored, and completed with the participation, support and help from many, many people. I give great and heartfelt thanks to you all, mentioned or not mentioned here.

One person has been a steady, challenging, supporting, demanding, and immensely generous presence through the course of this research. I am indebted to Tony Wigram, my supervisor, who has facilitated the learning process in wondrous and differentiated ways. I want to thank him also for his friendship and for being such an inspiring colleague.

This research was undertaken in cooperation with Unit T, Cardiovascular Centre at Aalborg Hospital. I want to thank the research team at Unit T for granting me the permission and approval to let the clinical trials happen. I thank all the nursing staff who lived through this first encounter with music therapy with much interest, support, and willingness to make things work. The two research nurses, Astrid Lauberg and Charlotte B. Thorup have been very committed to help out throughout the clinical trial in clarifying communication, solving logistical issues, and assisting in many ways at many levels. I want to thank all the people at the General office of Cardiovascular centre, for helping out with statistical information. I send a special acknowledgement to Birgitte Wested who was a star in ensuring that eligible patients were informed about the research.

Now, I wish to warmly thank the participants who agreed to be part of this research at a critical time in their lives. Their generosity and willingness to expose themselves to clinical trial sessions as well as completing lots of questionnaires are admirable, and I am very grateful to them all. This research would not have been possible without their participation.

The research team members have been of such great and necessary assistance, and I want to thank every one of them for their unique contributions to making the clinical trials possible. They have been asked much flexibility, and unpredictable working hours.

A big part of this research was about learning statistics from the very basic, and I wish to thank Dr. Christian Gold for his patience, for his way of explaining statistics so that numbers became alive and meaningful. I am also indebted to Francisco Pons who was being the kindest 'Devil's Advocate' during the development of the method and design. His ongoing interest for my research has been special and touching to me.

The former hospital organization Musica Humana, lead by Per Thorgaard, supported this research during its early stages by providing equipment, audio pillows, compact disc players, and economical support to purchase varied music selections for the development of the CD's with relaxing music programmes. I thank Niels Eje who granted me the permission to include excerpts from MusiCure. I thank Vibeke Hansen, an experienced nurse at the Intensive Care Unit, Odense University Hospital, who assisted in revising the questionnaires and the protocol. Musica Humana had no vested interest in this research.

I warmly thank The Obel Family Trust, and the Faculty of Humanities, Aalborg University, for granting me financial support to carry out the clinical trials with assistance from the research team members. Also, I am grateful for the encompassment and support that was provided from Christian Jantzen, Institute for Communication, and the Faculty of Humanities, which has made the completion of this doctoral research possible.

I wish to thank all my colleagues in music therapy for their encouragement, many inspiring conversations, for humour, much kindness, and warmth in their way of being. I have loved getting to know you since I came to Aalborg in 1997 to study music therapy. I deeply appreciate all that you have given me during these years. Thank you to Lars Ole Bonde for helping in developing the MIA profiles and for constructive critique of the translation of the summary into Danish.

Being a doctoral student in music therapy with the many wonderful fellow students has been very inspiring, and I want to thank them all for the fruitful discussions, for friendship, and for creating a conducive environment for developing ideas. Together with consultancy from Cathy McKinney, an experienced GIM therapist, they helped me to unfold the guiding procedure into a treatment in a form that may be helpful to cardiac surgery patients.

I thank my close friends and family for their support and patience during these years.

Now, most of all, I wish to thank Knud for coming into my life in a tango, for his timing and for his support and most amazing engagement with me, and with music therapy. He deserves a major thank you for not just surviving the last phases of this research process with me, but mostly for just being who he is, a beautiful being and the kindest man in my life.

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER 1

INTRODUCTION

1.1 Background of the thesis and research

The use of music in Danish hospitals especially in outpatient, recovery and intensive care units has emerged over time since the late nineteen nineties. In Denmark there is no tradition or experience of music therapy as a complementary treatment in somatic hospitals. The multi-centre and multi disciplinary hospital organisation Musica Humana set up studies to examine the value and effect of music in medical settings. Recovery and intensive care hospital units[1] in the largest cities in Denmark participated within this organisation. The main purpose of the Musica Humana research so far was to measure the effect of music listening to especially composed recorded music as part of a designed sound environment for patients in their immediate post operative recovery and care. Data regarding patients' experiences of their stay in hospital were collected, measuring outcomes such as pain, anxiety and nausea. These studies were developed from a pilot project "Ataraxia – between music and medicine" (Andersen et al., 1999) and a music psychology project "The Healing power of Music" (Andersen et al., 1997). More than 2000 patients have been included as subjects in these studies and the results were reported at medical conferences (Annual Heart Congress, Nyborg Strand, April, 2003; Norsk Dagkirurgisk Kongres, Soria Moria, June 2003). The organisation composed, produced and studied the effect of specially designed music, MusiCure, for hospital patients primarily in relation to cardiology, recovery after anaesthesia and during intensive care (Thorgaard et al., 2005), However no mention of the criteria for the music selections were made, and the purpose for using the specially composed music was related to the patients' and staffs' opinions of the sound environment. Musica Humana research was based on using MusiCure exclusively[2].

One study in particular inspired new research in Musica Humana. The study was set up to investigate the effect of Guided Imagery with soothing music (Tusek et al., 1999) as a relaxation technique (Tusek et al., 1999, p. 22) on length of hospital stay, pain and anxiety. The study reported a reduction in preoperative anxiety and pain. The reported reduction in the length of

---

[1] Aalborg Hospital (part of Århus University Hospital), Skejby Hospital (part of Århus University Hospital); Odense University Hospital, and Rigshospitalet in Copenhagen.

[2] Since 2007, Musica Humana no longer exists as a multi centre organisation undertaking research.

hospital stay from an average of seven days to five days was particularly interesting, and added an economical perspective that may influence political and financial administrators, including doctors responsible for budgets. It may not necessarily be a bonus for the heart surgery patient to have the length of hospitalisation reduced further. However, the study by Tusek et al. was carried out in an American context and setting where hospitalisation is funded by health insurance companies, which means that the patients and the insurance companies funding healthcare have an economical interest in reducing their length of hospital stay. Replication of this study was not possible as the study reported no specific information on how the guiding was undertaken, or which music was used. Considering the lack of reported information as to how the guiding was undertaken and which music was used, it became a particular intention of the current study to document exactly which procedures were used for the guiding, and the way music to be used in the study was defined, and analysed for style. Transparency in the method by which different music selections were prepared, and how clients were offered a reasonable choice for their preferences to be addressed, were also important goals of this study.

In another study, the effect of physio-acoustic therapy on cardiac surgery patients in the immediate recovery phase was investigated (Butler & Butler, 1997), and a decrease in the use of pain and sedative medication was reported, which helped the patients to be mobilized earlier. Thereby a reduction in the average length of hospital stay from an average of nine days to an average of five days was reported. As a result thereof, the costs for the cardiac surgery patients have been cut substantially.

While there are no music therapists currently with permanent posts in General Hospitals in Denmark, a qualitative music therapy and medicine study was carried out in oncology (Bonde, 2004) with six women who had been discharged after treatment at the hospital. There is a need for studies investigating receptive music therapy methods suitable to meet the needs of a number of clinical populations who may benefit from such methods, including heart valve surgery patients in their first post operative care. Flexible music therapy procedures which include a selection of different styles of music are necessary in order to allow for the patients to choose according to their preference. So far the organised use of music in somatic hospital settings in Denmark has been administered by nursing staff, and the music chosen has been staff preferred music. Patients may bring their own equipment for music listening. Even if the heart patient expects somatic treatment only in a somatic hospital international studies document the need to develop this area in Denmark as well.

1.2 Personal motivation and focus of the study

During the period 2000 – 2005, as a member of the board of Musica Humana, I partook in designing research studies with the purpose of improving the sound environment in Danish hospitals. This work included the development a compact disc of a guided relaxation with music especially designed for the intensive care population. Through the board meetings of this organisation it was possible to obtain information and news on pilot studies on music used in cardiac outpatient department for cardiac examinations and 'stent' procedures in Aalborg Hospital. Staff preferred music was already used randomly in the outpatient department, and anecdotally reported to be of benefit to the staff. When listening to specially composed music in the Cardiac Catheter Laboratory, 91 % of the patients in the study by Thorgaard, Henriksen et al. (2004) found the sound environment very pleasant/pleasant, and 68 % found the sound environment to be of great positive importance to the participants' feeling of well-being, and expressed that the music made them feel less tense, more relaxed and safe (Thorgaard, Henriksen et al., 2004). This study was designed to investigate the patient's opinion of the sound environment, his or her experience of the music played, the effect of music on the well being of the patient, and the patient's likes or dislikes of the music heard. The study was not designed for measuring anxiety, and my curiosity grew to explore the feasibility of applying music in the pre and post heart surgery care in the heart-lung surgical unit.

The heart was of particular interest to me as it is a vital organ to the human body and existence, and because diseases of the heart may cause existential anxiety, fear of dying and fear in everyday living. The ‘language of the heart' often comes in the form of poetry and in daily language, many metaphors are related to the heart. Having a big heart means that a person is loving and kind to others; in Danish heart and pain form a rhyme (hjerte – smerte). The saying “Hånden på hjertet” (directly translated: “Hand on Heart” meaning “speaking honestly”) is given new meaning in a short story by the Danish author and priest Johannes Møllehave (2002) who had a bypass operation himself some years ago. Møllehave described his observations of the heart surgeon Gösta Petterson performing a bypass operation in the Cleveland clinic, Ohio. At the end of the surgery, before the wound was sewn back together, Petterson put his hand under the patient's heart to make sure that everything was in the right place, thus literally holding the heart in his hand for a moment while he was still. This moment speaks to me of great care and beauty in performing a serious and life improving operation.

This position in relation to music in medicine forms a basis for my growing interest in implementing receptive music therapy in the medical field and in the area of cardiac care in particular. Music therapy may provide patients with an avenue for coping with their experiences of pain and anxiety in particular in relation to their cardiac malfunction.

1.3 Concept of body and mind in somatic illness

The conceptual framework for this study is a holistic concept of body, mind and spirit (Justice & Kasayka, 1999; Bonny & Savary, 1973,1990). Inherent in a holistic concept are the assumptions, that all phenomena affect the functioning of body and mind. This is based in the recognition that there is a connection between physical illness and the mind (Lazarus, 1999). The physical event of a cardiac surgery effects the cardiac patient at several levels, and even though imagery is not in question in this study, it is relevant to think about the suggestion by Short (2003, p. 35) to consider the patient's experience (in her study through the imagery) such as the emotional, psychological, social, spiritual and physical realms. As documented in the section (2.2) on Current practice, the standard treatment mostly focuses on the physiological aspects of the patient's care and on providing comfort such as pain relief.

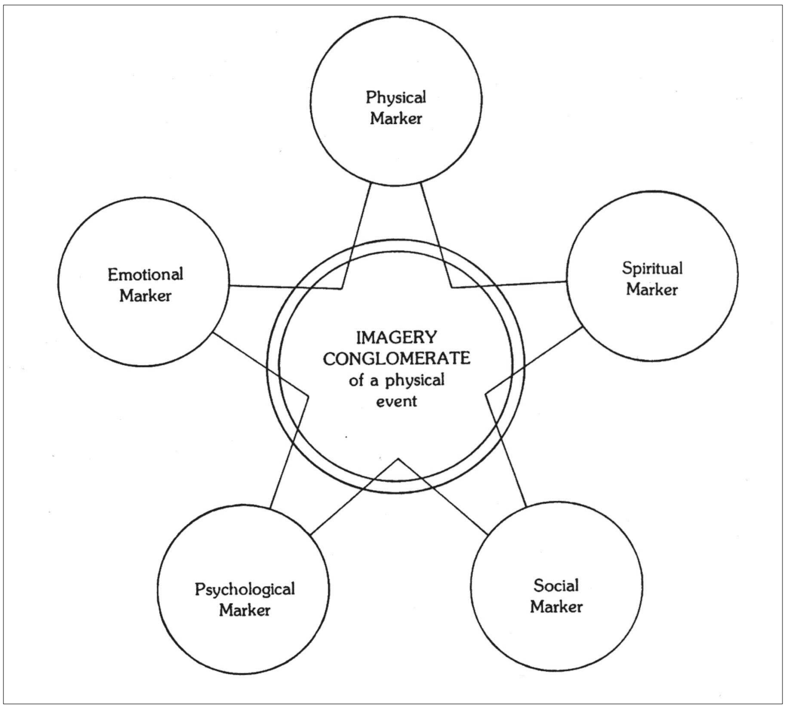


Figure 1.1. Schematic diagram of the imagery conglomerate generated by a physical illness or trauma, and the imagery markers left by this event (With permission, after Short, 2003).

As illustrated in figure 1.1., Short proposes that any physical problem or somatic event most likely cause a number of responses in the patient (person). The five pointed star depicts that these reactions or responses called somatic markers, can be of physical, spiritual, social, psychological or emotional nature. These somatic markers may communicate important clinical information and could possibly contribute to the assessment and diagnostic procedures (Short, 1991) though this most likely is a non common concept in the health system. The somatic marker's model can contribute to a more holistic perspective on the uncovering and expanding of a person's experience of a given somatic incident as for example heart disease and surgery.

Anecdotally, nursing staff at Unit T, the cardiac unit at Aalborg Hospital, report that patients who think positively about their recovery, who trust the doctors and that the operation will be successful, have a better recovery than do those who worry and are more anxious. Nilsson (2003) states that the impact of preoperative anxiety on recovery after surgery remains unclear. Janis (1958) proposed that a moderate level of preoperative distress is presumed to result in an optimal postoperative recovery, while both excessively low and excessively high levels of distress result in impaired or suboptimal recovery. More recent studies proposed that preoperative anxiety is associated with poor quality of postoperative recovery (Brull et al., 2002), and that there have been reports of associations between preoperative anxiety and postoperative mood and pain (Munafò & Stevenson, 2001). This understanding forms the basis for developing a guided relaxation focused on body awareness accompanied by relaxing music.

1.3.1 'In sickness and in health'

The use of music in relation to illness and health has been known since ancient history. The shamans and medicine men of indigenous people have used music, drumming, singing, and dancing to heal people (Eliade, 1989; Henry, 1995). The shaman was seen as a magician as well as a healer, who was believed to cure, like all doctors with his music (Eliade, 1989). In the 19th century, music was considered for healing purposes as addressed by Nightingale's concerns regarding the effect of noise and music in the care of patients. What may harm the sick person 'is the unnecessary noise and the noise that causes specific expectations' (Nightingale, 1995, p. 149; researcher's translation), and that harsh or sudden sounds are more harmful than a steady noise level. These comments may still be relevant in today's hospital environment which is characterized by a highly technologically developed milieu with sounds from monitoring systems, alarms, telephones, and high level nursing activity. Nightingale (1995) at her time found music to be a neglected area as it was considered too expensive to implement into nursing. She probably was considering live music only, as recording music at that time was not an option. Further she comments on the effect of specific instruments:

> …Wind instruments, including the human voice, and string instruments, that are characterized by prolonged tones, would have a pleasant effect, whereas the opposite would be true for piano and other instruments with short lasting tones. Even the most virtuous piano playing may harm the patient, while they would most likely calm down listening to a melody such as 'Home, sweet home' played on the most miserable barrel organ – and this may be true what ever associations this would evoke. (Nightingale, 1995, p. 161).

In the late 19th century the first recorded music was used in the hospitals as an intervention to diminish anxieties associated with surgery (Ruud, 1990), and it has been a growing field of development and research since after World War II, especially in the USA (Aldridge, 1996; Myskja, 2000; 2005), and in Germany (Spintge & Droh, 1992). After World War II music was used in the rehabilitation of the wounded veterans in North America. In recent years, the use of music in medical settings has been applied in relation to preventive measures, treatment, and rehabilitation of medical problems. In the USA in particular music may be played during surgery, not for the benefit of the patient, but for the medical staff performing the surgery (Bonde et al., 2001). In Germany, research in the field of music used during anaesthesia has been developed during the last twenty years (Spintge, 1985-1986; Spintge & Droh, 1983; 1992). Music is used in dental and physicians' clinics (Bonde et al., 2001; Standley, 2000).

1.3.2 Music in medical settings

Two different complementary approaches to the use of music in medical settings are distinguished to be currently in practice (Dileo, 1999): *music medicine* and *music therapy*. Music medicine is used as adjunct to the medical treatments by staff from medical professions, typically nurses and doctors and interventions are based on pre-recorded music. Medical practices of music therapy include approaches that focus on the direct treatment of biomedical illness, disease or injury, as well as those that address related psychosocial factors (Bruscia, 1998, p. 193). Further, Bonny, (1983) defined the use of music as a support to the medical treatment procedures and for its physiological effects and for its positive effect on the well being and mood of the patients.

Music therapy in medical settings was identified as music therapy and medicine by Standley (1995) and Dileo (1999). This area of practice involves a trained music therapist, and music is the modality through which the relationship between patient and therapist and the therapeutic process evolves. These differentiations and definitions are elaborated further in chapter 2 of this thesis.

The current study was set up to investigate the effects of guided relaxation with music and music listening on anxiety and other variables. The music therapy intervention of guided relaxation with music in this study included the patient-therapist relationship within the medical setting of a cardiac surgery unit. This relationship was not included in the music listening intervention. According to the above mentioned definitions of the use of music in medical settings, the level that this form of music therapy intervention meets is defined as a type of music therapy and medicine. Conversely, the music listening that was employed in this study is defined as a form of music medicine. This study intended to measure the effects of these interventions against a control condition, and the parameters for this will be established in chapter 3 of this thesis.

1.3.3 Anxiety and relaxation

The theoretical basis for using music as an intervention for anxiety has to do with its ability to promote relaxation through its effect on the autonomic nervous system (Cooke et al., 2005). As relaxation may influence anxiety and vice versa an intervention of guided relaxation with music may affect both the anxiety level and the function of the immune system (Zachariae, 1997). In relation to cardiac surgery, the well functioning of the immune system is important to the healing process in general and to 'fighting' infections in particular. Zachariae points to the fact that situations of intense, lasting and not controllable stressors, experienced by an individual as a loss of control, affect the balance of the immune system. According to Zachariae, there are studies that show effects on the immune system by intervention techniques such as visualization, hypnosis and relaxation. Though the studies include only healthy subjects, it is possible to expect a beneficial effect on the immune system in cardiac patients as well. Cortisol level and adrenalin are all indicators of relaxation or stress, while heart rate, and respiratory rate indicating a parasympathetic response, which means that change in these parameters can act as indicators of change in a patient's anxiety level. Spintge (1989) emphasises that anxiety can negatively impact treatment and recovery processes by depleting immune responses and resistance to infection, by increasing basal metabolic rates and incidences of cardiac complications, and by increasing the need for higher doses of anaesthetics and postoperative pain medications.

Patients with heart valve diseases are prone to a special risk when they experience anxiety as they already have a critical heart condition (White, 1992; Barnason et al., 1995). Spiegal (1991) suggests that there is growing evidence that helping people to express, rather than repress, emotion, is effective. Though as a receptive method of music therapy the guided relaxation intervention in the current study does not directly assist the patient in expressing and addressing their emotions, the music provides a means for experiencing oneself in a relaxed state including whatever emotions occur.

1.4 Theoretical basis

1.4.1 Music therapy approach in relation to client population

In order to consider the potential value of music as a therapeutic tool, the role may be considered first to be that of entertainment, enjoyment, diversion, comfort, mood enhancement, and relaxation in the lives of people admitted to hospital with life-threatening illnesses. Music listening is part of daily activities for all age groups in everyday life (Sloboda & O'Neill, 2001), and in general many people will be familiar with music of different styles that help them to relax in a variety of situations, and some will also have encountered guided visualizations. The musical programmes available for relaxation mainly include the new age style of music or light classical collections. In a hospital ward, the staff and the patients, are likely to choose this sort of selections of music for relaxation if (or when) they are looking for music to be used in the ward, since relaxation is helpful and necessary for the after care and rehabilitation of cardiac patients in particular. Anecdotally, it may be added here that the music played in the cardiac out-patient department is based on suggestions from staff as well as from patients.

Returning to the role of music as a therapeutic intervention, the most widely known intervention involving the use of recorded music in music therapy is the Bonny Method of Guided Imagery and Music (BMGIM), which is a receptive music therapy method that claims to be an effective tool in individual work and as a projective device for personal growth in the normal population (Bonny, 1999). It is indicated for people who are motivated and want to explore their inner lives and to grow personally (Bonny, 2002; Bruscia & Grocke, 2002). This method invites a client to go deeply into his or her personal process (Bonde et al., 2001, chapter 3.1) by way of a deep relaxation followed by shorter selections of classical music, which were designed to assist deep psychotherapeutic work on different issues and problems (Bonde, 1999). This method is defined as an intensive level of music psychotherapy (Bruscia, 1998, p. 219).

For differing reasons, this method of intervention may not be appropriate for the cardiac population. The population of Northern Jutland is known to consist of reserved, very down to earth and practical people. In general patients in this geographical area are not likely to speak much of their inner experiences or to want to dwell on their personal psychological / emotional processes. It is assumed that the patients are expecting somatic treatment for their physical condition as they enter a somatic hospital setting. The focus on their physiological functioning is in line with main stream Western Medicine and patients expect and are used to this approach in the public health care in Denmark. They are thus likely to be somewhat sceptical or even suspicious and reluctant to participate freely in a music therapy method such as the BMGIM. Furthermore, the patients in coronary surgery stay in hospital for only 5 to 10 days and are in need of relaxation. Receptive music therapy sessions may however provide a space for the patient to be contained with whatever emotions and states they may be in, but it is not intended in the present study to address anxiety through direct emotional processing, but rather through physical and mental relaxation achieved by therapeutic guiding and a specific music programme. Patients normally have to deal with their anxieties in the hospital setting any way they can, and degree and manifestation of anxiety will vary significantly from one patient to another. Given these conditions, a receptive music therapy method, as an adjunct to the medical treatment is being investigated in this study as an appropriate approach.

1.4.2 Heart disease, diagnoses and current practice

The literature on the use of music in relation to heart surgery unanimously describes anxiety, loss of control and fear of pain as characteristic of the experience in the heart surgery population. Further, it states that rest and relaxation are of great importance after surgery (Linow, 2005) and to this population when recovering from their heart operation. The introductory question then relating to this study was how to relieve or reduce anxiety in a non intrusive manner? The physiological signs of anxiety are increased heart rate, shallow breathing and tension of muscles. Inducing deeper breathing and a systematic relaxation *may* result in a reduction in anxiety. In an initial search in preparation for this study, no studies were found which included a one-to-one guided relaxation and relaxing music. The focus of the study was to investigate whether this introductory hypothesis was true or not. The current standard treatment focuses mainly on the physical aspects of the heart surgery patient for very good reasons. Introducing an intervention in relation to the psychological and emotional well being of the heart surgery patient may be too much for both staff and patients who expect somatic treatment in a somatic hospital.

Based on the expectation of anxiety being prevalent in heart surgery patients both before and after their operation it seemed specifically useful to introduce a non intrusive intervention into the post surgical hospital setting. A receptive music therapy method in the form of a guided relaxation with music does not demand verbal processing which was important to patients who may very well feel fatigued, fragile and vulnerable in the first post operative phase. The present investigation defined a controlled research study of three experimental research conditions in the field of music therapy used in a medical setting. A literature search revealed a number of publications in the field of music in medicine (Pratt & Grocke, 1999; Pratt & Spintge, 1996; Spintge & Droh, 1983; 1992), the use of music adjunct and supportive to medical treatment (Standley 1995), and that of music therapy and medicine (Dileo, 1999; Heal & Wigram, 1993; Wigram & Dileo, 1997). There was less evidence of enquiry into the value of music listening for relaxation with this population, and a paucity of detailed analysis into the effect of the music used.

Publications found on the use of music in hospital settings, reflected many studies carried out by nurses (Almerud & Petersson, 2003; Barnason et al., 1995; Blankfield et al., 1995; Chlan et al., 2001; Evans, 2002; McCaffrey & Good, 2000; Nilsson, 2003; Tusek et al., 1997; Tusek et al., 1999; Voss et al., 2004; Watkins, 1997; White, 1992; Winter et al., 1994; Zimmerman et al., 1996). The studies that have come out of nursing research tend to use music as an intervention in treatment without the required presence during treatment of a therapist or guide implementing it.

There were a few nursing studies that include taped therapeutic suggestions with music intervention (Blankfield et al., 1995; Nilsson, 2003; Tusek et al., 1999). Nilsson (2003) based four studies (Nilsson et al., 2001; 2003; 2003a; 2003b) on music and music with taped therapeutic suggestions and suggested that there was still a need for research which is specific regarding the music and guiding used. A different approach was reported by Cowan (1991) in her review of literature regarding the role of music in the reduction of anxiety. Three case studies were included specifically describing the process of the music therapist assisting the patient in preparing for the surgery right up to the moment of anaesthesia in function. The reported findings of beneficial effects on reducing anxiety were interesting in relation to this study, and emphasized the need for further research in music listening implemented by a music therapist. Further there was also a need for research taking a specific approach to analyse the selected music in order to illustrate and document how it may influence and affect the patients' experience of and coping with anxiety and relaxation, pain, and mood. Two studies which included the guidance of a music therapist were two doctoral dissertations (Bonde, 2004; Short, 2003). Short's study (2003) was concerned with holistic aspects of the rehabilitation of post-cardiac surgery patients and used a method of qualitative textual analysis. In Bonde (2004) the influence of The Bonny Method of Guided Imagery and Music, BMGIM, on mood and quality of life in oncology with music therapist present as guide was studied.

The literature search revealed no studies on a modified, receptive approach such as the use of guided relaxation with music for cardiac surgery patients in which music therapists administer the guiding with music. Further research in this field may contribute to the application of music therapy in a medical setting of patients particularly in need for relaxation.

1.5 Context

As stated above, there is little tradition of music therapists as a profession working in the somatic hospital in Denmark, and therefore knowledge and understanding of music therapy as an intervention in general medicine method is limited. The use of music by other health professionals is known in a variety of medical settings such as dentists and doctors treatment and/or waiting rooms (Standley, 1995; 2000), during kidney dialysis (Dileo, 1999; Maranto, 1993; Standley, 1995), adjunct to physiotherapy (Thybo, 1999) and in pain relief (Bjellånes, 1998; Myskja, 2005). In cardiac operating rooms and the cardiac outpatient department at Aalborg Hospital[3], music is played through loud speakers built into the ceilings of the rooms. Music is now part of the standard sound environment and is randomly chosen from a selection of soothing and popular music by the surgeon or nurse. The function of the music is to enhance the sound environment, to enhance the patient's experience in relation to their stay in the Cardiac out patient department (Thorgaard, B., 2004[4]). Anecdotally, surgeons reported[5] that they seem to focus (even) better when the music being played is chosen according to the surgeon's preference. Music is not part of the standard sound environment at the thoracic surgical unit, where cardiac patients are in postoperative care.

The relationship between patient and staff has changed during the last few decades as people have access to more information on health, illness and treatment via the internet, libraries, medical programs on TV, free medical magazines, and magazines published by advisory organisations such as the Danish Heart Society (Damsgaard, 2005). In addition, the authoritarian style has been superseded by a more communicative style. People tend to share their experiences more. Though there is a growing movement of 'grassroots' asking for alternative treatments or medications, as well as good reasons for medically proposed treatment plans, most patients (especially in Northern Jutland) still trust and believe in doctors' orders and suggestions.

1.6 Development of research design

The research design was developed on the basis of the findings from the literature search regarding

---

[3] Aalborg Sygehus Syd, in English: Aalborg Hospital, Southern Department
[4] Unpublished paper/ personal communication with B. Thorgaard.
[5] Personal communication when researcher observed activities in cardiac outpatient department, and news on local television, 2004.

the needs of the heart valve surgery population, and which music therapy approach would be appropriate. A key factor was the selection of different music styles that could offer the participants' alternatives in a 'forced' choice of music for their relaxation. To achieve this involved the development of music selections based on pre-determined criteria for a range of appropriate music for the therapy process. Included in the design were recommendations for the duration of sessions, and the dosage and timing of treatment. An appropriate form of guided relaxation needed to be developed in order to establish consistency.

1.6.1 Theory and issues in research design

In Danish hospitals setting there is a tradition of medical research being based in the natural science, and in this regard Taylor (1997) writes that:

> In order to establish music therapy firmly within the community of medical and scientifically based disciplines, its research base needs to consist of valid well controlled studies whose design, methodology, and analysis procedures are replicable and yield reliable results. (Taylor, 1997, p. 123)

A fixed design (Robson, 2002) was chosen as this is appropriate for outcome based investigations analysing the type of data collected in this study. In respect to communicating evidence based music therapy for a hospital setting and medical doctors/surgeons and nursing staff it seemed at the time a constructive way in to implement music therapy into a thoracic surgical unit.

1.6.2 Choice of research design and procedures

A between and within groups design was selected to allow for comparison between different research groups to explore whether differences in guided relaxation with music, music listening and no music control research conditions influence the outcome and whether they differ compared to each other. Within each group, comparisons could be made at different times of sessions through repeated measures possibly revealing differences in the effects pre and post surgery and/ or differences pre and post sessions and pre/ post 'treatment' overall of any of the three research conditions. The between groups-repeated measures-design allows for comparison between research conditions and of the effect of the dosage of each condition at different times of measurement.

1.7 Problem formulation

This study investigates if it is possible to relieve or reduce anxiety and pain, to enhance mood, and to support patients in coping with their situation in the first phase of their rehabilitation[6], after heart valve surgery by way of a receptive music therapy method in the form of a guided relaxation with music. The *intention* of the guided relaxation with music is to:

- Introduce the patients to a simple relaxation technique that may be combined with music listening
- To reduce the patient's anxiety, pain and tension level and possibly increasing their satisfaction with their stay in hospital

The *purpose* of the study is to investigate the following:

1. What are the effects of guided relaxation with music on selected psychophysical outcomes in patients after their heart valve surgery?
2. What aspects of the intervention of guided relaxation with music have an effect on the patient's experience of relaxation?

The first question of the above mentioned problem formulation has lent itself to the generation of five hypotheses regarding the effect of a receptive music therapy method on specific psycho-emotional and physical measures. The second, supplementary question has generated two research questions regarding which aspects of the music therapy intervention affect relaxation in the participant's experience. These hypotheses and supplementary research questions are presented in detail in the final section of chapter 2 (section 2.8). From these hypotheses and research questions, a review of literature will be undertaken in order to contextualise the current study of a receptive music therapy method in medicine – with a population of patients experiencing heart valve surgery in a hospital setting.

[6] Definition of rehabilitation following heart surgery as formulated by the Danish Heart Association and based on The World Health Organization, WHO's definition from 1992. This operates with three phases of which the first includes the hospitalisation pre and post heart surgery until discharge.

1.8 Overview of the thesis

Chapter 1 introduces the background, the personal motivation, the theoretical frame for the study regarding somatic illness, music therapy in medical settings, and the development of the research design. The problem formulation stating the purpose of the current study is also presented.

Chapter 2 provides an extensive review of the literature on the epidemiology and the current treatment of heart disease and surgery in adults in Danish hospital settings, in order to provide a theoretical frame for the study. The general and specific uses of music in medical settings, of relaxing music in relation to surgery, and with the cardiac population are reviewed, as well as outcome studies reporting the effects of music medicine and music therapy in relation to surgery. In conclusion this chapter presents the specific research questions and hypotheses as derived from the theoretical frame. In the main, the previous research and clinical reports referred to in this chapter were those published up to and including 2005, at which point the clinical trials were initiated. Studies and reports published after 2005 will be addressed in the discussion.

Chapter 3 outlines the methodology, including the choices made in developing the music therapy technique, guided relaxation with music, and the research method for the clinical trial.

Chapter 4 reports the results of the study, and presents the descriptive and inferential statistical analyses in relation to the hypotheses and the supplementary research questions.

Chapter 5 discusses the findings and the methodology in relation to the theoretical frame, and with reference to findings from previous studies. The limitations of the study are assessed and reported, as well as the clinical relevance and application of the findings. The chapter offers a final conclusion of the findings from this study, together with thoughts on future research directions.

A DVD[7] containing the music programmes and excerpts utilised in the current study, and a CD-Rom containing the Appendices, accompany the thesis. The contents of the DVD are found in appendix 1.1.

Formatting of text, tables and figures

The writing up of this thesis has followed the guidelines from the American Psychological Association (APA, 2005) as a recommended house style at Aalborg University.

[7] The DVD can be played on a laptop / personal computer.

CHAPTER 2

THEORETICAL FRAME OF RECEPTIVE MUSIC THERAPY IN SOMATIC MEDICINE AND HEART VALVE SURGERY

There is a large amount of literature on music used in medicine of current interventions before, during and after operative procedures and a number of therapeutic approaches that are undertaken by music therapists and also by other professionals. The review will identify the differences between these interventions and then review the literature that relates to the more general level of the use of music in medical somatic hospital settings. The primary purpose of the review though is to focus in detail on studies reporting the value of music in the treatment of the population with heart diseases, the specific function of music therapy for this population both in medical and surgical treatment, in particular on the evidence of outcome research on the effects of music and music therapy pre and postoperatively. The review will also explore what has been documented regarding the therapeutic quality that needs to be identified in the music used in these therapeutic interventions.

2.1 Epidemiology

The scientific basis for introducing music with guided relaxation for a population of patients suffering from severe heart conditions demanding surgery, begins with an understanding of the context of heart disease. In Denmark approximately 450.000 persons suffer from heart- and circulatory disturbances (Hjertenyt[8], 2003), and an estimated 200.000 persons have ischemic heart disease, which is caused by atherosclerosis[9] (Schmidt, 2005). Risk factors for developing atherosclerosis are smoking, obesity, unbalanced diet (much fast food), and lack of exercise. Cardiovascular diseases are the most frequent cause of death in Denmark.

The number of deaths from cardiovascular diseases among employed men and women (30 – 64 years) has decreased in a linear fall by 56% over the last 15 years (Hjertestatistik/*Heart statistics*, 2004). This decrease is partly due to changes in life style and partly to preventive measures, though education is an influential factor as well. Heart valve malfunction is found in approximately 2.000 patients admitted to hospital every year (Denmark), and in persons older than

[8] Hjertenyt Magazine published by the Danish Heart Society(in English *News of the Heart)*
[9] Atherosclerosis is the medical term for arteriosclerosis, hardening of the arteries (Axelsen, 2002)

75 years of age the prevalence is 3%. The risk of developing heart valve disease increases with age (Kelbæk et al., 2005). As a consequence of the technical improvements, the average age of the heart patients has increased; the majority of patients are now in their late sixties and seventies, and male. In 2000 – 2003, 83% of the 589 cardiac surgery patients were men in the age group 40 – 60 years. In the same four-year period, a total of 1.417 patients in the age band 61 – 80 years had cardiac surgery, and 72,5 % of this population were men (based on statistics from the thoracic unit, Aalborg, 2000 – 2003).

The history of heart surgery in the form of open heart surgery with the use of a heart and lung machine was initiated in the 1950's primarily in cases of innate heart deformities. The first artificial heart valve replacement was performed in 1958. The most common type of heart surgery is **C**oronary **A**rtery **B**ypass **G**rafting, CABG (Petterson et al., 1999). The average annual number of heart valve operations (with and without CABG) in previous years were 900 (Kelbæk et al., 2005). This number has increased to 1450 in 2005 (Danish Heart Registry[10], www.dhreg.dk). The types of heart valve operations made in 2005 in Aalborg and in Denmark in total are shown in table 2.1 by distribution in percentages. The heart valve surgery is either performed as a valve operation only (single procedure) or with a concurrent CABG (double procedure).

Table 2.1
Heart valve surgeries in 2005 (percentages) in Aalborg and in total for Denmark

	Single procedure			Double procedure With CABG		
Type of heart valve operation	Aorta	Mitral	Both			
Aalborg	*45.6*	*13.4*	*1.3*	34.9	4.0	0.7
Denmark	*45.3*	*15.7*	*3.3*	28.3	6.1	0.8

As shown in table 2.1, the majority of heart valve surgeries (Aalborg 45.6 %; Denmark in total 45.3%) are performed on the aorta as a single procedure type surgery. The percentages of the total number of heart valve surgeries as single procedures are similar in Aalborg compared to the total in Denmark. Aorta valve operations in combination with a CABG are the most common double procedure type surgery (28.3 to 34.9%).

[10] The Danish Heart Registry is a Nationwide database, covering all invasive cardiac procedures and all coronary artery by-pass and heart valve surgery performed on adults in the entire country. The registry is based on regular reports from all public and private hospitals, performing invasive cardiology and thoracic surgery.

Taking a regional area in Northern Denmark as a focus (where this study was carried out), there has been a constant development and improvement of examinations in the cardiac outpatient department which has reduced the number of cardiac surgeries. At the specialist Heart and Lung Surgical Unit T in Aalborg General Hospital, the number of heart operations has decreased from an average of 700 per year over the last decade to an average of 500 cardiac surgeries per year (based on statistics from the thoracic unit, Aalborg, 2000 – 2003). In recent years, the annual number of heart valve surgeries has increased from an average of 90 (2000 - 2003) to 120 (2004 to 2005) due to improved examination methods. Heart valve surgeries form 21% of the total annual number of heart surgeries in Aalborg (2003).

2.1.1 Heart disease and surgery in adults

The following section describes the types of heart diseases that are treated with surgery.
Ischemic heart disease is caused by atherosclerosis in the corona arteries, and present clinical conditions such as angina pectoris (heart spasm /convulsion or coronary thromboses); heart insufficiency or heart failure, and heart arrhythmia (Schmidt, 2005). The risk of developing atherosclerosis, hardening of the arteries, and its related diseases is increased by relatively persistent high blood pressure (Benson, 1975/2000, p. 22). There is an increased risk of developing atherosclerosis diseases from factors such as:

- family history of atherosclerosis disease
- smoking
- obesity
- the combination of increased blood pressure and high concentrations of cholesterol

High blood pressure or hypertension, causes the heart to work harder and puts excessive strain on the heart which makes the heart muscle increase in size like any muscle would that is used or exercised. The risk of a heart attack is greater in the case of an enlarged heart (Benson, 1975/2000, p. 27 -30). When atherosclerosis builds up in the arteries and is gradually blocking these, it can cause death by heart disease and stroke (Benson, 1975/2000, p. 24). Populations with high cholesterol are more prone to hardening of the arteries and atherosclerosis disease than populations with low cholesterol (Benson, 1975/2000, p. 27). The tendency towards high or low cholesterol may be hereditary. Ischemic heart disease is surgically treated with CABG or **O**ff **P**ump **C**ardiac **A**rtery **B**ypass grafting, OPCAB.

The most common types of heart valve diseases are found in the aorta and the mitral valves, both found in the left part of the heart. Diseases in aorta are commonly caused by atherosclerosis, rheumatic fever earlier in life, degeneration of the valve, infection in the valve (endocarditic), or an innate condition. In case of atherosclerosis the valve is either being too tight (stenosic), or not tight enough (insufficient) or in some cases, both tight and insufficient. A stenosic valve means that the heart needs to work harder in order to provide the same amount of blood to pass the valve. When the valve works insufficiently, some of the blood returns to the left ventricle from the aorta, and the heart increases its beat volume in order to pump more blood. This condition causes an enlarging of the heart and thickening of the 'wall' of the muscle (Schmidt, 2005; Petterson et al., 1999). Symptoms of these conditions in the aorta are shortness of breath, nausea, fainting, fatigue or chest pain (Andreasen et al., 2003). Diseases in the mitral valve most often are caused by rheumatic fever earlier in life, and mostly found in women (Schmidt, 2005). Symptoms of this type of heart valve malfunction are also shortness of breath, faintness, and tiredness due to a reduction in the heart's pumping function. An irregular heart beat can cause a sensation of the heart pounding.

General symptoms of heart disease are chest pain and discomfort; swollen ankles, fainting incidents and coughing. Weight loss and fatigue can also be symptoms of diseases of the heart (Petterson et al., 1999). There are more reasons for these symptoms: One is that the heart is over worked and not able to pump a sufficient amount of blood in the body causing heart failure or heart insufficiency. Angina pectoris is another condition causing chest pain due to an insufficient blood supply through the arteries. Disturbances in heart rhythm can cause heart pounding, irregular heart beat and fainting. In the treatment of angina pectoris it is often possible in the outpatient department to perform **P**ercutaneous **T**ransluminal **C**oronary **A**ngioplasty (PTCA). This technique is suited for easily accessible constrictions in the larger arterial branches of the heart muscle. The PCTA may be complemented by the insert of a so called ‘stent’ which supports the expansion of the blood vessel (Petterson et al., 1999).

In the case of heart valve malfunction the valve needs repair or replacement. Artificial valves are either mechanical, which lasts the longest, or biological that have a limited durability (approximately 10 years) (Schmidt, 2005, p. 345). The standard type operation for CABG and heart valve surgery includes sternotomy (opening of the chest through the sternum). In recent years, a less invasive type of heart valve surgery has been available regarding heart valve surgery. In place of the traditional type of surgery done through the opening of the chest, this 'sternum-preserving' type surgery is performed through a short opening under the rib in the side of the patient's body, a method which is physically less traumatic to the patient, also done with the use of the heart-and-lung-machine. The operation is supported by a arthoscopy through which pictures are transferred to a monitor allowing the surgeon to watch the area in question (Schmidt, 2005; Dölner, 2005). The coronary bypass is made by grafting a blood vessel, usually taken from the patient's leg, onto one of the arteries in order to 'bypass' the blockage or narrowed artery (Petterson et al., 1999, p. 108 ff). After the CABG, the patient in principle experiences a normal blood flow to the heart, but the atherosclerosis continues (Schmidt, 2005, p. 342).

Surgeries performed in Aalborg include OPCAB (closed surgery), and heart surgery with heart- and lung machine, **E**xtra **C**orporal **C**irculation, ECC (open surgery). OPCAB surgery applies to CABG only, as heart valve surgeries are performed on a still heart and with the help of heart-and-lung machine.

In summary, the prevalence of ischemic heart disease which is caused by atherosclerosis is, to a large degree, related to lifestyle factors such as smoking, obesity, and limited exercise, whereas heart valve diseases and malfunction can be innate, degenerative, or caused by rheumatic fever. Surgical treatments are done as single procedures repairing or replacing heart valves only, or in connection with a CABG, double procedure. Both types of procedures are performed as open surgery. The aim of the heart valve surgery is to repair the insufficient or the stenosic valve so that the heart can work well again, allowing a sufficient blood stream through the heart, and ensuring that the patients can regain normal breathing and a condition of less fatigue compared to their condition before surgery. In the following sections, the current treatment practice in the rehabilitation that follows the surgery, is described.

2.2 Current practice (treatment)

In the following sections, the problems exhibited by persons with heart valve disease in need of surgical treatment, and the practice of current treatment and rehabilitation at different stages in Denmark are described. Different forms of relaxation are defined and described, as well as their current practice in relation to this population.

2.2.1 Problems exhibited by the heart (valve) surgery population

2.2.1.1 Anxiety in relation to heart surgery

Patients with a heart disease are presented with a new, unknown situation for which they have not been prepared. Heart problems are usually perceived as life threatening, and anxiety and uncertainty about the future are feelings that are often triggered. Difficulty in breathing can cause a person with heart disease to experience fear of dying (DHS, 1997). In facing the fact and impact of a serious heart problem, many (and often contradictory) emotions may be experienced (Petterson, 1999). Several studies have reported that a sense of loss of control, anxiety and fear of death are common characteristics independent of age in patients with heart diseases (Bonny, 1983; Elliott, 1994; Barnason et al., 1995; Mynchenberg & Duncan, 1995; Aldridge, 1996; Saperston, 1999; Tusek et al., 1999; and Escher et al., 1996). It is recognised that awaiting heart surgery can cause stress, and that anxiety prior to heart surgery is very common, as stated by Denber:

> Cardiac surgery can be considered a major stress... There is a basic fear inherent in cardiac surgery. The uninterrupted heartbeat is accepted universally as evidence of life, and its cessation means death. Cardiac surgery disconnects patients from the past and places them in both an inexistent present and in a future without meaning until they re-awake. Some patients believe they are dead during cardiac surgery, that their heart has been removed elsewhere to be operated on and repaired, or that their brain has been deprived of oxygen. (Denber, 1995, p. 160)

Imminent surgery is a causative factor in releasing specific emotional, cognitive and physiological reactions in a patient (Rymaszewska et al., 2003). These authors found that 55% of the patients in their study (n= 53) experienced a high level of anxiety as self reported by the Spielberger Anxiety Questionnaire. Shortly after surgery, 34% of the patients still experienced a “clinically relevant level of anxiety”. The authors concluded that high preoperative state and trait anxiety (and depression) scores “appear to be predictors of postoperative psychological outcome”, and that effective treatment of disorders such as high level of anxiety “is an indispensable condition for recovery to full psychosocial competence”, (Rymaszewska et al., 2003, p. 155). Their study was concerned with depression and anxiety, and though these variables were measured independently, the conclusion may not necessarily be drawn regarding one variable independent of the other.

When people are taken ill with a heart disease, this can be experienced as a threat that intrudes and shakes the persons' lives. Suddenly, well known coping strategies become inappropriate; The world is in chaos, and out of control (DHS, 2003, p.4). This psychological crisis, Cullberg divides into four phases of *shock* either showing as anxiety and despair or (for some) with seemingly no reaction; then a *reaction* phase; followed by a *processing* phase; and concluded in the *new orientation* phase (DHS, 1997). Physical symptoms emerge such as dizziness, tension, difficulty in breathing, chest pain, and sudden palpitation among others. Neurologically, cardiac surgery with a heart- and lung machine (ECC) affects the patient by causing difficulty in concentration, reduced reaction, and reduction of the strength in arms and legs (Petterson et al., 1999). A study on depression in cardiology reported the finding of 25 % of patients having a depression in relation to their heart disease (Spindler & Pedersen, 2005). Some patients experience life as meaningless and not worth living. They perceive their heart problem as marking the end of a working and active life. Heart patients commonly experience a decrease in their self esteem, and feel like giving up every thing. Of the total cardiac surgery population, 20% experience depression, often months after their surgery (DHS, 2004). Depression is rarely present in the first postoperative phase (Spindler & Pedersen, 2005) and is not explored further in this study.

The patient's anxiety level is usually decreased by the time the patient has had the surgery and enters the rehabilitation programme. The patients typically are relieved that the surgery was successful and that they are alive. Some patients *may* experience anxiety whether their problem is solved or their situation improved, though they are informed and know mentally that the operation was successful. Many of these issues are difficult for the patients and their relatives to talk about, amongst themselves and/or with staff and others. If feelings are not expressed and shared, the patient may experience irritability, mood fluctuation, and instability, lack of concentration, bad memory, or fatigue. Though patients feel relieved right after the surgery (Petterson et al., 1999), they may become more anxious at discharge when they leave the safety and the care of the hospital setting. In general, the cardiac surgery population is keen to get out of hospital, go back to work, and resume a normal life style. They may not want to go into a deep experience; they want to get on with life! According to the head nursing staff this attitude is characteristic of this population (personal communication, 2004).

2.2.1.2 Pain in relation to heart surgery

Pain is a common characteristic of the immediate postoperative phase, when the heart valve has been repaired or replaced, and in some cases, a bypass has repaired the arteries that were narrowed from atherosclerosis. After the operation patients experience pain in the sternotomy in the chest and in the back, because this has been strained due to the opening of the chest during the operation (Andreasen et al., 2003). The postoperative pain may last for an extended period of time, which can cause anxiety and irritation (Short, 2003). Short writes:

> The pain in itself has the capacity to promote worry about a recurrence of angina or heart attack, and at times such pain limits participation in rehabilitative activities such as physical exercise. (Short, 2003, p.39)

In current practice of the postoperative pain treatment, the objective is to secure the patients' possible mobilisation, normal food intake, and make the patients comfortable, thus resuming their normal condition as quickly as possible and prevent complications. In personal communication

(2004) with the head nursing staff at Unit T, it was reported that patients often are uncertain about their physical activity level and capacities, since the chest has been opened and stitched together with metal wire. They tend to avoid using their arms out of fear of pain and of doing damage to the wound.

2.2.2 Pre- and Post operative rehabilitation

The rehabilitation of cardiac patients is founded on legal regulation, evidence based research, and on recommendations by the Danish Heart Society (DHS). The definition of heart rehabilitation offered by the Danish Heart Society (in cooperation with the Danish Cardiological Society) is based on the definition by World Health Organization, WHO, from 1992:

> The object of rehabilitation of heart patients is to increase the level of function in the patient, to eliminate or decrease activity related symptoms, to minimize the level of invalidation, and make it possible for the heart patient to resume a satisfying role in society. (DHS[11], 2004)

The legal foundation in Denmark is published in 'Law on Patients Legal Position of 1999' and in 'Law on Hospital Service' (including change of 1st July 2001) and states that:

> It is compulsory to inform all heart patients about the rehabilitation options, even if they are not available locally. It is also compulsory to prepare a rehabilitation plan for all patients, including ischemic heart patients. (DHS, 2004)

The Cardiac rehabilitation programme falls into three phases (DHS, 2004):

Phase I	Preparation for surgery, and the post operative period in hospital until discharge
Phase II	From discharge till the patient is able to manage his/her daily activities
Phase III	A late follow-up and continued rehabilitation

The rehabilitation is mainly concerned with the care that is necessary following the most common heart operations, CABG and heart valve repair or replacement. The treatment offered in these phases varies as follows:

2.2.2.1 Phase I

In the early rehabilitation phase the *physical* functioning of the patient is the main focus. All staff caring for the patients on a daily basis are nurses specialised in the thoracic surgery care[12]. The doctor is in charge of prescriptions and the monitoring of medication. A physiotherapist instructs

[11] Researcher's translation from the Danish.

[12] No staff members of less than nursing training are employed in Unit T in terms of caring for patients pre and post operatively.

the patient in some breathing techniques on the day before the surgery, so that the patient has a chance to try these and knows how to do them without the experience becoming painful. The exercises are done as soon after the surgery as possible and assist the release of mucus from the lungs. The *purpose* of this phase is to:

a) improve the patient's level of functioning
b) remove or reduce activity related symptoms
c) minimize the level of invalidity
d) enable the patient to resume a satisfying role in society

In order to achieve these objectives, rehabilitation is organized and adapted to patients individually. The following factors regarding the patient are considered:

- the severity of the heart disease
- the types of medical and surgical treatment
- the level of physical functioning
- psychological state
- risk factors
- the patient's profession

Patients are admitted to Unit T in the morning on the weekday prior to their surgery. In preparation for their surgery, the patient meets with several specialists of a multidisciplinary team: A *nurse*, who is assigned as the primary contact person, informs the patient of the schedule for the day; a *physiotherapist* informing on breathing exercises; the *physician* in charge of the overall treatment of the patient; the *surgeon* in charge of the surgery; an *intensive care nurse* informing about the intensive care unit and showing pictures of the full equipment; and an *anaesthetist*. Further the patient has blood and urine samples taken, weight and height are measured; x-ray examinations of the heart- and lungs are done; as well as measures of heart rate, blood pressure and Echo-Cardio-Graphy.

As part of the admission procedures, the patients are given written patient information on heart valve operations (Andreasen et al., 2003). This paper provides the patients with a general introduction to what is going to happen to them during their hospital stay, particularly regarding physical and practical aspects. Mention is made, that a priest associated with Unit T can be contacted (Andreasen et al., 2003, p.13). The patient's anxiety about the upcoming surgery is not directly addressed in the preparation meetings and only briefly mentioned in the patient information in regard to the postoperative period (Andreasen et al., 2003, p. 8). In drawing from the researcher's observations, how this issue is included in these conversations seems to depend on the personality of the staff. Anecdotally it may be added here, that a surgeon mentioned the importance of de-dramatising the event by providing exact and relevant facts about the surgery and of the risks involved, and by creating a calm atmosphere in the situation. Leaving space between questions, encouraging the patient to ask questions, and acknowledging the patient's anxiety, was intended to contribute to the patient's trust in the process (and staff) and to 'normalise' their fear. Observing the patient, however, some of these factors seemed to have an effect of possibly increasing anxiety. The patient is likely to have suppressed his real feelings. This observation is supported by Spintge who writes:

> Especially in anaesthesiology and surgery many patients are so much influenced by their fears that they are unable to gain any emotional profit out of their talk with the physician. (Spintge, 1985-1986, p. 186)

As for pain, the patient was encouraged not to endure pain and try to be tough. Instead, the importance of expressing their pain was underlined, since the pain could prevent the patient from doing healthy movements and exercise. It is underpinned in the written information as well, that the patients should not hesitate to let the nurses know when they experience pain (Andreasen et al. 2003, p. 6).

The day after surgery the patient is transferred from the thoracic intensive care unit, TIU, to Unit T. The cardiac patients are monitored on screens for the first few days after their return from the TIU by telemetric monitoring which allows for the patients' moving around freely in the following days. At the hand-over, any important information about the state of the patient and related factors affecting the current treatment, are reported to a (primary) nurse. Related factors are for instance surroundings, resource demands, values. This information is given based on a model for documenting the nursing care in the patient journal, a guideline, in short called VIPS[13]. Vital functions such as respiration, circulation, and consciousness, how the patients handled the surgery, their communicative status, their ability to express their needs, pleasant /unpleasant experiences, how relatives interact, are all observed and reported. After a couple of hours the patient is assisted by a nurse and the physiotherapist in getting out of bed. The exercise programme is expanded on a little day by day. The patient is instructed how to breathe in order to release any mucus from the lungs.

The standard treatment during the hospitalisation until discharge includes continued overlooking and monitoring of heart rate, blood pressure, atria flutter, breathing function, nutrition, secretion, and the general well being of the patient. Heart rate and blood pressure are regulated by

[13] Danish (*English)*: Velvære (W*ell-being*), Integritet (*Integrity*), Profylakse (*Prevention*), Sikkerhed (*Safety*)

medication such as acetylsalicylate and beta blocker, and, when needed, by a temporary, external pace maker which is connected through electrodes as part of finishing off the heart valve operation. In addition to the physical care and treatment, and according to the guidelines, patients and their relatives should be offered psychological support in the early phase of rehabilitation (DHS, 2004). The guidelines recommend a maximum period of 1 to 2 weeks from phase one to the initiation of phase two, as an early follow-up reduces the risk of anxiety and depression (DHS, 2004, p. 14).

2.2.2.2 Phase II & Phase III

These two phases are briefly mentioned as a context for the phase in question in this study. The hospital is in charge of phase II, initiated preferably 1-2 weeks after the surgery, and typically of 6 to 12 weeks' duration post surgery. Phase III is managed by the hospital in cooperation with the GP[14], and the relevant patient organisation (such as the DHS). One month after discharge the patient is invited and encouraged to participate in a group rehabilitation programme of eight sessions, which take place in the physiotherapy department at the hospital. A nurse and a physiotherapist lead the programme with the purpose of assisting the patients

- in the process of resuming their usual activities
- to get to know their physical capacity after the surgery
- to increase the patients' knowledge on the factors that affect the heart
- to motivate the patients to a life style beneficial to the heart

The sessions include exercise, advice and education on diet, medication, anxiety, pain, smoking, heart disease, and the anatomy of the heart. The programme is mainly for the heart patients' voluntary participation. Their relatives are invited to participate in a specific session.

2.2.2.3 Further rehabilitation: The Danish Heart Society (Hjerteforeningen) – DHS

Outside of the hospital setting and the treatments offered there, patients are encouraged to make use of the Danish Heart Society (DHS). The purpose of this private organisation is to:

a) support heart research (economically and otherwise)
b) offer counselling on how to prevent heart- and circulatory illnesses
c) support heart patients and their relatives

[14] GP= General Practitioner (in Danish: praktiserende læge)

The DHS has seven regional counselling centres and two smaller satellite centres in this country. The counselling centres offer personal conversations; conversations on dietary needs; support groups; telephone counselling; measurement of blood pressure, cholesterol, and blood sugar; fitness test; lectures, talks and courses; publications and cook books on healthy diets. The staff at DHS centres consist of a few professionals (nurses, social worker, and dietician) employed by the organisation, and of many volunteers. At the local centre in Aalborg the nurse stresses, that their main focus is educational activity, and counselling in the sense of offering people advice on where to seek further assistance. They do not offer psychological or psychotherapeutic assistance as a treatment.

2.2.3 Heart diseases and relaxation

In order to understand relaxation in relation to heart disease and surgery, the following sections first consider definitions of relaxation, how to understand relaxation in relation to the fight-or-flight response, followed by the illustration of different approaches to relaxation. Then, the current practice of relaxation is described.

2.2.3.1 Definition of relaxation

Relaxation may be defined as a physical state of becoming less tense or tight in the muscles; and psychologically to feel relaxed in the sense of feeling free from nervous anxiety and disturbing tensions. A relaxed body can be described as a state in which the muscles of the entire body are in a state of balance (Bonny & Savary, 1973, 1990, p. 6). Further on these authors describe a relaxed feeling to be one of weightlessness. This relaxed state is intended to assist the persons in their shift from ordinary consciousness to an altered state in order to create a music listening space. For the purpose of this study further enquiry into levels of consciousness was not undertaken.

2.2.3.2 Relaxation and the fight-or-flight response

There are different ways to respond to a stressful situation known as the fight-or-flight response. When faced with a stressful situation the body releases hormones, adrenaline and nor adrenaline, or epinephrine and nor epinephrine, in order to increase heart and breathing rate, blood pressure, metabolic rate and blood flow to the muscles, to enable the body to either fight the situation or flee from it (Benson, 1975/2000, p. xvii). When the body is in a state of relaxation the opposite response is true: a survival mechanism in the sense of "the ability to heal and rejuvenate" the body. One difference between sleep and a relaxed state (such as meditation) is the increase in intensity and frequency of slow brain waves (alpha waves) during the practice of meditation. These are not commonly found in sleep (Benson, 1975/2000, p. 66).

2.2.3.3 Approaches to relaxation

The literature search found a number of body-mind approaches to relaxation, such as autogenic training as developed by a German neurologist, Schultz (Benson, 1975/2000; Schultz & Luthe, 1969); progressive muscle relaxation as developed by Jacobson (1959); and more recently, visualisation as developed and described (in Denmark) by Zachariae (2005). Further, different types of meditation, behaviour modification, mind control, and hypnosis are found as means of promoting relaxation (Bonny & Savary, 1973, 1990), which are not further developed in relation to this study.

The autogenic training suggests five exercises to reach a trophotropic[15] state: The patient takes a lying position and closes his/her eyes. Following this, the patient should:

1) focus "on a feeling of heaviness in the limbs"
2) focus a feeling of warmth in the limbs
3) deal with alleged heart regulation
4) develop passive concentration on breathing
5) cultivate feelings of coolness in the forehead
(Benson, 1975/2000, p. 76)

An eliciting attitude toward the exercises should be of a "let it happen" nature (Benson, 1975/2000, p. 76). Progressive Relaxation was developed by Jacobson, and emphasised the relaxation on the muscles over which a person has conscious control, and is practised by tensing and relaxing the muscles progressively through the body (Jacobson, 1959).

As an experienced research and clinical cardiologist working with patients with high blood pressure (a precursor of heart disease), Benson (1975/2000) developed a method for relaxation, the Relaxation Response, which he defined as an inducible, physiological state of quietude.

> In modern times, the Relaxation Response is undoubtedly even more important to our survival, since anxiety and tension often inappropriately trigger the fight-or-flight response in people. (Benson, 1975/2000, p. xvii)

Further, this author stated that the Relaxation Response proved effective in treating hypertension

[15] relaxed

as well as cardiac rhythm irregularities and anxiety (among others) ((Benson, 1975/2000, p. xix). There is not a single method that is unique to elicit what Benson (1975/2000) refers to as the Relaxation Response. Benson writes:

> When the mind is focused... through repetitive mental activities the body responds with a dramatic decrease in heart rate, breathing rate, blood pressure (if elevated to begin with), and metabolic rate - the exact opposite of the fight-or-flight response in people. (Benson, 1975/2000, p. xviii)

Four steps (in the updated version) are considered essential to elicit the relaxation response:

1) a quiet environment
2) a mental device - a sound, word, phrase, or prayer repeated silently or out loud
3) a passive attitude - not worrying how well one is performing - putting away distracting thoughts to return to one's focus
4) comfortable position

In the revised edition (Benson, 1996) these were reduced to two essential steps, that of the repetition of a word, sound, phrase, prayer, or muscular activity; passively disregarding everyday thoughts, and returning to the repetition. The author lists nine instructions as a general technique for eliciting the Relaxation Response:

1) Pick a focus word, short phrase, or prayer firmly rooted in your belief system
2) Sit quietly in a comfortable position
3) Close your eyes
4) Relax your muscles, progressing from your feet to your calves, thighs, abdomen, shoulders, head and neck
5) Breathe slowly and naturally,..., and repeat the focus word, phrase or prayer silently
6) Assume a passive attitude (when other thoughts come to mind ....gently return to the repetition
7) Continue for ten to twenty minutes
8) Continue sitting quietly for a minute or so, allowing other thoughts to return. Then open the eyes and sit for another minute before rising
9) Practice the technique once or twice daily. Good times are before breakfast and before dinner

   (Benson, 1975/2000 p. xx)

This was a method taught to patients to practice in their own time, which proved to lower the patients' blood pressure level (Benson, 1975/2000). This result was partly supported in a study investigating two different relaxation techniques, the Relaxation Response with a jaw relaxation versus a control condition in 45 male patients after open heart surgery (Horowitz et al., 1984). The patients in the treatment groups had a relaxation experience before and 2-3 days after surgery. Significantly lower systolic blood pressure measures were found in both treatment groups, and significantly lower respiratory rates were found in the relaxation response group when compared with the control group, whereas no differences were found between groups in diastolic blood pressure. In addition, relaxation techniques can reduce distress components of pain (Horowitz et al., 1984), and simply decrease pain after coronary bypass surgery (Miller & Perry, 1990). From this theoretical context, the following section addresses how rest and relaxation are applied in current practice during early rehabilitation following heart valve surgery.

2.2.3.4 Current practice regarding rest and relaxation

Regular periods of rest and relaxation are necessary when recovering from a heart operation and are recommended to heart surgery patients during their hospitalisation and after discharge from the ward. It is interesting to note that a book on heart operations informing the patient in this situation includes only one sentence on rest periods (Petterson et al., 1999, p. 47). The transition from the healing phase to the recovery phase occurs after four weeks and it is implied that the level of activity may be gradually increased at this point in the recovery. In current practice of standard care in Unit T, rest is encouraged during scheduled hours (12.30 - 14.30) with no further instructions on relaxation. Nursing literature on rest (Linow, 2005) defines rest as a state of reduced physical and psychological activity to an extent that leaves the person refreshed and with increased energy both physically and psychologically (p. 94; researcher's translation). Discomfort and experiences which the person (patient) perceives as negative may contraindicate rest, such as pain, tension, anxiety, fear, irritability, feeling lonely, tense muscles, stress, unpleasant stimuli from the surroundings, lack of the opportunity for exercise, and lack of the opportunity for meaningful activities. Insufficient rest may cause physical exhaustion, fatigue both physically and psychologically, irritability, nervousness, increased vulnerability and poor quality in sleep. Rest is a prerequisite for relaxation (Linow, 2005, p. 94). Autogenic training is mentioned as an example of non-invasive treatment in the case of sleeping problems. The guidelines for psychic rehabilitation of patients with heart diseases, recommend relaxation as a technique to cope with the stressful situation (DHS, 1997, p. 38). Following heart valve surgery and CABG, Broadbent et al. states that interventions that intend to reduce the patient's psychological stress level may improve wound repair and recovery (Broadbent et al., 2003, p. 865).

2.2.4 Summary

In summary the current treatment of cardiac surgery patients mainly focuses on the physical needs of the patient. Following all types of cardiac surgery, physical mobilization and exercise are in focus, and in case of atherosclerosis, the treatment includes suggestions for smoking and dietary habits as these factors directly influence the patient's vitality and quality of life. Heart rate and blood pressure are regulated by medication and in the early phase an external pace maker stabilises the heart rate. Pain is also regulated by medication based on how the patient subjectively experiences these factors. Mood is observed and included in the overall picture of the patient's well being by staff's observation of and conversation with the patient.

In terms of the patients psychological needs as opposed to the physical needs, the philosophy around the patients' anxiety, is to de-dramatize the situation by thorough information and to openly discuss the risk factors both pre- and post surgery. The way anxiety was dealt with, very much seems to depend on the individual staff member and their attitude towards such psychological matters. The literature search found the Relaxation Response (Benson, 1975/2002) to be recommended for patients suffering from hypertension, a precursor of heart diseases. Relaxation is recommended as a coping strategy for patients with heart diseases (DHS, 1997), whereas no specific recommendation for current practice of psychic rehabilitation were found regarding heart valve surgery.

2.3 Music in medical settings

There are many different approaches where music is used in medical settings, some of which involve a trained music therapist in administering treatment, and some of which don't (Bruscia, 1998; Dileo, 1999). It is important to contextualise the intervention used in this study, and to establish its position in relation to mainstream music therapy and interventions used by other healthcare practitioners. It is also important to establish the function of a music intervention of guided relaxation with music compared with other interventions involving music listening for relaxation, or purely calm resting periods.

Given the extensive literature in music therapy and music psychology regarding the influence of music on the human condition, it would be beyond the scope of this review to present the majority of these studies. Therefore the researcher intends to review literature primarily concerned with reporting results within medial settings, and begins with a section that focuses on the different terms used to describe and define the different levels of which music is applied in medical settings.

2.3.1 Definitions for this study: Music Medicine and Music Therapy

As described in the Introduction chapter (section 1.3.2), two different complementary approaches to the use of music in medical settings are distinguished, and reported to be currently in practice (Dileo, 1999): *Music Medicine* and *Music Therapy* (medical music therapy). *Music medicine* is used as an adjunct to the medical treatments by staff from medical professions, typically nurses and physicians, and interventions are based on the use of selected, pre-recorded music. In their meta analysis, Dileo & Bradt (2005, p. 9) distinguish music medicine from music therapy studies by the following criteria: *music medicine* studies were defined by

1) the use of passive listening music interventions of pre-recorded music
2) the music intervention being implemented by medical personnel (non-music therapists)

Studies, in which music therapists provided a pre-recorded music listening experience as the intervention, were defined as music medicine studies.

The *music therapy* studies were defined by the following criteria:

1) a music therapist implemented an 'in-person' treatment intervention and
2) music therapy methods were used

Selecting appropriate terminology for identifying and defining the clinical interventions in this study was further aided by some of the definitions that are provided in "Defining Music Therapy" (Bruscia, 1998) in which he clearly differentiates between music as therapy *within medical settings,* and *Music in or as Medicine*. These approaches are included in medical practices using music defined as:

> ...all applications of music or music therapy where the primary focus is on helping the client to improve, restore, or maintain *physical* health. This includes all those approaches that focus on biomedical illness as the main target of change, as well as those that also operate on psychosocial and ecological factors which influence biomedical illness and wellness. (Bruscia, 1998, p. 159f).

Bruscia (1998, p. 193) states that medical practices of music or music therapy include only those that seek a change in the client's physical health regardless of whether the immediate focus is biomedical or psychosocial. Medical practices are typically found in settings such as hospitals, clinics, rehabilitation centres, hospices, and nursing homes (Bruscia, p. 160).

2.3.2 Levels of practice

Music is used at different levels in relation to the medical treatments based on their relevance to the client's primary health needs, on the clinical independence of the client's total treatment plan, on the role of the relationships, the level of the music experience, and the breadth of the therapeutic process (Bruscia, p. 163-165). Bruscia defines four levels of practice (*Auxiliary*, *Augmentative*, *Intensive*, *and Primary*) according to:

- whether music is used *as* or *in* medicine (or therapy)
- whether the goals of using music are of primary or secondary medical significance
- whether the medical treatment is short- or long-term
- what type of clinical setting (for example hospital)
  (Bruscia, 1998, p. 194)

The *auxiliary* level includes any applications of music for non musical purposes, such as *music medicine,* which can be applied by health personnel other than a music therapist and in which the process and change do not happen through a client-therapist relationship. (Bruscia, 1998, p. 167). The *augmentative* level defines levels of practices within which music therapy augments the healing, or adds something unique (music) to the treatment modalities that are provided to the individual. In such contexts music is used as therapy, and is not the main treatment modality. Music therapy at this level plays a supportive and complementary role to enhance or accommodate the goals of other disciplines (Bruscia, 1998, p. 168). *Music in Medicine* defines an *augmentative* medical practice in which:

> ...music is used as the primary agent within a supportive client-therapist relationship to facilitate brief medical procedures, and to assist the client before, during and after such procedures. (Bruscia, 1998, p. 195).

These medical practices include examples of the use of music before and during medical procedures, such as surgery, in order to reduce anxiety, facilitate anaesthesia, provide diversion and distraction, reduce stress and discomfort, enhance the effect of pain medication, and to facilitate relaxation (Bruscia, 1998, p. 195-196).

In *Music as Medicine*, an *intensive* practice, the music therapist works as an equal partner to other professionals, and

> ... music is used as the primary agent within a supportive client-therapist relationship to address significant needs of the client throughout an extended period of time, that is beyond a single short-time procedure or hospital stay. (Bruscia, p. 196).

At the intensive level, music therapy assimilates the goals of other treatment modalities into itself in order to accommodate the client's needs (Bruscia, p. 169). Examples of *Music as Medicine* practices are the use of music during an extended hospital stay, during after-care, convalescence, or ongoing outpatient services (Bruscia, 1998, p. 196f).

Primary level practices of music therapy are distinguished by two conditions:

1) when the work leads to significant and pervasive *changes* in the health condition that is being addressed
2) when the goals and *processes* extend beyond the focal concern of medicine to include those other areas of practice such as psychotherapy

The process of intervention and change in medical practices of music therapy at the primary level have depth and breadth, and always involves a holistic approach (Bruscia, p. 199).

Dileo (1999) offers more specific levels of Music Therapy Practice appropriately related to Medical settings. Dileo takes into consideration the clinical needs of patients, level of training experience and qualifications, the therapist's autonomy in defining therapeutic goals, the depth of the intended goals and the function of music therapy with regard to medical treatment. Dileo proposes three general levels, supportive, specific and comprehensive and then provides examples using the criteria described above in relating to a treatment intended to address a patient coping with pain (Dileo, 1999, pp7-8).

Music therapy in medical settings involves a trained music therapist, as the relationship between patient and therapist and the therapeutic process evolves through the music. Both music and the client-therapist relationship are needed and used equally in order to meet significant needs of the client over an extended period of time, that is, more than one session (Bruscia, 1998). He defines this medical practice *Music Therapy and Medicine*:

> *Music Therapy and Medicine* includes the goals and methods subsumed under *Music in Medicine* and *Music as Medicine* and goes beyond them to assimilate other areas of practice at the augmentative level. Thus *Music Therapy and Medicine* may also include supportive music psychotherapy ... or any other augmentative practice that might enhance the treatment or quality of life of the medical patient. ... when other practices are assimilated into *Music Therapy and Medicine*, they are means to a medical end, rather than end goals in themselves; otherwise the practice is no longer considered medical. (Bruscia, 1998, p. 197)

Music therapy belonging to this practice are for example approaches with the goals to reduce distress, fear of illness and injury (patients and their relatives), to reduce depression, anxiety, stress or insomnia due to illness, treatment or recovery, and to encourage positive health attitudes (Standley, 1986, as referred by Bruscia, 1998, p. 197f).

In this study, the term *Music Therapy and Medicine* is applied regarding the music therapy intervention in this study, and thus seen as augmentative to the medical treatment given.

The music therapy intervention which is applied in the current study is not considered being an intensive practice as music therapy is not the primary agent for recovery. The term *Music Medicine* defines the music listening intervention which does not include a client-therapist relationship, and is therefore understood as auxiliary to the standard treatment in relation to heart valve surgery rehabilitation.

2.3.3 Receptive music experiences

Music listening, as applied in medical settings, belongs to receptive methods of music experiences in which the client is engaged in music listening experiences and may respond to the music silently (or verbally) or in a different modality (Bruscia, p.114). The clinical goals of receptive music therapy include stimulation or relaxation of the client. Variations of receptive experiences are Somatic Listening experiences including the use of vibrations such as Vibroacoustic Music; Music Anesthesia to enhance the effects of anaesthetics or analgesics; Music Relaxation to reduce stress and tension, to reduce or counter a condition of anxiety, or to induce body relaxation; and Meditative Listening assisting in meditation (Bruscia, 1998, p. 120 ff). Examples of Vibroacoustic Music are found in Wigram (1996), Wigram & Dileo (1997), and are also found in the form of physioacoustic therapy (a variant of Vibroacoustic Therapy) with open heart surgery patients (Butler & Butler, 1997), in relation to post surgical pain (Burke, 1997), and of Music Anaesthesia in Spintge & Droh (1983). Examples of Music Relaxation are found in Robb et al. (1995) on preoperative anxiety and in a study on anxiety in adolescent pregnancy by Liebman & MacLaren (1991).

2.3.4 Hospital setting

This review on the use of music in the hospital setting was aided by two meta analyses, the first undertaken by Standley (1986, 1995, 2000), and the second and more comprehensive undertaken more recently by Dileo & Bradt (2005). In her analysis (Standley, 2000) included 13 studies in surgical populations. Music listening was used pre-operatively to reduce anxiety, and to reduce the medication to obtain the desired anaesthetized state. During operation under local anaesthesia this intervention was used to reduce anxiety. Postoperatively music listening was used in recovery to promote wakefulness and reduce discomfort from pain. In the first two days following surgery music listening was used to reduce the amount of analgesics required and the after-effects of anaesthesia. Standley stated that music is most effective when begun prior to the surgical intervention (Standley, 2000, p. 22). Further, it was recommended to use patient's preferred music, to combine music with pleasant verbal associations (focused thought or guided imagery), to allow patients to control as much of the procedure as possible, such as volume, and to reinforce signs of relaxation (Standley, 2000, p. 23).

In their meta analysis, Dileo & Bradt (2005) included 179 studies using music in medical settings. One hundred and twenty of those were music medicine studies, and 59 were music therapy studies. Five medical specialities were within hospital settings, and concerned adult populations (number of studies included in Dileo & Bradt (2005) for adult medical hospital speciality area in parentheses):

- Surgery (51)
- Cardiology/ICU (14)
- Cancer/ Terminal Illnesses/HIV (18)
- General Hospital (11)
- Obstetrics/ Gynaecology (7)

Categorisations of the medical specializations relevant for this study included the following areas (Dileo & Bradt, 2005):

Surgery

- Pre-, peri- or post surgical interventions with all age groups
- Various types of anaesthesia
- Surgical procedures involving many speciality areas such as cardiac surgery

Cardiology/ ICU

- Treatment for cardiac illness and cardiac rehabilitation
- Acute treatment in intensive care units (cardiac, mechanical ventilation)
- Adults only

The surgery category included many specializations other than cardiac surgery, and the Cardiology/ ICU category included treatment in the intensive care units as well as the direct treatment of cardiac illness and rehabilitation. The studies of cardiac surgery were therefore, in this review, not treated as a separate category, and the results of the meta analysis by Dileo & Bradt are here reviewed from a more general perspective regarding surgery and cardiology.

Receptive methods were applied in the majority of the studies in the form of music listening in 137 studies; Music and Imagery in five studies; and Music and Relaxation in two studies. In cardiology, all the included studies were categorised as music medicine, and used music listening as the treatment condition (Dileo & Bradt, 2005, p. 27). Studies in surgery also used music listening as the predominant intervention, and three used music and imagery; only two of the 51 studies were categorised as music therapy. In the medical specialization regarding cancer and terminal illness/HIV, eight studies were classified as music medicine, and ten as music therapy. In General Hospital studies, all studies were classified as music medicine; ten of those used music listening, and one study used music and imagery as the treatment intervention. In Obstetrics/ Gynaecology, a variety of music interventions were studied: music listening in four studies, music listening and imagery in one study, and two studies used various music therapy interventions.

The effects of music were reported on *physical* measures such as

- heart rate, skin temperature, mean arterial pressure, blood pressure, oxygen saturation level, cortisol, and analgesics intake

Psychophysical measures were taken on

- anxiety, pain, mood, nausea/ vomiting; and behavioural measures such as aggression, and social behaviours

In studies of the effects of music listening interventions on *anxiety* measured by the State-Trait-Anxiety Inventory (STAI), significant effects were found in surgery and in cardiology/ICU ($p<$ .00). In studies using other instruments than STAI for measuring anxiety such as the Visual Analogue Scale (VAS), a mean effect size of $r=$ .24 and statistically significant effects were identified for surgical patients. The authors stated, that music therapy studies were greatly under-represented in the analysis regarding anxiety, as seven were classified as music therapy versus 52 music medicine studies (Dileo & Bradt, 2005, p. 72), thus additional music therapy studies are justified.

In regard to *pain*, Dileo & Bradt (2005, p. 69) reported that music therapy interventions appeared to be much more effective than music medicine interventions, though in the speciality area of surgery within which all studies were classified as music medicine, statistically significant effects on pain were identified ($p<$ .00). The authors suggested that caution in interpretation of these results should be taken as the numbers of music therapy versus music medicine studies were disproportionate.

'Analgesics' intake included analgesic drug intake, sedative intake, and anaesthetic drug intake (Dileo & Bradt, 2005, p. 43f). Statistically significant results were found for the analgesic drug intake ($p<$ .01) even though the mean effect size was small ($r=$ .16), and for sedative drug intake ($p < .00$) in which larger effect sizes were found in surgical patients ($r = .35$). The authors recommend music therapy studies regarding the effect of this type of intervention on analgesic demands in patients (Dileo & Bradt, 2005, p. 69). For anaesthetic drug intake (during surgery) non significant effects were found across the three studies that investigated the effect of music listening on this measure. Also, non significant effects were found for reduced length of hospital stay for surgical patients, and no studies were included in this meta analysis of length of hospital stay in cardiology/ICU. Small mean effect sizes for mood were found in one study for surgery, and one for cardiology/ICU ($r = .27$ and $r = .07$ respectively), and no statistical significance was reported.

Examples of music medicine studies in a hospital setting are Miluk-Kolasa, Matejek & Stupnicki (1996) of the effects of music on physiological measures in adult presurgical patients; Voss, Good, Yates, Baun, Thompson, & Hertzog (2004) of the effects of sedative music on anxiety and pain during chair rest after open heart surgery; and Nilsson, Unosson & Rawal (2005) who investigated whether intra- or postoperative music could influence stress and immune response during and after general anaesthesia. In Denmark, a music medicine approach was applied in the study undertaken by Thorgaard, Henriksen et al. (2004) investigating the effects of specially selected music on the well being of patients. One hundred and ninety three patients undergoing invasive procedures (catherization) in the cardiac laboratory were randomly assigned to two groups, a music group who listened to music during the procedure, and a group who received standard care. The music selection was made by the researcher and comprised 'soft classical' music, and music specially composed for the hospital setting. The category named 'soft classical' music covered selections such as true classical music (Carl Nielsen, J.S. Bach), but also contemporary composition in styles that could be perceived as easy listening and included Trio Rococo's "Friends" and their "Classical Mystery Tour" version of Beatles compositions, and Kåre Norge's "Morning has Broken". Structured interviews were made regarding the patients' opinion of the sound environment. Test results showed that 91% in the music group found the sound environment very pleasant/pleasant, compared to 56% in the non-music group. Results indicated that the specially selected music had a positive effect on the well being of the patients and their opinion of the sound environment. In section 2.6, the effects of music in outcome research are reviewed.

The following examples illustrate the use of Music therapy and Medicine within a hospital context. The effects of a Music Assisted Relaxation intervention on preoperative anxiety (in paediatric patients) was investigated in a study undertaken by Robb et al. (1995), and Cowan (1991) investigating the use of music therapy in the surgical arena. A study investigating the effects of Guided Imagery through Music (GIM) and relaxation techniques on stress and anxiety levels was undertaken by Hammer (1996). Sixteen subjects involved in alcohol and chemical dependency rehabilitation participated - consisting of an experimental group receiving 10 treatment sessions and a control group receiving no treatment. Stress levels were measured through the State-Trait Anxiety Inventory (STAI) and individual self-reports and evaluations. Test results showed that the experimental group experienced a decrease in perceived situational stress that was statistically significant. Verbal reports and observations corroborated this. Results indicate that GIM may be of benefit to persons with chronic stress and anxiety. In a study by Bonde (2004), BMGIM[16], was applied with six women who were cancer survivors and voluntary participants who received 10 individual sessions. The focus of the study was to investigate the influence of BMGIM on mood and quality of life, and the participants reported a significant effect over time on anxiety and non significant effects over time on depression as measured by the Hospital Anxiety and Depression Scale (HADS). The results showed an effect of treatment over time, improvement in the participants' coping with life with cancer, and improvement in quality of life (Bonde, 2004, p. 379), therefore indicating that a BMGIM intervention can be helpful for cancer survivors.

2.3.5 Summary

Two different complementary approaches to the use of music in medical settings can be summarized and defined as *Music Therapy and Medicine,* involving a client, music, and a trained music therapist, and *Music Medicine,* involving a client and music (Bruscia, 1998; Dileo, 1999). Music experiences within medical settings are primarily receptive, and include a variety of techniques such as somatic listening including the use of Vibroacoustic Music (Wigram & Dileo, 1997), music used with anaesthesia (Spintge & Droh, 1992; Nilsson, 2003), music relaxation to reduce anxiety (Elliott, 1994). Reviewing the literature on music used in hospital settings was aided by the comprehensive meta analyses by Dileo & Bradt (2005), and two speciality areas were found in which music was applied in hospital settings. In relation to the surgery speciality area, music listening was the predominant intervention used for anxiety and pain reduction (Voss et al., 2004), and in the cardiology/ICU area also for promoting relaxation (Chlan, 1998), and for reducing anxiety (Elliott, 1994; Hamel, 2001; White, 1992, 1999; Wong et al., 2001). GIM was applied in relation to cancer (Bonde, 2004), and in the rehabilitation of clients with alcohol- and chemical dependency, both suggesting that the respective populations can benefit from sessions with GIM.

---

[16] The Bonny Method of Guided Imagery and Music, BMGIM. In this thesis the short form, GIM, is used. Exception is made as Bonde (2004) in his study uses the longer form.

In the following sections, relaxing music is defined, and the literature is reviewed regarding the properties of relaxing music for potentially reducing anxiety, and regarding the function of music as an adjunct to medical treatment in relation to surgery.

2.4 Relaxing music in relation to surgery

The literature search revealed several music medicine studies using relaxing music as an intervention for various physiological effects in medical settings. In the following sections, relaxing music is reviewed specifically in relation to surgery.

2.4.1 Relaxing

Listening to relaxing music is a type of music experience defined as *Music Relaxation* which describes:

> The use of music listening to reduce stress and tension, to reduce or counter condition anxiety, to induce body relaxation, or to facilitate entry into altered states of consciousness. (Bruscia, 1998, p. 122).

Relaxing music listening experiences in surgical settings are practices *auxiliary* (or supportive) to the existing standard treatment defined as *Therapeutic music* in which:

> ... a person (or client) uses music to maintain his/ her own health, to prevent illness, and/or build up one's resistance against physical health threats of various kinds. The person may do this independently, with consultation from various sources ... or within an established program which uses music for purposes of health maintenance or prevention of specific medical problems. (Bruscia, 1998, p.194).

At this level, changes do not involve or depend upon a client-therapist relationship. Examples are the use of music to relax the body as investigated by Good (1996), to reduce stress (Nilsson et al., 2005; Winter et al., 1994; Yung et al., 2003), to manage pain (Good et al., 2001; Zimmerman et al., 1996), to support physical or therapeutic exercises in physiotherapy (Thybo, 1999), and in intensive care units (Bonny, 1983). Relaxing music is used in preparation for surgery (Miluk-Kolosa et al., 1996; Robb et al., 1995; Spintge & Droh, 1983; Wang et al., 2002; Winter et al., 1994;), during surgery with general anaesthesia (Nilsson, et al., 2001), in recovery (Nilsson et al., 2001), and after surgery (Barnason et al., 1995; Nilsson et al., 2005; Voss et al., 2004).

2.4.2 Properties of relaxing music

The literature search found very few studies that reported analyses of the specific music used and these only briefly described which music was used and the criteria for their selection. Exceptions are Winter et al. (1994), Voss et al. (2004), Bonny (1983), and the studies based on Bonny's description and choice of sedative music selections (Barnason et al., 1995; Zimmerman et al., 1996[17]). In the study by Bonny (1983), sedative music was chosen for the purpose of relieving anxiety (among others). Gaston, in 1951, had characterized such music by regular rhythm, predictable dynamics, consonance of harmony and recognized instrumental timbre (Bonny, 1983).

> Sedative music is of a sustained melodic nature, with strong rhythmic and percussive elements largely lacking. This results in physical sedation, and responses of an intellectual and contemplative nature rather than physical. (Gaston, 1951, as cited by Taylor, 1997, p. 103)

Further the music was selected to present a positive mood state and to eliminate dynamics of composition which might suggest fearful or compulsive imagery (Bonny, 1983).

2.4.2.1 Selecting relaxing music

When applying the descriptions of what characterizes relaxing music, Taylor stated that:

> ... most investigators based the process of classification on the properties of the music and chose to ignore the portion of each definition that described the effects on the listeners. (Taylor, 1997, p. 103)

In referring to his own previous writing from 1973, Taylor continues:

> Subsequent research using galvanic skin response and questionnaire data showed that when precategorizations were tested against actual responses, the subjects did not respond in accordance with the stimulative or sedative preclassifications assigned to the music by the investigators. (Taylor, 1997, p. 103)

Taylor therefore suggested to play a potentially sedative selection for a patient (or participant) before determining which music will have calming effect during periods of anxiety.

Selecting music for the purpose of relaxation by music listening may be done on the basis of various considerations and several musical parameters. Few studies have investigated these factors specifically. One study by Wolfe et al. (2002) investigated which music selections/ CDs to include in a portfolio that was to be used within a music listening/ relaxation programme for

[17] Chlan, 1998; 2001; Elliott, 1994; White, 1992 also based their music selections on Bonny's description, but populations in cardiology (no surgery) are included in section 2.5 of this review.

parents of children in a paediatric hospital. The music selections were developed in four stages.

1) In the first stage a selection of 10 CDs (containing 98 selections in all) were chosen by two criteria: a) words in the title were suggestive of sedative or relaxing music; or b) the literature with the CD claimed relaxing effects of the music.
2) In stage two an expert panel listened to 1½-minute excerpts of all 98 selections from the beginning of each recording, and was asked to rate the relaxation qualities of each piece. The listening process was done in weekly sessions of 40 – 50 minutes over a 10-week period.
3) In the third stage, ten of the total music selections were played to a group of non-musicians following the same procedure as the expert panel. Further, the non-musicians were asked whether they listened to music for relaxation and if so what kind of music they used for their relaxation.
4) In the fourth stage the results from the expert panel and the non-musicians were analysed and resulted in suggestions given for possible inclusion of musical recordings which could be used for a music listening and relaxation programme.

Considering the fact that all music pieces claim a relaxing effect it is interesting to note that one piece in the music selection played to the two groups was considered 'not relaxing at all' by the experts and less than 'somewhat relaxing' (1.69 on a scale: 1= not relaxing at all; 2= somewhat relaxing; 3= relaxing; 4= very relaxing) by the non-musicians. The same piece was the recording least familiar to both experts (100%) and non-musicians (92%).

It may be difficult from this study to find a relationship between familiarity and to what degree the two groups of listeners rated the music recordings to be relaxing as the pieces no. 1, 2, 6 and 9 were rated to be relaxing (3.33), yet 17 % (experts) were familiar with these pieces. Piece no 2 was unfamiliar to 85% of the non-musicians and rated to be relaxing (3.42). Music recording no. 4 was unfamiliar to most and rated by experts to be relaxing (3.16) and by non-musicians to be a little more than 'somewhat relaxing'. What characterise these recordings musically may illustrate this apparent 'no-relationship' between familiarity and how relaxing a music selection is rated by experts and non-musicians.

Relaxing music is described by different terms. Bonny (1999) in her development of Guided Imagery and Music[18], GIM, called the selected classical music for relaxation purposes *trophotropic*. This same term is used by Decker-Voigt (1991). *Anxiolytic* music can be described as any music that has the effect of reducing anxiety (Taylor, 1997, p. 109), and is the term used by

[18] The Bonny Method of Guided Imagery and Music, GIM, is described further in section 2.5.2.

Spintge (1983; Spintge & Droh, 1983, 1992) for music used in order to reduce anxiety, stress and pain in patients undergoing surgery. The word *soothing* is used in several studies (White, 1992; Mynchenberg & Duncan, 1995; Escher et al., 1996; Tusek et al., 1999; Nilsson et al., 2003; Thorgaard et al., 2005).

Based on the use of anxiolytic music with 7500 patients during the period from 1973 to 1975, Spintge stated that a number of preconditions for the anxiolytic effect of the music must be met:

1) The pieces must be selected and combined according to duration, instrumentation, dynamics, interpretation
2) The selection depends on the patient's subjective preferences
3) The effects of the single pieces and their combination must be looked at in ongoing trials
4) The performance must be of high quality, and be technically simple and reliable.
(Spintge, 1985-1986, p. 195)

The different terms, relaxing (or sedative), trophotropic, and soothing, share the parameters which characterise relaxing music, whereas anxiolytic music differs slightly. The common characteristics of relaxing music are stable tempo, regular rhythm, predictable dynamics, consonance of harmony, structure and form, and stability or only gradual changes in for instance volume, tempo and harmony (Bonny, 1983; Barnason et al., 1995; Saperston, 1999; Wigram, 2004). Anxiolytic music is similar in few dynamic changes, whereas tempo should be slightly slower, 50 – 70 beats per minute, use a flowing rhythm, and in general use few contrasts (Spintge as referred by Bonde et al., 2001, from an unpublished conference paper in 1993). Wigram (2004, 2002) formulated a tool, Potentials in Stimulatory and Sedative Music (PSSM) for selecting music for relaxation or stimulation. The characteristics of potentially sedative/ relaxing music are defined by the following elements as listed:

- ♦ Stable tempo
- ♦ Stability or only gradual changes in: volume, rhythm, timbre, pitch and harmony
- ♦ Consistent texture
- ♦ Predictable harmonic modulation
- ♦ Appropriate cadences
- ♦ Predictable melodic lines
- ♦ Repetition of material
- ♦ Structure and form

- Gentle timbres
- Few accents

(Wigram, 2004, p. 215f)

The *potential* aspect of this list is important as people may not necessarily agree that music with these qualities is relaxing or sedative. Individual taste and habitual listening postures influence how music affects the body and mind (Bonny, 2002). An example is found in the thesis by Nilsson (2003) who, in four studies, investigated the effects of soothing music alone or in combination with therapeutic suggestions intra-operatively (study I: Nilsson, Rawal, Uneståhl et al., 2001), postoperatively (study II: Nilsson, Rawal, Enquist et al., 2003), music alone intra- or postoperatively (study III: Nilsson, Unosson, Rawal, 2003a), and music intra- versus postoperatively (study IV: Nilsson, Rawal, Unosson, 2003b). In all four studies, participants were randomly assigned to one of three groups: two intervention groups and one control group. The music used in these studies, was described as:

- soft and relaxing, with instrumental synthesizer accompanied by the sound of sea waves (I)
- classical music (II)
- new age synthesizer specially developed for relaxation (III and IV)

(Nilsson, 2003, p. 19).

Pain was measured by VAS and Numeric Rating Scale, NRS, and anxiety by STAI. Other dependent variables were nausea, fatigue, sleep, and wellbeing, urinary problems and headache, mobilization, bowel function and hospital stay, vital signs (blood pressure, oxygen saturation, and heart rate). Results showed that participants who had listened to intra-operative music, reported less pain in the PACU and one day after surgery, and required less morphine in the PACU than the control group (I). Participants, who listened to music postoperatively, reported less pain after one and two hours and less mean pain intensity for the first two hours after surgery, and reported less anxiety after one hour when compared to the control group (II). In general, the results suggested, that the analgesic effects of the interventions were modest and of relatively short duration (Nilsson, 2003). These studies did not aim to investigate which type of music would have the best analgesic effect, and Nilsson reported that no consensus in this regard was found from these investigations or from the literature. A comment on the use of new age music suggests one explanation why this style is not necessarily effective in a surgical setting:

> New age music strives to a relaxing musical mood, and much is written about its healing effects. After a few hearings, however, the sameness of its dynamics, the lack of reaching a climax or resting point, and the unvarying rhythms, can become irritating rather than restful. (Bonny, 2002, p. 127)

In discussing the use of music in order to prevent illness, Bonny (2002) also stated, that no definitive studies have determined which type of music has the best healing qualities.

A pioneering and well-known research in establishing structural factors of music for different emotional states was carried out by Hevner (1937) who, in six studies published between 1935 and 1937, investigated the affective value of major versus minor mode, ascending versus descending melody, firm versus flowing rhythms, modern dissonant harmonies versus classical consonance, pitch, and tempo. In these experiments, Hevner had arranged sixty six adjectives describing emotions into eight clusters of adjectives similar in meaning (1) dignified, 2) sad, 3) dreamy, 4) (calm)-serene, 5) graceful, 6) happy, 7) exciting, and 8) vigorous). For example, the adjectives ‘tranquil’, 'quiet', 'soothing', and 'leisurely' were include in the 'serene' grouping. These clusters were arranged in a circle so that adjacent clusters were close in meaning, and opposite clusters were of the largest contrast (the 'sad' cluster opposite the 'happy', and the 'serene' cluster opposite the 'vigorous' cluster). Results from her investigations suggested that the slow tempos are most effective on the dignified and the calm-serene clusters (Hevner, 1937, p. 624). Gabrielsson and Lindström (2001) have adapted Hevner's adjective circle and added 'calm' to the serene cluster, and also they adapted her summary of the results. These showed that slow tempo, simple harmony, and high pitch range were the structural factors rated most important for the serene cluster, whereas the musical factors mode, rhythm, and melody line were found of very little importance for this mood. Hooper has described the process of developing criteria to determine the selection of sedative music for research in his doctoral thesis (in process), and has reviewed the literature on the relationship between structural factors of music and affective values (mood) extensively. This will be elaborated further in the discussion[19].

2.4.3 Music function

> Historically, the most widely accepted application of music as a therapeutic agent is its use as a calming agent to combat anxiety, tension, and stress. (Taylor, 1997, p. 102)

Music as a calming agent is one function of an intervention of relaxing music. Another perspective is presented by Saperston (1999) who suggests three different ways that music can function:

[19] Based on personal E-mail communication with J. Hooper, 2005)

- as reinforcing stimulus providing meaning to the activity as the individual participates by listening to music
- as a structural prompt, i.e. cues for progressive relaxation of body parts
- as an eliciting stimulus, e.g. in perception of improved states of relaxation
  (Saperston, 1999).

It is assumed here that music may function as cues whether the relaxation is a progressive or a systematic type of relaxation. In the survey undertaken by Metzger (2004) the use of music by patients participating in cardiac rehabilitation was assessed. Thirty three male participants over the age of 65 rated their level of use of music for exercise, relaxation, and enjoyment, and information on the participants' musical preferences and experiences were collected. Results showed that the use of music as a stimulus cue for exercise was decidedly absent, whereas the participants reported positive responses to the aesthetically pleasurable aspects of music.

Music can function as an audio-analgesic, anxiolytic or sedative (Standley, 2000, p. 21). The therapeutic objective of music intervention may be reduction of pain, anxiety, and/or stress (Standley, 2000; Taylor, 1997). Music may function as a distraction from anxiety and directly acting on the sympathetic nervous system. (Evans, 2002). Music may not only function as a distraction from the discomfort of procedures or after surgery, but is also reported to increase the relaxation response and thus relieve pain (Good et al., 1999). McCaffrey & Good (2000) in their study of the lived experience of listening to music while recovering from surgery interviewed eight participants who listened to music during their postoperative recovery. Participants were given a music choice from a selection of 20 tapes to play at least once a day and as many times as they liked (Participants listened from 3 to 8 times a day). Examples of music styles were Gregorian chant, easy listening, new age, light classical, light jazz, and country western (McCaffrey & Good, 2000, p. 381). Data were evaluated phenomenologically, and three themes of the music listening function were found. Listening to music during the postoperative recovery can be perceived as:

a) Comfort from a discomforting condition
b) Providing familiarity in a strange environment
c) Distraction from fear, pain, and anxiety

The comforting function of music is very relevant in the treatment of patients in medical settings and particularly in the perioperative phases, during which the nursing care is focused on relieving the patient of discomfort as much as possible. In this way, music functions as a nursing modality (McCaffrey & Good, 2000). These authors reported, that music listening functions especially well as distraction when the participants listen to familiar music, thus providing something familiar in an unfamiliar environment. This suggests that patients should be given the opportunity to choose their preferred music for their listening. Further, McCaffrey & Good suggested future research of the relationship between the distracting and the relaxing effects of music (McCaffrey & Good, 2000), and they suggested that in the further rehabilitation following discharge from the hospital, the patients may use the tool of music listening for relaxation.

Surgery produces anxiety and anxiety affects the body by aggravating pain (Burke, 1997). At the same time fear of pain may contribute to increase in anxiety (Burke, 1997). Cowan (1991) in her review of literature regarding the role of music in the reduction of anxiety includes three case studies in the surgical arena. She stated that music therapy can give back some control by providing the patient with choices and patients may experience anxiety and pain reduction through music therapy. Cowan stated that it is not merely the music, but the intervention by the therapist that is crucial during the surgical procedure, a procedure of bonding between the music therapist and patient in the process of preparing the patient for the surgery right up to the moment of anaesthesia in function is an important factor for the positive effect of the music intervention. In her study the music therapist also assisted with breathing techniques in the preparation for the surgery, the rationale being that the music therapist may assist the patient in the recovery room with music and imagery for pain distraction, returning to an ordinary state of consciousness and for relaxation (Cowan, 1991). In the study by McCaffrey & Good (2000), participants were interviewed about their experience of listening to music while recovering from surgery. These experiences of comfort included a sense of relaxation, of peace and calmness, of being taken to a safe place; and that the music helped them cope with pain, discomfort, and a strange environment. The authors stated that their study showed that patients experienced broader benefits from the music listening than simply a relief of postoperative pain, and that the patients' descriptions added to the understanding of music listening as not only relieving the experience of pain, but also assisting in the patients' coping with pain. This indicates that *subjective* aspects should be added when measuring the physical and psychological effects of music listening.

2.4.4 Other studies

Music listening interventions using relaxing music in relation to surgery are mainly based on pre-recorded tapes of music selected for their soothing and relaxing effect, thus Dileo & Bradt (2005) found 49 music medicine studies using pre recorded music. This was also the case in recent studies by Kane et al. (2004), Nilsson et al. (2003), Nilsson et al., (2005), Voss et al. (2004). Dileo &

Bradt (2005) identified 34 studies in surgery populations in which the patients' preferred style of music for relaxation were included, whereas 17 studies used researcher selected music. These authors stated that the results of their meta analysis implied:

> ... that although music listening (pre-recorded music) may have therapeutic benefits for the medical patients, music therapy interventions, involving a trained music therapist, a relationship and a therapeutic process can produce greater effects in clinical outcomes. (Dileo & Bradt, 2005, p. 63).

In general, information on the criteria for the selection and music used varied across studies. Table 2.2 shows the studies reviewed regarding to the use of relaxing music in relation to surgery. The two left columns list the author and year of publication. Then follows four right columns with information, respectively, on the research area and in which population the investigation was undertaken; which music was used; on which criteria this music was selected, and finally who chose the music (researcher and/or participant).

Table 2.2 *Relaxing music in relation to surgery 1992 - 2005*[20]

Author	Year	Research area/ population	Relaxing music	Criteria for music choice /	Selected by *R, P*[1]
Heitz, et al.	1992	pain, morphine requirement, length of stay/ post op	instrumental *Calm* examples Bach: Suite No. 3 in D, Air for the G string Debussy: Claire de Lune' Pachelbel: Canon i D Popular: G. Winston, W. Ackerman, S. Halpern *Stimulative* examples Strauss: Blue Danube Waltz Tchaikovsky: Nut cracker suite, Overture	calm (or stimulative)	*R, P*
Barnason, et al.	1995	anxiety/ post op CABG	Country Western Instrumental, Fresh Aire by Mannheimer Steamroller, Winter Into Spring by George Winston; Prelude, and Comfort Zone by Steve Halpern	soothing type, facilitates relaxation	*R, P*
Zimmerman, et. al.	1996	pain, sleep/ post op CABG	Country Western Instrumental, Fresh Aire by Mannheimer Steamroller, Winter Into Spring by George Winston; Prelude, and Comfort Zone by Steve Halpern	soothing type, facilitates relaxation	*R, P*
Burke	1997	pain/ post op	Music to Disappear In by Raphael Instrumental, synthesized piano	promote muscular relaxation, slow, steady tempo, ascending and descending melodic pattern and harmonic chord structures, free-flowing phrases lacking a strong, rhythmic pulse	*R*
Tusek, et al.	1997	colorectal	20 minutes long, no details provided	soft, soothing	*R*
Good & Chin	1998	pain / post op	synthesizer, harp, piano, orchestral, and slow jazz	without lyrics, 60-80 bpm, general absence of strong rhythms of percussion (Gaston, 1951)	*R, P*
Good, et al.	1999	pain relief/ post op	synthesizer, harp, piano, orchestral, and slow jazz	no details provided	*R, P*
Tusek et al.	1999	lenght of stay, pain, anxiety/ peri op, cardiac	18 minutes as background for Guided Imagery	soothing no details provided	*R*
Good, et al.	2001	pain/ post op	synthesizer, harp, piano, orchestra, slow modern jazz	sedative music (Gaston,1951)	*R, P*
Nilsson, Rawal, Uneståhl et al.	2001	recovery / intra op	music accompanied by soothing sounds of sea waves	judged to be relaxing and calming, soothing	*R*
Nilsson, Rawal, Enquist et al.,	2003	recovery/ post op	classical	soft, relaxing and calming	*R*
Nilsson, Unosson, Rawal	2003a	stress, immune response/ intra or postop	new age synthesizer included seven different melodies for 43 minutes' playing time	soft and relaxing	*R*

[20] Adapted from J. Hooper, unpublished doctoral thesis in process, personal E-communication (2005)

Nilsson, Rawal, Unosson	2003b	Post op pain/ intra vs. post op	included seven different melodies for 43 minutes of new age synthesizer	soft instrumental with a slow, flowing rhythm	*R*
Yung, et al.	2003	stress/ pre op	Chinese instrumental music Western instrumental music Western and Chinese slow songs	possessed minimal rhytmhic characteristics	*R, P*
Kane et al.	2004	pain/ post op	Carnelian (Llewellyn)	no details provided	*R*
Voss, et al.	2004	anxiety, pain / post op, open heart	synthesizer (new age), harp (poular and new age), piano (popular from the 1940s to 1980s), orchestra (classical), slow jazz (modern), and flute (American Indian)	music without lyrics, sustained melodic quality, 60-80 bpm, absence of strong rhythms (ref. to Gaston, 1951)	*R, P*
Nilsson et al.	2005	stress reduction/ post op	'new age synthesizer, seven different melodies, a total of 43 minutes playing time'	soft and relaxing	*R*

Note. [1]R= researcher selected P= participants selected/ preferred.

As shown in table 2.2, the information on which music was used varies between studies ranging from none (Tusek et al., 1997), to 'classical' (Nilsson, Rawal, Enquist et al., 2003), to 'synthesizer, harp, piano, orchestral, and slow jazz' (Good & Chin, 1998; Good et al., 1999; Good et al., 2001). In the studies by Nilsson the music is described as 'new age synthesizer, seven different melodies, a total of 43 minutes playing time' (Nilsson, Unosson, & Rawal, 2003a; Nilsson, Rawal & Unosson, 2003b; Nilsson et al., 2005), and 'music accompanied by soothing sounds of sea waves' (Nilsson, Rawal, Uneståhl et al., 2001). Two studies reported the number and which styles of music were used (Voss et al., 2004; Yung et al. 2003), and five studies reported titles of the music used (Barnason et al., 1995; Burke, 1997; Heitz et al., 1992; Kane et al., 2004; Zimmerman et al., 1996).

A number of studies reported limited descriptions on the criteria used for selecting relaxing music, such as 'soothing type music' that facilitates relaxation (Barnason et al., 1995; Zimmerman et al., 1996), 'soft, soothing' (Tusek et al., 1997), 'soothing' (Tusek et al.,1999), or simply 'calm' (Heitz et al., 1992) or none (Good et al., 1999; Kane et al., 2004). In studies by the same main author, identical or very similar brief descriptions are reported, such as 'soft and relaxing' (Nilsson, Unosson, & Rawal, 2003a, Nilsson et al., 2005), 'soft, relaxing, and calming' (Nilsson, Rawal, Enquist et al., 2003), music 'judged to be relaxing and calming' (Nilsson, Rawal, Uneståhl et al., 2001), 'soft instrumental music with a slow, flowing rhythm' (Nilsson, Rawal,& Unosson, 2003b). In three studies the criteria were based on Gaston who in 1951 determined relaxing music to be characterized by the 'general absence of strong rhythms' (Good & Chin, 1998; Good et al., 2001; Voss et al., 2004). Further, these three studies reported that the criteria 'without lyrics', and a tempo of 60-80 bmp were applied with an addition of 'sustained melodic quality' in the study by Voss et al. (2004). 'Minimal rhythmic characteristics' was the only criteria reported in the study by Yung et al. (2003). Burke (1997) who investigated the effects of physioacoustic intervention on post operative pain, using a computerized program of music and sound frequencies to promote muscular relaxation in women after gynaecological surgery, reported several characteristics of the music used in her study. These were: slow, steady tempo, specific melodic pattern and harmonic structure, free flowing phrases, and lacking a strong rhythmic pulse[21].

The music was selected by researchers in all studies in this overview, and in eight of the studies, participants selected their preferred music from the researchers' selections (Heitz et al., 1992; Barnason et al., 1995; Zimmerman et al., 1996; Good & Chin, 1998; Good et al., 1999; Good et al., 2001; Yung et al., 2003; Voss et al., 2004). None of these studies included the presence of a music therapist, whereas this was the case in one study by Escher et al. (1996) and in the review illustrated by three cases by Cowan (1991).

An example of the use of anxiolytic music in relation to surgery is the study by Spintge (1983) who undertook a controlled trial of psycho physiological 'surgery fitness' with and without anxiolytic music during the preparation for surgery. The sample were 400 patients admitted to a hospital for surgery due to sports injuries. They were randomly assigned to four groups: Two groups that were given the usual dosages of analgesia and anesthesia, and two groups who received 50% of usual dosages as well as listening to anxiolytic music. The music consisted of four programmes (anxiolytic music, classical, popular, Evergreens in a fast tempo) from which the participants could choose. Physiological measures were made on heart rate, blood pressure, and 'palm sweating' (Electro-Dermal Activity) as a measure of autonomic activity. Psychological measures were self reported by the participants 24 hours after their surgery. The results showed a significantly better effect of medication in the two music groups than the groups receiving the usual dosages, thereby suggesting that anxiolytic music can reduce the patients' analgesia and anesthesia intake by 50%.

2.4.5 Summary

This section has defined relaxing music in relation to surgery as a medical practice, Music Relaxation, auxiliary to existing standard treatment (Bruscia, 1998), as stress reduction, pain management, and applied in all phases of surgery. Properties and criteria for selecting relaxing music (Taylor, 1997; Wolfe et al., 2002) were described by potential elements characterising relaxing music (Wigram, 2004). In reviewing Hevner (1937), slow tempo, simple harmonic

[21] Results from this study are reviewed in this chapter, section 2.6.3.2.

structure, and high pitch range were identified as the most important structural factors for creating an emotional state closest to relaxation (the calm-serene cluster). In relation to surgery, music has been used mainly for reducing anxiety, tension and stress (Taylor, 1997), and as a distraction from anxiety (Evans, 2002) and pain (Good et al., 1999). When participants in cardiac rehabilitation use music for exercise, relaxation, and enjoyment, they do not use music as a stimulus (Metzger, 2004), whereas this is seen in music therapy and music medicine (Saperston, 1999). Further, the use of music may provide the patient with a sense of control and familiarity in the strange, unknown hospital setting (Cowan, 1991). The review of literature in relation to surgery found varied information on the music used for relaxation and the criteria by which the music was selected. Thus, five studies provided specific information on the music used (Heitz et al., 1992; Barnason et al., 1995; Zimmerman et al., 1996; Burke, 1997; Kane et al., 2004), or of the styles used (Voss et al., 2004). One study provided details of the criteria for the music selections used (Burke, 1997); and other studies based their criteria in reference to Gaston, 1951 (Good & Chin, 1998; Good et al., 2001; Voss et al., 2004). The relationship between the structural factors of music and their possible relaxing effect will be discussed in chapter 5.

From the focus on relaxing music in relation to surgery, the review now moves on to the subject of music therapy as applied in the cardiac population.

2.5 Music and music therapy interventions with the cardiac population

In this section, the literature on music interventions including music therapy with the cardiac population is reviewed with specific reference to how music therapy can accommodate the specific problems that this population experiences with anxiety and pain.

2.5.1 Receptive music experiences

Receptive music experiences describe practices in which the client:

> ... listens to music and responds to the experience silently, verbally, or in another modality. The music used may be live or recorded improvisations, performances, or compositions by the client or therapist, or commercial recordings of music literature in various styles (e.g., classical, rock, jazz, country, spiritual, new age). The listening experience may be focused on physical, emotional, intellectual, aesthetic, or spiritual aspects of the music, and the client's responses are designed according to the therapeutic purpose of the experience. (Bruscia, 1998, p. 121)

The receptive music experiences are used for example to evoke specific body responses, to stimulate or relax a person, or to evoke affective states or experiences (Bruscia, 1998).

2.5.2 Receptive techniques used in music interventions

Various receptive techniques are applied in music therapy in different contexts and stages of treatment in relation to cardiac illnesses. Table 2.3 gives an overview of receptive techniques used in cardiac settings. The two left columns show the author and year of publication, then the research area and cardiac speciality with which the study was concerned. The studies are organized chronologically by year within the period from 1990 to 2005.

Table 2.3 *Receptive techniques used in cardiac settings 1990 - 2005*

Author	Year	Research area/ cardiac speciality	Technique	Music Selected by *R, P*
Updike	1990	stress response/ CCU & ICU	M.L.	eight programs of classical or contemporary (replicate of Bonny, 1983) *R, P*
White	1992	anxiety/ myocardial infarct	M.L.	classical, four adagios *R*
Elliott	1994	anxiety/ CCU	M.L. and verbal instruction for relaxation	light classical *R*
MacNay	1995	perceived exertion, mood, time estimation score/ cardiac rehabilitation	M.L.	Various styles according to participants' preference and self-selection (four cases) P, R
Mandel	1996	Wellness/ cardiac-pulmonary rehabilitation (phase II)	M.L., MAR relaxation & imagery techniques	Varied *P*
Chlan	1998	relaxation, anxiety/ ventilatory assistance (ICU)	M.L.	Choice of: classical, country western, easy listening, new age *R, P*
White	1999	balance, anxiety / cardiology (myocardial infarct)	M.L.	classical music *R*
Vollert et al.	1999	coronary artery disease	M.L.	raga *R*
Hamel	2001	anxiety/ cardiology/ICU (cardiac catherization)	M.L.	Trance-Zendance, S. Halpern (listed in references only) *R*
Wong et al.	2001	anxiety/ cardiology/ ICU (ventilator- dependent)	M.L.	*Chinese music*: folk song, played by Chinese instrument, played by Western instrument, and Buddhist. *Western music:* classic, movie, and piano. *R, P*
Almerud & Petersson	2003	relaxation/ mechanically ventilated, ICU, including post op cardiac patients	M.L.	Beethoven: Suite 1 in C sharp minor (Moonlight sonata); Pachelbel Canon; Debussy: Claire de lune; Bach: Air from suite for orchestra no. 3 Vivaldi: Spring (Largo); Seymer: Solõga (Suneye); Marcello: Concerto for oboe in D minor (Adagio) *R*
Short	2003	CABG rehabilitation	GIM	classical *R (music therapist)*

Note. R= Researcher. P= Participant. M.L.= Music listening. MAR= Music Assisted Relaxation. GIM= (The Bonny Method of) Guided Imagery and Music.

In the rehabilitation of persons suffering from heart diseases, music listening was used alone (MacNay, 1995) or in combination with Music Assisted Relaxation and imagery techniques (Mandel, 1996). MacNay (1995) investigated how preferred music would influence the perceived exertion, mood, and time estimation scores of patients who participated in a cardiac rehabilitation programme. Four participants received 15 sessions and alternated between exercising in a control condition with no music, and an experimental condition of their preferred music. Measures on the dependent variables were self reported by the participants on the Borg Ratings of Perceived Exertion Scale, the Rejeski Feeling Scale, and a Time Estimation Questionnaire. Test results indicated, that listening to preferred music may have decreased perceived exertion, increased mood, and decreased estimations of time duration for two of the participants. Mandel reviewed the rationale for developing music therapy for stress management in a rehabilitation program which had been offered to patients in cardiac and pulmonary rehabilitation. Music therapy was administered in small groups or individual biweekly sessions after referral (by medical staff, family, or self request). Various relaxation and imagery techniques were applied, and interventions included live and recorded music, and verbal discussion to encourage expression of feelings and to reduce anxiety. Part of the goal in the music therapy was for the participants to learn how to select music for distraction and enjoyment. In cardiology, music listening is used mainly for reducing anxiety (Chlan, 1998; Hamel, 2001; Updike, 1990; White, 1992, 1999; Wong et al., 2001), and for relaxation (Almerud & Petersson, 2003). One study used music listening and verbal instruction for relaxation (Elliott, 1994). Two studies were concerned with patients in postoperative cardiac care, a music medicine study in the ICU (Almerud & Petersson, 2003), and a music therapy and medicine study using GIM (Short, 2003).

A variation of *Music Relaxation* is the technique of a Music Assisted Progressive Relaxation combining progressive muscle relaxation with music (Robb, 2000). The client listens to a recording of a progressive muscle relaxation script mixed with a musical selection characterised by relaxing qualities. In the study by Robb, the music was selected by the researcher in order to control the musical elements and style. The music function was to support and structure breathing and muscle tension exercises. Rhythm, tempo, and melodic repetition were of particular importance as far as supporting these exercises (Robb, 2000, p. 7), as patient preference was secondary to selecting music which met this demand for support (Standley, 1996). Music Assisted Progressive Relaxation technique was used in no studies with the cardiac population.

2.5.2.1 Guided Imagery and Music, GIM

One example was found of the application of the Bonny Method of Guided Imagery and Music (GIM) with patients after CABG (Short, 2003). This method belongs to the category of receptive techniques used in music therapy in which music listening is used to evoke and support imaginal processes or inner experiences, while the client freely images to music while in an altered state of consciousness and dialoguing with the therapist (Bruscia, 1998). GIM was developed in the 1970's by Helen Lindquist Bonny who defined GIM as a process of listening in a relaxed state to selected programmed music, in order to elicit inner imagery in the form of mental imagery, symbols, or deep feelings (Bonny, 1978).

> The unique combination of music, relaxation, and the responses generated by the stimulus, provide a therapeutic milieu, which constantly succeeds in calling forth the creative and holistic sources of consciousness. (Bonny, 1978, p. 5)

A GIM session comprises four stages (Bonny, 2002):

1) The preliminary conversation
2) The induction (relaxation-concentration exercises)
3) The music listening session (music journey)
4) The post-session integration or review (postlude)

The music listening session is of 30 to 45 minutes' duration, during which the client listens to music in a lying position, and the therapist (guide) sits close to the head of the client but with no physical contact. While listening to the music, the client is encouraged to verbalise his/ her responses to the music, be they imagery or feelings. The music functions as a catalyst for healing to happen through the music and through an allowing attitude of the guide (Bonny, 2002, p. 282). The guide (facilitator) in a GIM session takes various roles; suffice here is to mention that of a *relaxer,* in that the guide:

> ... through the use of the voice, through suggestion and, at times, through a more directive use of imagery, subjects can be helped to relax the tension which often accompanies the emergence of a long repressed emotion. A guide's quiet modulated voice is relaxing and reassuring. (Bonny, 2002, p. 274f)

Other roles of the guide are those of a listener and sharer, of an observer and recorder (Bonny, 2002) which are not discussed further in this context.

In relation to outpatient treatment, the Bonny Method of Guided Imagery and Music (BMGIM) was used by Short (2003) with participants recovering from Coronary Artery Bypass Grafting (CABG). Short's study aimed to explore how meaning as depicted in music-supported imagery related to the patient's process of adjustment from a health crisis (in this case heart surgery). The results of her investigation suggested that participants used a wide range of personal and cultural texts to convey meanings about their health care situation, and that BMGIM has value as a means to assist clinical change in this population.

2.5.2.2 Music listening with therapeutic suggestions

Taped suggestions for relaxation are included and only briefly described in a number of studies (Blankfield et al., 1995; Mynchenberg & Duncan 1995; Tusek et al. 1999; Nilsson, 2003; Nilsson, Rawal, Uneståhl, et al., 2001; Nilsson, Rawal, Enquist et al., 2003). One study was concerned with populations with heart disease (Blankfield et al., 1995) investigating the effects of taped suggestions for relaxation with background music when compared with music listening alone and a control condition for patients after Coronary Artery Bypass (CAB). Outcome variables were postoperative analgesic intake, length of hospital stay after surgery, duration of stay in the Surgical Intensive Care Unit, and the types of complications. Anxiety was reported by nurses' observations of the patients during their stay in the unit. The music used as background for the therapeutic suggestions, served as the intervention in the music group. The authors stated that the therapeutic suggestions, tailored for the CAB patient, contained permissive suggestions for relaxation, healing, and mental imagery (Blankfield et al., 1995, p. 33). The study found no significant differences between groups in any of the measured outcome variables. No criteria for the properties of the music for relaxation were reported, and the non significant results suggest the need for further research into music listening in combination with therapeutic suggestions for relaxation.

In more recent studies in this area of practice, music was again used as a background for an intervention primarily using spoken suggestions for relaxation (Nilsson, 2003; Nilsson, Rawal, Uneståhl, et al., 2001; Nilsson, Rawal, Enquist et al., 2003). The populations were patients undergoing various types of surgery, and the studies were not concerned with patients with heart disease. The studies are included here, as they explicitly focus on the therapeutic suggestion aspect of the intervention. The therapeutic suggestions may be considered within a hypnotic context as suggested by Nilsson (2003). The intervention is characterised by:

> ... patients listened to relaxing and calming music accompanied by relaxing and encouraging suggestions recorded in a male voice by a person with extensive experience in hypnotherapy.
> The taped voice suggested a feeling of relaxation, security, rapid healing, return to normal appetite, quick recovery, absence of pain and nausea together with encouragement of comfort. (Nilsson, Rawal, Enquist et al., 2003, p. 279)

The study by Nilsson (2003) reported results on different specific populations in surgery that may not be generalized to the cardiac population. Nilsson undertook a number of investigations (Nilsson, 2003; Nilsson et al., 2001; Nilsson et al., 2003a) that are of special interest to the current study as they have specifically compared the use of music with and without (taped) therapeutic suggestions. The reduction in pain was reported in all music with therapeutic suggestions, or without therapeutic suggestions, and patients exposed to both interventions had significantly lower pain intensity post operatively at the Post Anaesthesia Care Unit compared with the control group (Nilsson et al., 2003a). The study also demonstrated that both of these interventions in the early postoperative period have a beneficial effect on patients’ experiences of analgesia. The improvement in analgesia, though statistically significant, is modest in the population presenting an overall low pain level. This result is congruent with the findings of other studies that music interventions have greater effects when some pain is present at the time of intervention (Standley, 1995).

2.5.2.3 Music and relaxation Techniques

Music listening and relaxation techniques were found in very few studies in relation to patients with heart disease, such as in the study by Elliot (1994) who examined the effect of muscle relaxation procedures versus music listening on patient anxiety in a Coronary Care Unit, CCU. Music listening and verbal instruction for muscle relaxation were used as comparison interventions, not as a combined intervention. Participants were 56 patients who were in treatment after myocardial infarction. The music was tested for preference before the experiment, and the participants chose light classical music as the most soothing and for providing a more relaxing environment (Elliott, 1994, p. 28). This study was based on previous studies on autogenic therapy (Schultz & Luthe, 1969), the relaxation response (Benson & Clipper, 1976), and progressive relaxation training (Bernstein & Borkovec, 1973) suggesting a non-muscle-tensing muscle relaxation for patients with heart disease. Thus, the participants were verbally instructed in a systematic relaxation of the gross muscle groups, reinforcement of breathing, and silent pauses to allow for the participant's own repetition of words or phrases to help focus on the relaxation (Elliott, 1994, p. 29). This study found no significant reduction in anxiety for patients using music or muscle relaxation when compared to a control group.

Examples of music and relaxation techniques used with other populations are found in Robb et al.(1995) investigating Music Assisted Relaxation (MAR) on preoperative anxiety in paediatric burn patients, and in the study by Robb (2000) trialling Music Assisted Progressive Muscle Relaxation (MPMR) with university students, comparing the MPMR intervention with interventions of Progressive Muscle Relaxation (PMR), Music Listening, and Silence. The effects of these interventions were examined on anxiety (measured by the STAI), and perceived relaxation (measured by the VAS) in sixty university students who were randomly assigned to the four groups. The relaxation script was identical for the MPMR and the PMR interventions and was audio taped. The researcher selected the music for the MPMR and the music listening conditions, based on specified musical elements characteristic of sedative music. This study found each treatment to be equally effective in producing significant changes in anxiety and perceived relaxation from the pre test to the post test period. The author recommends that,

> ... if music listening is used for relaxation or anxiety management, clients should receive direct instruction for using this technique, as ... effective use of music listening to promote focus of attention and structure physical responses, such as breathing, do not appear to occur spontaneously. (Robb, 2000, p. 17-18)

These examples illustrate the paucity of music and relaxation techniques investigated in the treatment of persons with heart diseases, and when examined in other populations, these techniques were equally effective when compared to relaxation without music or to silence.

2.5.2.4 Music listening

Music Listening as a form of intervention is widely used for a variety of situations and populations. The medium of Receptive Music Therapy has in itself a broad application ranging from passive experiences involving imaging, appreciation, to foci for discussion, and relaxation. More specifically in relation to people with heart problems, many studies reported music listening as the treatment intervention applied (Almerud & Petersson, 2003; Barnason et al., 1995; Blankfield et al., 1995; Bolwerk, 1990; Bonny, 1983; Broscious, 1999; Chlan, 1998; Chlan et al., 2001; Davis-Rollans & Cunningham, 1987; Hamel, 2001; MacNay, 1995; Vollert, 1999; Voss et al., 2004; White, 1992; 1999; Winter et al., 1994; Wong et al., 2001; Zimmerman et al., 1988; 1996). Patients listen to selected, recorded music on their own. No relationship between the patient and a music therapist is involved, and music is therefore used *auxiliary* to the standard care and treatment (Bruscia, 1998). In relation to cardiology, music listening is primarily used to reduce anxiety (Hamel, 2001; Vollert, 1999; White, 1992, 1999; Wong et al., 2001), and to promote relaxation (Almerud & Petersson, 2003; Chlan, 1998). In relation to heart surgery, music listening experiences are used for pain management (Tusek et al, 1999; Voss et al., 2004; Zimmerman et al., 1996) and for anxiety reduction (Barnason et al., 1995; Tusek et al., 1999; Voss et al., 2004). In cardiac rehabilitation with exercise, music listening was used (MacNay, 1995). Music is selected by the researcher, except one study regarding rehabilitation in which the participants used their own music selections (Mandel, 1996). In all other studies listed in tables 2.2 and 2.3, music was selected by researchers, and from these selections, participants could choose their preferred music (Barnason et al., 1995; Chlan, 1998; Voss et al., 2004; Wong et al., 2001; Zimmerman et al.; 1996). Information on the music selections as well as the criteria by which the music was selected are reported to varying degrees.

An early study often referred to in the literature, is the pilot study by Bonny (1983). In using music listening for patients in Intensive Coronary Care Units, ICCU, Bonny examined the effectiveness of programmed recorded music in reducing stress and in creating an auxiliary treatment which the nursing staff could apply. Participants in the study were 26 patients, over 50 years old, in ICCUs in two hospitals. Four programmes of sedative music were selected and sequenced by the researcher. In referring to Gaston (1951), Bonny described sedative music to be characterized by regular rhythm, predictable dynamics, consonance of harmony and recognized instrumental and voice timbre. Further, based on Hevner (1937), Bonny selected the music to present a positive mood state and to eliminate dynamics that could suggest fearful imagery (Bonny, 1983, p. 7). The music programmes used were two classical/ one light-classical, mostly from the romantic era, and one programme of popular music included folk, country western, jazz and swing styles. Participants were invited to listen to the music in a particular sequence determined by the researcher before they were given a choice between classical and popular music. Physiological, psychological and social reactions (in participants and nursing staff to the introduction of sedative music) were measured four times. Results showed a significant reduction in heart rate, a non significant decrease in blood pressure, greater tolerance of pain, decreased anxiety and depression. Playing sedative music in the ICCU was reported by the nurses to provide a more pleasant environment for both the patients and the staff. The results therefore suggest that music listening is increasingly applied by the medical staff in hospital settings (Bonny, 1983, p. 15). A weakness of the study was the lack of a control condition. Therefore the positive results could not solely be ascribed to the music listening intervention.

A more recent example of applying music listening with heart patients, was a controlled study undertaken by Voss et al. (2004). In their study, the effectiveness of sedative music in reducing anxiety and pain was examined during a 30-minute chair rest in 61 patients after open heart surgery. The outcome variables anxiety and pain were measured by the VAS. The music listening was compared to scheduled rest and a control condition of treatment as usual. The music consisted of synthesizer (new age), harp in two styles (popular and also new age), popular piano music from the 1940's to 1980's, classical orchestra, slow modern jazz, and American Indian flute (see table 2.2). The criteria for the music selections in this study were also based on Gaston (1951), and the music was without lyrics, using a sustained melodic quality, a tempo of 60 to 80 beats per minute, and was characterized by the absence of strong rhythms or percussion. In preparation for the music listening, the participants received instructions for using the music by listening and following the music, and to allow the music to relax and distract (Voss et al., 2004, p. 198). Unlike the traditional application of music listening, the investigator stayed in the room while the participant listened to the music without engaging therapeutically with the participant. In this study, sedative music was more effective than scheduled rest and treatment as usual in reducing anxiety and pain in patients after open-heart surgery during their first chair rest. These results indicated that patients would benefit from listening to relaxing music after open-heart surgery.

2.5.3 Clinical music interventions and music therapy with heart patients

Very few examples of music therapy interventions with heart surgery patients have been revealed from the literature search. There are nevertheless a number of studies using music that have relevance for this study (Barnason et al., 1995; Tusek et al., 1999; Voss et al., 2004; Zimmerman et al., 1996). In their review of the effects of music therapy in cardiology, Hanser & Mandel (2005) report on the use of music for distraction from pain, anxiety or depression, and to enhance the quality of life. The receptive methods include Guided Imagery and Music (the Bonny Method) and Music Facilitated Stress Reduction as well as active music therapy approaches. The results of the different intervention types are not distinguished in the review, as its purpose was to review all music interventions in cardiology. The studies reviewed by Hanser & Mandel (2005) did not take the patients' preference into account, yet significant differences were nevertheless found as a function of music listening. The authors therefore state that:

> It seems reasonable to conclude that if investigator-selected music has impact, music selected by the patient and administered by a music therapist… should expect even greater effects. (Hanser & Mandel, 2005, p. 20).

Further they point to the fact that music listening is generally more effective with chronic pain than with acute and severe pain, as was also reported by Standley (1995). In relation to the selection of music, an interesting finding is reported by Zimmerman et al. (1988) who found a choice of music by Halpern, classical-instrumental, or country western music to be equally effective as white noise or uninterrupted rest in reducing anxiety in coronary care patients (Zimmerman et al., 1988).

An example of music therapy with heart patients, is the study by Short (2003) (see section 2.5.2) which addressed psychosocial needs of patients recovering from Coronary Artery Bypass Grafting, CABG. The intent of the study was to explore how imagery occurring in GIM sessions depict the emotional problems which coronary bypass patients experience. Physically they typically recover quickly, but depression, anxiety and pain are often experienced in their later recovery process. Short writes:

> As cardiac patients recover from surgery, there is a need for re-experiencing self, as increasingly healthy and capable, not disabled. It is also necessary to address anxiety and promote relaxation, to assist with pain management, and to support the rehabilitation process of increasing health and adaptation. An acceptable, non-threatening form of therapy such as music therapy may be individualized to the needs of the patient. (Short, 2003, p. 41)

Six participants were in the study, and five of these had the full treatment of six GIM sessions. Narrative data were drawn from the sessions and thematically analysed for clinical meaning. As part of addressing anxiety, the participants were involved in deciding which relaxation techniques to use. The results showed that the GIM therapy technique assisted in mobilizing both physical and emotional recovery, converting psychic activity into physical recovery in patients after CABG (Short, 2003, p. 249). This study illustrates the close relationship between the psychological and the physical aspects of recovering from a heart operation, and the benefits that receptive music therapy which includes relaxation, may provide to this population.

2.5.4 Summary

A variety of receptive music intervention techniques were found in cardiac settings in the form of music listening for anxiety reduction and promoting relaxation. Music listening with therapeutic suggestions was found in a single study with the population with heart disease (Blankfield et al., 1995). One study investigated the effects of music listening versus verbal instruction for relaxation (Elliott, 1994). These studies both reported non significant results from interventions of music listening compared to therapeutic suggestions with or without music as background. No other studies were found in populations with heart disease in which music and relaxation techniques were used. Music listening, auxiliary to the standard medical treatment, is the predominant technique applied in practices in relation to cardiology and heart surgery. Clinical work in music therapy with heart patients was illustrated by the study of GIM with patients recovering from CABG suggesting that this population can benefit from music therapy in the form of GIM sessions (Short, 2003).

In the last section of this review, the focus moves to reviewing the literature on the effects of music in relation to surgery in general and in relation to heart surgery.

2.6 Outcome studies reporting the effects of music medicine and music therapy in pre-, intra, and post surgical procedures

Based on the review of the current treatment of persons with heart valve disease in need for surgical treatment, this section is organised by the outcome variables investigated in relation to surgery (adults only), and presents outcome studies reporting the effects of music used before, during and after surgery, mainly performed under general anaesthesia. The postoperative studies are concerned with the immediate recovery period after anaesthesia, and the rehabilitation phase I, the period following until discharge. This section's literature is limited to the period 1990 to 2005 with one exception. The study by Updike & Charles (1987) is included as it partly replicated the pilot study, Music Rx by Bonny (1983) which has formed the basis for a number of later studies. Their investigation of the effects of music listening was undertaken in a surgical setting, and the music selections and their sequencing were similar to those reported by Bonny (1983).

Table 2.4 presents an overview of the outcome studies included in this section's review. The studies are listed in the order of which operative stage they investigated. In each stage, the studies are organised chronologically by author and year of publication, displayed in the two left hand columns. The right hand column lists the outcome variables examined in the studies respectively. All studies listed in table 2.4 were music medicine studies and applied music listening auxiliary to the standard medical treatment. The effects of these investigations are reported in the sections to follow from table 2.4.

Table 2.4. *Outcome studies of the effects of music in relation to surgery*

Surgical phase	Author	Year	Outcome variables
Pre operative			
	Updike & Charles	1987	anxiety, mood (physiological and emotional measures)
	Winter, et al.	1994	anxiety, stress (vital signs)
	Gaberson	1995	anxiety (VAS)
	Miluk-Kolosa, et al.	1996	stress related measures (physiological)
	Szeto & Yung	1999	Anxiety (Chinese Version of the STAI, SUTS), SBP, DBP
	Miluk-Kolasa et al.	2002	anxiety (STAI)
	Wang et al.	2002	anxiety (STAI)
	Yung, et al.	2003	anxiety, stress related measures (STAI and physiological)

Table 2.4. continued

Intra operative			
	Steelman	1990	anxiety (STAI), blood pressure
	Blankfield, et al.	1995	anxiety (staff observation), analgesia, length of stay
	Koch et al.	1998	anxiety (vital signs), pain, analgesia
	Nilsson, et al.	2001	recovery (wellbeing, fatigue a.o.), pain (VAS), analgesia
intra or post	Nilsson, et al.	2003b	anxiety & pain (NRS), fatigue
intra or post	Nilsson, et al.	2003a	stress: anxiety & pain (NRS), vital signs, immune response
Post operative			
	Heitz et al.	1992	pain (VAS), vital signs, analgesia
	Barnason et al.	1995	anxiety (STAI, NRS), mood (NRS), vital signs ♥CABG
	Zimmerman et. al.	1996	pain (VRS, MPQ), sleep ♥ CABG
	Burke	1997	anxiety (MAACL), pain (Present Pain Intensity, VAS)
	Byers & Smith	1997	noise annoyance, heart rate, blood pressure
	Tusek et al.	1997	anxiety & pain (linear analogue scale), analgesics, length of stay
	Good & Chin	1998	pain (VAS)
	Taylor et al.	1998	pain (VRS, Graphic Numeric Pain Intensity Scale)
	Broscious	1999	pain (NRS), heart rate, blood pressure ♥ open-heart surgery
	Good et al.	1999	pain (VAS)
	MacDonald et al.	1999	anxiety (STAI), pain (MPQ, VAS), analgesia
	Tusek et al.	1999	anxiety & pain (NRS), length of stay ♥
	Good et al.	2001	pain (VAS)
	Nilsson et al.	2003	anxiety (STAI), pain (VAS), analgesia, fatigue a.o.
	MacDonald et al. (1)	2003	anxiety (STAI), pain (PRI from teh MPQ, VAP)
	MacDonald et al. (2)	2003	pain (PRI from the MPQ, VAP), analgesia
	Kane et al.	2004	anxiety (STAI), pain (MPQ, VAS), analgesia (preference, VAS)
	Voss et al.	2004	anxiety & pain (VAS) ♥ open-heart surgery
	Nilsson, et al.	2005	anxiety & pain (NRS), analgesics, stress reduction (physiological)
	Thorgaard et al.	2005	relaxation, satisfaction, opinion of designed music environment
	Mok & Wong	2003	anxiety (STAI), heart rate, blood pressure

Note. SUTS= Subjective Unit of Tension Scale. SBP= Systolic Blood Pressure. DBP= Diastolic Blood Pressure NRS= Numerical Rating Scale. MPQ= McGill Pain Questionnaire. VRS= Verbal Rating Scores. VAP= Visual Analogue Pain Question. PRI= Pain Rating Index. ♥= heart surgery.

2.6.1 Anxiety and stress

The studies in which STAI was used for measuring state anxiety, moderate mean effect sizes were found and the results were inconsistent (Dileo & Bradt, 2005). When other instruments were applied such as the VAS, more consistent results were reported, and the mean effect size was close to moderate in surgical patients (r= .24).

2.6.1.1 Pre operative

Eight studies reported the effects of music used pre operatively, on *anxiety* (Gaberson, 1995; Szeto & Yung, 1999; Miluk-Kolosa et al., 2002; Updike & Charles, 1987; Wang et al., 2002), *anxiety* and *stress* (Winter et al., 1994; Yung et al., 2003), *stress related measures* (Miluk-Kolosa et al., 1996), and *emotional responses* (Updike & Charles, 1987). Except for one study which used a within subjects design (Updike & Charles, 1987), the studies were controlled trials. None of these studies were concerned with heart surgery, and inconsistent results were reported.

Significantly less stress and anxiety was reported by the participants who listened to music than was reported from the no music groups in the controlled trials by Wang et al. (2002), and Winter et al.(1994). Consistent with this finding, Yung et al. (2003) found that a preoperative 20 minute music listening intervention significantly reduced state anxiety and mean arterial pressure, when compared to a control group that showed no significant reductions. Winter et al. (1994) stated that changes in heart rate and blood pressure were expected to reflect the patients' stressful state, yet they found no correlation between these physiological parameters and patients' state anxiety scores. Wang et al. (2002) also found significantly lower levels of state anxiety in the music listening group as compared to the control group (no music), and no differences between groups were found in the physiological measures (heart rate, blood pressure, and stress hormones). In both these studies the music used may explain these results. Wang et al. asked all their participants to bring their favourite music (compact disc), and only the music group came to listen to their music. The control group listened to white noise. The music was not 'controlled' as far as stimulative or sedative characteristics, and no information of which music the participants chose, were reported. In the study by Winter et al. (1994) the music selection comprised instrumental and vocal classical, country western, popular, and jazz. The classical music included Tchaikovsky's symphony no. 6 'Pathetique', Schumann's Quartet for Piano and Strings in E-flat Major, and Beethoven's Symphony No. 2 in D Major, therefore incorporating both slow and fast movements. The music selections would meet the criteria for stimulative music based on the potential elements suggested in the PSSM (Wigram, 2004), which could explain why no correlations between any particular type of music and stress reduction and anxiety as measured by the STAI were found in this study.

Another study concerned with the preoperative phase was carried out by Miluk-Kolosa, Matejek, and Stupnicki (1996) who investigated the effects of music on physiological measures (arterial pressure, heart rate, cardiac output, skin temperature, and glucose count) in adult patients. One hundred in-patients awaiting non-orthopaedic surgery were randomly assigned to an experimental group receiving music listening to individually composed music programmes prior to surgery and during recovery, or a control group receiving standard care. The results of this investigation showed that the music listening group recovered faster to their initial values than did the control group. The results indicate that music listening is attractive in terms of reducing preoperative stress. Similar results were reported in a more recent study (Miluk-Kolosa et al., 2002).

2.6.1.2 Intra operative

A few studies investigated the effect (on anxiety) of music applied during surgery, with spinal anaesthesia during urological procedures and lithotripsy (Koch et al., 1998, study 1 and 2), in outpatient hand or wrist surgery (Steelman, 1990), and under general anaesthesia during coronary artery bypass grafting (Blankfield et al., 1995). The studies in which patients were awake during surgery, reported no differences between groups on changes in anxiety (Koch et al., 1998; Steelman, 1990), whereas significant differences were identified within groups when comparing changes from before to after surgery in music and in the control groups (Steelman, 1990). Inconsistent effects of intra operative music used during general anaesthesia were reported. No difference between groups was reported when music was used in patients undergoing CABG (Blankfield et al., 1995).

2.6.1.3 Post operative

Two studies (Barnason et al., 1995; Blankfield et al., 1995) trialled the effect of music in *cardiac* patients postoperatively, and intra- and post operatively, respectively. No difference in anxiety as measured by VAS and STAI was reported by Barnason et al. (1995). The study by Blankfield et al. (1995) also reported no difference between groups in anxiety, and no significant differences were found in this outcome between patients who felt they were helped by the intervention and those who did not find the tapes helpful. Different results were reported by MacDonald et al. (2003) who investigated the anxiolytic effects of music following surgical procedures involving general anaesthesia, on 40 patients undergoing foot surgery (study 1) and 58 women having abdominal hysterectomy (study 2). Both studies involved a music group receiving 20 minutes of music listening after surgery, and a control group receiving standard treatment. Anxiety was measured by STAI. Results of study 1 indicated that the music group experienced significantly less anxiety than was reported by the control group, whereas results of study 2 showed no differences between groups regarding anxiety. An earlier study evaluated the anxiolytic effects of music in patients undergoing foot surgery (MacDonald et al., 1999). The study showed significantly lower levels of anxiety (STAI) in subjects in the experimental group compared with those in the control group.

Voss et al. (2004) undertook an investigation of the effects of sedative music on anxiety during chair rest after open heart surgery, using a three group pretest- posttest experimental design. Sixty-one patients who had open-heart surgery participated in the study postoperatively and were randomly assigned to either an experimental group receiving 30-minutes of sedative music, a group receiving scheduled rest, or a group receiving standard care. Anxiety was measured with visual analogue scales. Test results showed that sedative music was more effective in decreasing anxiety in open-heart surgery patients during their first chair rest, than scheduled rest and treatment as usual. Another RCT (Nilsson et al., 2005) investigated whether intra- *or* postoperative music could influence stress and immune response during and after general anaesthesia. Seventy-five patients admitted for day care open hernia surgery were randomly allocated to an intra-operative music group, a postoperative music group, or a control group of silence. Stress response was measured by the cortisol and blood glucose levels during and after surgery, and by patients' postoperative anxiety (and vital signs). Anxiety measures were taken through individual self-reports on numeric rating scales. The results showed that after two hours in the post anaesthesia care unit, the postoperative music group reported a significantly greater decrease in cortisol level than was reported by the control group. After one hour in recovery, the postoperative music group reported less anxiety than did the control group and no differences were found between groups in cortisol and blood sugar levels. These results suggest that intra operative music shows no difference in anxiety, and that postoperative music reduces anxiety. It has been suggested that the effect of sound is somewhat limited in the middle of the general anaesthesia period as compared with regional anaesthesia (Nilsson, 2003, p. 36). Further, it was proposed that a moderate level of preoperative anxiety is presumed to result in an optimal post operative recovery while both excessively low and excessively high levels of anxiety result in impaired or sub optimal recovery (Janis, 1958). One study reported a positive correlation of patients' experience of relaxation with their like or dislike of the sound environment (Thorgaard et al., 2005[22]).

2.6.1.4 Pre, intra, and postoperative

An example involving the application of interventions before, during, and immediately after surgery, and during the first phase of rehabilitation, is the study by Tusek et al. (1997) which evaluated the effects of Guided Imagery with back ground music on anxiety, analgesics requirements, and length of hospital stay. Participants were 130 patients having their first elective

[22] The study is further explained in relation to satisfaction with stay (section 2.6.4 in this chapter).

colorectal surgery who were randomly assigned to one of two groups receiving standard peri operative treatment (control group) or a treatment group receiving sequenced interventions of listening for 20 minutes twice a day to the following tapes:

- guided imagery with a 'soft, soothing, musical background' three days before surgery
- music-only (same music as used in the guided imagery tape) during induction, during surgery, and immediately after surgery in the recovery room
- guided imagery with same background music during each of the first six postoperative days

The guided imagery tape instructed participants to relax and become focused, and encouraged them to confront and work through feelings of fear, anxiety and negativity. Participants rated their anxiety level twice daily on a linear analogue scale of 0 to 100. Preoperatively, the guided imagery group reported a decrease in anxiety, whereas an increase was reported by the control group. Results indicated that guided imagery significantly reduced post operative anxiety when compared to the control group.

Tusek, Cwynar & Cosgrove (1999) undertook a further RCT to investigate the effect of guided imagery on anxiety in patients undergoing cardiac surgeries. One hundred participants were randomly assigned to an imagery group or a control group. The guided imagery intervention consisted of two 18 minute taped recordings first guiding the patient in a general relaxation of deep breathing and muscle relaxation, and then suggesting the participant to imagine him/her self in a place suited for relaxation. The purpose of the guided imagery was to allow the participant to become calm and centred. 'Soothing music' forms a background for the guiding. Participants were instructed to listen to the tapes twice a day at specific times *before* surgery, and on the first to the fifth days after surgery. During anaesthesia, the treatment group listened to a music-only tape with the same music forming the background for the guided imagery. Anxiety was measured twice daily by the numeric rating scale. The study found significant differences between groups in anxiety, indicating that guided imagery with background music decreases pre and post operative anxiety significantly in patients undergoing cardiovascular surgery.

2.6.2 Pain and analgesia

In their meta analysis, Dileo & Bradt (2005) reported inconsistent findings concerning the effects of both music medicine and music therapy interventions on patients' pain levels across 48 studies evaluating pain. Twenty-two of these studies, all categorised as music medicine, examined the effects of music listening on pain perception in surgical patients, which yielded a small mean effect size (*r*= .15).

2.6.2.1 Intra operative

Studies evaluating the effects of *intra* operative music (Koch et al., 1998) and of music with therapeutic suggestions (Blankfield et al. 1995; Nilsson et al., 2001) have reported inconsistent results. Koch et al. (1998) examined the sedative effect of music on 35 patients undergoing urological procedures (awake patients). Participants were randomly assigned to music or control conditions, and results suggested that intra operative music decreased patient-controlled sedative and analgesic requirements. One RCT evaluated the effects of intra operative music in combination with therapeutic suggestions on 90 women undergoing a hysterectomy under general anaesthesia (Nilsson et al., 2001). Participants were randomly assigned to one of three groups receiving either music in combination with therapeutic suggestions, music alone, or operation room sounds (Control). Pain was measured by a Visual Analogue Scale (VAS) and postoperative analgesia was patient controlled. Results indicated that the music group experienced more effective analgesia on the first postoperative day than the two other groups. Inconsistent with this result, no differences between groups were found in evaluating the effects of taped therapeutic suggestions or taped music on narcotic usage (Blankfield et al., 1995). These results suggest that music only is more effective in reducing pain than therapeutic suggestions.

2.6.2.2 Post operative

Several studies reported on the effects of music postoperatively on pain which was measured by means of the VAS, Numeric Rating Scale (NRS), Verbal Rating Scale (VRS), and/ or the McGill Pain Questionnaire. No differences between groups were reported in a number of studies (Broscious, 1999; Heitz et al., 1992; MacDonald et al., 2003, study 1 and 2; Taylor et al., 1998), though in one study the music group was able to wait longer before requiring analgesics than the control group (Heitz et al., 1992).

A variety of techniques have been evaluated in relation to postoperative pain showing positive effects on pain and analgesics. Voss et al. (2004), again, evaluated the effects of sedative music on pain during chair rest after open heart surgery, and pain sensation and pain distress were measured with visual analogue scales (VAS). Test results showed that sedative music was more effective in decreasing pain in open-heart surgery patients during their first chair rest, than scheduled rest and treatment as usual. These authors recommend that patients should be encouraged to use sedative music adjunct to medication during chair rest. The effects of relaxation and music, on day 1 and 2 after surgery, were evaluated in controlled studies in a small sample (Good & Chin, 1998) and large samples of surgical patients, 500 and 468 patients respectively (Good et al., 1999; Good et al, 2001). Participants were randomly assigned to four groups: (jaw) relaxation, music, relaxation and music, and control. Music was found to reduce reported sensation of pain on day 2 and the distress of pain on day 1 (Good & Chin, 1998). The three interventions taken together were effective for pain on both postoperative days (Good et al., 1999). The most recent of their studies also used a repeated measures design and participants were 468 abdominal surgery patients who were assigned to four groups similar to the previous study. Results suggested that relaxation, music, and their combination reduce pain equally on day 1 and 2. Similarly, relaxing music was effective in reducing pain intensity as measured with the VAS and McGill Pain Questionnaire in patients after dressing change of vascular wounds (Kane et al., 2004).

Music, music video, and uninterrupted rest (comparison) were interventions examined in 96 patients having CABG surgery (Zimmerman et al., 1996). Pain was measured by VRS before and after each of two 30 minute sessions. Pain decreased over time for all three groups with no differences found between groups. Participants in the music group had significantly lower evaluative pain scores than the resting group. The effects of music and music in combination with therapeutic suggestions were evaluated in immediate postoperative recovery (Nilsson et al., 2003). A sample of 182 patients who had varicose vein or hernia repair surgery under general anaesthesia were randomly assigned to either music listening, music in combination with therapeutic suggestions, or blank tape. Analgesia and total morphine requirement were recorded. Results indicated that patients exposed to music and to music in combination with therapeutic suggestions had significantly lower pain intensity post operative at the PACU compared with the control group. No significant differences were found in the other outcome variables.

Butler & Butler (1997) in their study of the effect of physio-acoustic therapy on cardiac surgery patients in the immediate recovery phase also reported a decrease in the use of pain and sedative medication. Similarly, the overall decrease of pain was greater in the experimental group than in the control in a study also evaluating the effects of physio-acoustic therapy (Burke, 1997). The result of continued decrease of pain over time suggests that the continued use of the physio-acoustic therapy intervention which is thought to promote relaxation may be helpful in reducing the need for narcotics.

2.6.2.3 Intra versus post operative

In the study by Nilsson et al. (2005)[23], pain measures were taken through individual self-reports on numeric rating scales. The postoperative music group reported less pain, and required less morphine than was reported by the control group after one hour in recovery, the total morphine consumption in the postoperative music group was significantly lower than in the control group. These results indicate, that music used intra operatively decreases postoperative pain, and that postoperative music reduces pain, and morphine consumption.

2.6.2.4 Pre, intra, and post operative

Tusek et al. (1997) evaluated the effects of Guided Imagery with back ground music on analgesics requirements[24]. Postoperative analgesia intake was controlled by the participants, and pain experiences were self reported twice daily on the Numeric Rating Scale (NRS). Results indicated that pain and opioid requirements significantly decreased in the guided imagery group when compared to the control group. Tusek et al. (1999) in their study also evaluated pain which was measured twice daily by the NRS. The study found significant differences between groups in postoperative pain in patients undergoing cardiovascular surgery.

2.6.3 Mood

2.6.3.1 Pre operative

One study examined the effect of music listening pre operatively. Partly replicating Bonny's study from 1983, Updike and Charles (1987) used a within subjects design in evaluating emotional responses by open ended questionnaires concerning categories of mood:

- depression, sadness, and despair
- psychological isolation and defensiveness
- anxiety
- difficulty of medical management
- preoccupation with pain

This study used carefully selected and sequenced music for the purpose of improving the physiological and emotional status in the preoperative setting. The authors stated, that the most

[23] The study (Nilsson et al., 2005) is explained in section 2.6.1.3.
[24] The study (Tusek et al., 1997) is explained in section 2.6.1.4.

significant emotional effect appeared to be an experienced shift in participants' awareness toward a more relaxed and calm state, and that music listening appeared to effect desirable shifts in emotional (as well as physiological) states.

2.6.3.2 Post operative

A few studies were found regarding effects of music on mood. The pilot study by Bonny (1983) was concerned with non-surgery patients in Intensive Coronary Care Units (ICU) who suffered from heart diseases. Though non significant, a decrease of depression was reported from this study. Consistent with this finding, improved mood was reported by Barnason et al. (1995)[25]. Participants were 96 patients who, after their CABG surgery, were randomly assigned to one of three groups:

1) music listening to preferred music from a selection provided by the investigators
2) a music video intervention of soft instrumental music with visual imaging
3) scheduled rest

In examining the effects of music, mood was measured by participants' self report on a numeric rating scale before and after each intervention session. The music group reported significant increase in mood scores on their third postoperative day. The authors suggested that the participants generally were more alert and feeling much better by the third day after their operation. The significant results indicate that the enhanced mood in the music group can be ascribed to the music listening intervention, and that music is an effective intervention for improving the mood of surgical patients. Consistent with these findings, Burke (1997) reported that the emotional state of the experimental group was more positively affected than of those in the control group. Mood was measured with the Multiple Affect Adjective Checklist (MAACL) which included documenting depression and hostility (Zuckerman & Lubin, 1965).

Music preference may influence the effect of music listening, as reported by Dileo & Bradt (2005), who found that music preferred by the patients had a greater treatment effect in enhancing mood than did music selected by the investigators. This meta analysis included one study (Barnason et al., 1995) regarding mood enhancement of music interventions in relation to surgery (n=64), and a moderate effect size was found (r= .27).

[25] The effects on other outcome variables (anxiety, heart rate and blood pressure) in the study by Barnason et al. (1995) are reviewed in section 2.6.1.3 regarding postoperative music interventions.

2.6.4 Satisfaction with stay

One study was found reporting the effects of music listening on patients' satisfaction with stay (Thorgaard et al., 2005). This multi-centre study, carried out by Musica Humana, was set up to investigate patient and staff opinion of specially Designed Music Environment (DME). The participants recruited for this study were 325 patients and 91 staff in five post anaesthesia care units (PACU) in Denmark. Operations were performed under general or regional analgesia. Patients were selected for inclusion on specified days, and were not asked permission beforehand that music be played, nor were they notified about the presence of music in the PACU. Data on patients' opinion of the music sound environment, their degree of relaxation, and their satisfaction with their stay in the PACU were collected by means of questionnaires (10-item Likert Scale). Staffs' opinions of the music sound environment, how this environment affected their working conditions, how it affected the total sound environment, and how they thought this environment affected the patients, were also collected by means of structured questionnaires. The specially composed music consisted of a series of five compact discs (CD's), a selection developed and composed for this study, and included recorded sounds of nature, arranged as a series of sound-scapes[26]. The music was meant to be physically relaxing and mentally stimulating. The sound-scapes are combined with instrumentation of harp, cello, oboe, vocal, and synthesizer. Results showed that patients, who found DME pleasant, had a significantly higher rating of the importance of a good sound environment. Further, the authors stated that 83% of the patients found the DME pleasant, and that patient experience of satisfaction with stay was strongly correlated with their likes or dislikes of the sound environment. Participants were given no alternative choice of music, and it is not possible to draw conclusions from this study whether music listening to specially composed music in the early recovery after surgery is effective in enhancing patients' satisfaction with their hospital stay.

2.6.5 Length of hospital stay

In surgical patients, no significant effects for reduced length of hospital stay were found in the three studies included in the meta analysis by Dileo & Bradt (2005).

[26] Sound-scape may be understood as a 'landscape' of sounds

2.6.5.1 Intra operative

Blankfield et al. (1995) evaluated the effects of music played intra operatively during CABG, and found no differences between groups in length of hospitalisation. Consistent findings were reported by Nilsson et al. (2001) who examined whether music or music with therapeutic suggestions during general anaesthesia could improve the recovery of hysterectomy patients. A control group was exposed to the usual sounds in the operation room. No significant differences were found between groups in length of hospital stay.

2.6.5.2 Peri operative

The RCT undertaken by Tusek et al.(1999)[27] also investigated the effect of guided imagery on length of hospital stay. Results suggested a reduction in length of hospital stay by two days of an average hospitalisation of seven days, thereby demonstrating that an intervention using guided imagery with music background played before, during, and after surgery, reduces the length of hospital stay in patients undergoing cardiac surgery. A reduction by two days in length of hospital stay equates to a 19% savings in direct costs (Tusek et al., 1999, p. 27). A similar study was carried out with 130 patients undergoing elective colorectal surgery, and this study found no differences between groups (Tusek et al., 1997). These differing results indicate that the guided imagery technique is better suited for the patients undergoing cardiac surgery than the patients having elective colorectal surgery.

The finding reported by Tusek et al. (1997) is consistent with the results reported by Standley (1995), whereas the results reported by Tusek et al. (1999) are inconsistent with Standley's meta analysis, which identified the smallest effect of music on this outcome variable. In their meta analysis across 51 studies with surgical patients, also no significant effects were found for reduction in length of hospital stay after surgery (Dileo & Bradt, 2005).

2.6.6 Summary

Inconsistent results were reported on the effects of preoperative use of music listening on *anxiety*. When applied intra operatively, no differences between groups were reported (Koch et al., 1998), whereas significant differences were found within groups in awake patients (Steelman, 1990). Inconsistent results were reported regarding music during general anaesthesia, and no differences between groups were reported in patients undergoing CABG (Blankfield et al., 1995).

[27] See section 2.6.1.4

Postoperative music reported inconsistent effects on anxiety. One study reported that intra operative music showed no differences between groups, and postoperative music can reduce anxiety (Nilsson et al., 2005). Guided imagery with background music was reported to significantly decrease pre and post operative anxiety in patients undergoing CABG (Tusek et al., 1999).

Music used intra operatively can decrease postoperative *pain*, and postoperative music reduces pain, and morphine consumption (Nilsson et al., 2005). Inconsistent results were reported regarding postoperative use of music, though sedative music was more effective than scheduled rest and treatment as usual in decreasing pain in open-heart surgery patients during their first chair rest (Voss et al., 2004). Music and music in combination with therapeutic suggestions significantly reduces pain in the immediate postoperative period (Nilsson et al., 2003).

Music listening was reported to enhance *mood* both pre operatively (Updike & Charles, 1987) and post operatively (Barnason et al., 1995; Burke, 1997), and the effects are greater when participants listen to their preferred music (Dileo & Bradt, 2005). *Satisfaction with stay* was reported to be strongly correlated with the patients' opinion of a designed sound environment including specially composed music (Thorgaard et al., 2005). Music listening played intra operatively showed no differences between groups on *length of hospital stay* (Blankfield, et al. 1995; Nilsson et al., 2001). Inconsistent findings were reported of the effects on length of hospital stay of guided imagery with background music when used pre and post operatively (Tusek et al., 1997; Tusek et al., 1999).

These inconsistencies in results make interpretation difficult, and as Hanser (1985) stated, comparison of the results of any two studies may not be valid due to the variety of musical selections, experimental procedures, and recording methodologies. In addition the outcome variables as well as the time points of measurements, and the data collection instruments varied in the studies reviewed in this chapter. This underpins the challenge of and the need for clearly defined research of the effects of music medicine and music therapy in relation to surgery.

2.7 Chapter summary

This chapter began by describing the epidemiology of heart disease and surgery in adults as well as the current treatment of this population in Danish hospital settings. The phases of pre and postoperative rehabilitation were defined and the literature was reviewed for possible suggestions and recommendations for rest and relaxation. Then followed sections defining and reviewing the general use of music in medical settings, of relaxing music in relation to surgery, and of music medicine and music therapy with the cardiac population, particularly in cardiology, Intensive Coronary Care Units. The final section was concerned with outcome studies reporting the effects of music medicine and music therapy applied before, during and/or after surgery. No music therapy studies were found that used guided relaxation with music in patients who need heart valve surgery.

Based on these findings from the literature review, and the conclusions drawn from previous studies, the researcher was able to formulate specific research questions and hypotheses that focussed the direction of enquiry in the current study. These are presented in section 2.8.

2.8 Research questions and hypotheses

The problem formulation first posed the following research question:

> *What is the effect of guided relaxation with music and music listening on anxiety, pain, mood, satisfaction with hospitalisation, and on the length of hospital stay in patients after heart valve surgery?*

2.8.1 Hypotheses

This question generated the following five hypotheses:

1a) Cardiac valve surgery patients, receiving personalised sessions of receptive music therapy (group A) will report greater reduction in anxiety than those receiving individual sessions of music listening to relaxing music (group B), and those receiving individual sessions of scheduled rest with no music (group C).

1b) Cardiac valve surgery patients, receiving personalised sessions of receptive music therapy (group A), will report greater reduction in pain than those receiving individual sessions of music listening to relaxing music (group B), and those receiving individual sessions of scheduled rest with no music (group C).

1c) Cardiac valve surgery patients, receiving personalised sessions of receptive music therapy (group A), will report greater improvement in mood than those receiving individual sessions of music listening to relaxing music (group B), and those receiving individual sessions of scheduled rest with no music (group C).

1d) Cardiac valve surgery patients, receiving personalised sessions of receptive music therapy (group A), will report greater satisfaction with their hospitalisation than those receiving individual sessions of music listening to relaxing music (group B), and those receiving individual sessions of scheduled rest with no music (group C).

1e) The length of hospitalisation will be shorter for Cardiac valve surgery patients, receiving personalised sessions of receptive music therapy (group A), than for those receiving individual sessions of music listening to relaxing music (group B), and those receiving individual sessions of scheduled rest with no music (group C).

2.8.2 Supplementary research questions

The second question posed in the problem formulation was the following:

What aspects of the intervention guided relaxation with music have an effect on the patient's experience of relaxation?

On this basis, the study investigated the patient's experience of the music and guiding used in the music therapy (group A) and the music used in the music listening (group B) which was expressed in two supplementary research questions as follows:

2a) *What elements in the music helped the patient to relax?*

2b) *What elements in the guiding procedure helped the patient to relax?*

In the following chapter the method for the therapeutic intervention and data collection will be presented and described in detail.

CHAPTER 3

METHOD

In this section an overview of the method of this study is presented and a further elaboration will be provided in the sections to follow. *Excerpts and quotes from the protocols are put in italics and special typography*.

3.1 Introduction

The intention with the study was to focus on the first postoperative phase of the rehabilitation upon heart surgery. The literature search revealed studies reporting that participants who had pre operative sessions of music for relaxation experienced a greater reduction in their anxiety levels both pre and post their operation than did participants in the control (Standley, 2000; Tusek et al., 1997; 1999; Wang et al., 2002; Winter et al., 1994). This is supported by Standley (2000) who points to the fact that music listening as an intervention to reduce anxiety "is most effective when begun prior to the surgical intervention" (p. 22). It was therefore decided to include one pre operative session in the design.

The study was carried out at the heart- lung surgical unit, Cardio vascular Centre, Aalborg Hospital, Århus University hospital. This particular unit was formerly called the Thoracic unit, in short 'Unit T'. In order for the trials to fit into the standard routine at the hospital, and in preparation for developing the study protocol the two head nurses in the cardiac unit, Unit T, were consulted. The first contact with Unit T took place in February/ March 2004 during the initial stages of clarifying the feasibility of the study and of developing the method. The Scientific Ethical Committee for Viborg and Northern Jutland Counties was informed of the content and form of the protocol and the patient informed consent form by August 2005. A written consent from this committee states, that a formal approval procedure of this study was not needed[28].

After the approval of the elaborated proposal, the protocol[29] was developed in detail. During this time the internal procedures for accepting research studies to be carried out in units of the Cardio-vascular centre at the hospital in Aalborg had changed such that any study must be approved of by a research committee consisting of the head of the cardiovascular centre, a

[28] Consent from the Scientific Ethical Committee for Viborg and Northern Jutland Counties is found in appendix 3.2 on the CD-R accompanying this thesis.
[29] The protocol is found in appendix 3.1 on the CD-R.

consultant surgeon, the head nurse and the research nurse from Unit T. Prior to implementing the study, a meeting with the research committee in July 2005 generated a discussion and general comments to the method and design. These regarded ethics, sample characteristics and size, inclusion and exclusion criteria, informed consent form, blinding procedures, and the description of heart (valve) surgery, and are elaborated on in later sections (sections 3.2 – 3.2.1 in this chapter).

3.1.1 Study design

The objective of the study was to trial a receptive method of music therapy in the form of a guided relaxation in combination with listening to sedative music, and measure effects on anxiety, pain, mood, satisfaction with the hospitalisation and the length of hospitalisation. This intervention was compared with a music listening intervention with no guiding, and with a control condition of rest with no music or guiding. The music listening intervention was defined as a music medicine intervention based on the definition as presented in section 3.1.2.2, in addition to which a music therapist / RTM assisted the participant in selecting their preferred style of music for their sessions.

In order to be able to show the effects of a music therapy intervention for relaxation and to strengthen the study, a fixed design (Robson, 2002) in the form of a randomised controlled trial, between and within groups (RCT) was used. The sample were 68 participants (n = 68) in the age range 40 - 80 years who were patients admitted to the heart-lung surgical Unit T at Aalborg Hospital for a planned heart valve operation. The participants were proportionally matched by gender and age as the normal distribution of men and women having heart surgery was skewed. Participants were randomly assigned in equal numbers to the three groups. Informed by the literature review it was decided to include the three conditions in this study. Previous studies have reported the use of listening to relaxing music with no music therapist engaging in therapeutic dialogue with the patient. This condition was therefore included as a second intervention to which music and guided relaxation could be compared. Group A and group B both received music interventions with and without guided relaxation respectively, as explained in the following definitions. It was also decided to include a control condition of a resting time the same in length to the two other groups, but without any musical or verbal interventions.

The three research groups were therefore defined as follows:

1) Group A (GRM): a music therapy treatment, consisting of a receptive music therapy method Guided Relaxation with Music, (*Music therapy and medicine*) in which the participants received personalised individual sessions of guided relaxation with music with a trained music therapy research team member[30] (RTM) in the role of guiding a body relaxation based on the patient's preferred style of music for relaxation. The music was selected by the participant when offered four different styles of music.

2) Group B (ML): Music Listening to relaxing music, (*Music medicine*) in which the participants received a treatment of individual sessions of music listening to CD's of relaxing music based on the patient's preferred style of music for relaxation. The music was selected by the participant after being offered four different styles of music. An RTM attended the session without engaging therapeutically with the participant.

3) Group C (NM): a No Music control condition, consisting of scheduled rest without musical or verbal intervention. The participants received individual sessions of scheduled rest with no music, and rested on their own while the RTM stayed in another room in the unit. The nursing staff team monitored the patient from their workstation, and were able to respond to any electronic alarm made by the participant during this period. The participants were advised how to call for help if they needed it. During the course of the first year of data collection the participants rested on their own. Due to an increase of anxiety and discomfort in two cases, for the second year until the conclusion of the data collection the RTM stayed in the room in the NM group in a role similar to that of the RTM in the ML group.

Throughout the thesis the groups A, B, and C hereafter are named GRM, ML and NM respectively. During their hospitalisation all participants in this study received (in the group to which they were randomly assigned), one pre operative session on the day prior to surgery, and three post operative sessions during the first phase of rehabilitation, typically five to six days after surgery. These four sessions were additional to the care and treatment the patients received according to the standard routines pre and post surgery in the heart – lung surgical Unit T as organised and administered by the medical staff.

[30] The trained music therapy research team members (RTMs) were: a GIM therapist, a trained music therapist, and two music therapists in training, as well as the researcher, trained for administering the interventions in this study and in collecting data.

3.1.2 Manualised music therapy procedure

The treatment used in this study was a non invasive receptive music therapy method of music listening in combination with a guided relaxation. The Guided Relaxation with Music, GRM, was a 30 minutes verbally guided relaxation accompanied by a 35 minute program of relaxing music (one of four programs available for the choice of the patient), a music therapy method developed for this study (Benson, 1975/2000; Bonny, 1978). The guided relaxation procedure was introduced by a brief preparation followed by an expanded induction focusing on relaxation of the body in parts and as a whole. The relaxation (Benson, 1975/2000, p. xix; Bonny, 1978) was intended to meet the cardiac patients' need for rest and anxiety reduction, and guided the participants awareness systematically moving from their feet upward through the parts of their body. This particular relaxation method was not progressive (Jacobson, 1959) in terms of tension-release as the tensioning of muscles would be contra indicated for the heart patient and their condition. Instead, the guiding focused on body awareness only and contained no suggestions of imagery, or of particular physical or emotional perceptions. The procedure allowed for some personalisation of the guiding to the participant, insofar as small variations in tempo, quality of voice and timing were helpful.

3.1.2.1 Definition for this study: Guided Relaxation with Music

Guided Relaxation with Music (GRM) belongs to practices using receptive experiences (see section 2.5.1), and is a technique developed for the music therapy intervention in the current study. GRM creates an experience in which a client listens to relaxing music while a music therapist guides the client. The listening experience is focused on the client's awareness of the body as the music therapist guides the client in relaxing the body systematically from the feet to the top of the head. The guiding is done in accordance with the flow and phrasing of the music. The music is drawn from commercial recordings in four styles (easy listening, classical, specially composed, and jazz) selected for their relaxing properties. The client responds to the experience silently during the treatment. The main clinical goal of GRM is to relax the person, and it is a practice that is relevant for clients who have the attentional abilities and receptivity to take in both the music and the verbal guiding, and who can benefit physically, emotionally and otherwise from the experience.

3.1.2.2 Definition for this study: Music Listening

The Music Listening intervention, ML, includes the use of relaxing music intended to reduce anxiety, a technique which belongs to the music medicine area of medical practice. The way music is applied in this study suggests a complementary level (to the standard medical treatment plan at TU), between the supportive and the intensive levels. Dileo also refers to levels of practice, and applies them primarily to music therapy and medicine (Dileo, 1999). Dileo has predominantly argued for care and preciseness in defining the difference between the general use of music in medical contexts, and the applications of music as a therapeutic tool by different disciplines such as nursing and psychology, and the specific use of music in a therapeutic approach by a trained and qualified music therapist. In Dileo's levels of practice (Supportive, Specific, Comprehensive) the intervention in this study would be classified as Supportive level, whereas the use of music alone in this study is more clearly an intervention of Music Medicine, not requiring a qualified music therapist. The nursing studies include the use of music in medicine at a supportive level complementary to the somatic treatment in the form of music listening (Almerud & Peterson, 2003; Voss et al., 2004; White, 1992).

3.1.3 Participants

Participants were patients within the age range 40 – 80 years admitted for heart valve surgery in Aalborg Hospital, the heart-and lung surgical Unit T in the period of 15th September 2005 to 15th November 2006 and 1st March to 28th April 2007. Consent to participate was obtained from all included in the sample. If the planned number of 90 participants could not be met within the planned data collection period, at least a minimum of 60 participants should be achieved. The data collection period was continued until this sample size was achieved. This number (60) accounts for half of the average annual number of 120 heart valve surgeries expected to be performed in the cardiac surgery unit in Aalborg .

3.1.4 Independent and dependent variables

The *independent* (predictor) variables in this study were the following:

1) The RTMs guiding relaxation
2) A CD of relaxing music played through an audio pillow

The *dependent* (outcome) variables chosen for this study were:
Anxiety; pain; mood; satisfaction with hospitalisation; and length of hospitalisation.

The presence of *confounding* variables included types of medications ordered by the physicians, the patient's previous unknown experiences with pain and anxiety, and nursing staff or family members discussing and commenting on the (expected) effect of their rest periods. No data was collected on these variables, nor on the amount of time participants may have listened to music in their own time during their hospital stay.

3.1.5 Data collection

Data collection was done by means of a battery consisting of six questionnaires which contained the following instruments for data collection illustrated in the overview presented in figure 3.1, which furthermore illustrates the timing of sessions in relation to the data collection (measurement) time points. The flow diagram was developed on the basis of international standards as defined by the **Con**solidated **S**tandards **O**f **R**eporting **T**rials, CONSORT (Altman et al., 2001). These standards were developed by a group of scientists and editors in order to improve the quality of reporting of randomized controlled trials, RCT (Altman et al., 2001). Further inspiration was found in a flow chart as presented by Gold et al. (2005).

Participants were required to complete a set of six questionnaires at several time points of measurements (see Flow diagram of study design in figure 3.1). Each participant entered self-reported data at the following times during their hospitalisation:

Time point 1: Data was collected with a baseline questionnaire on admission similar to all three groups (*anxiety: UMACL-TA, VAS; pain: VAS, mood: POMS-37*).

Time point 2: Data was collected immediately after their pre operative session when they completed questionnaire two (*anxiety: UMACL-TA 2a+2b, VAS; pain: VAS; rest benefits: VAS).* Time points 2a and 2b address the participant's experience *during* and *after* treatment respectively for UMACL-TA. In addition the intervention groups were required to respond to questions regarding their treatment GRM or ML respectively (*importance of music and of guiding: VAS).*

Time points 3a, 3b, and 3c: Data was collected before and after the post operative session when they completed questionnaire three.

- ♦ Time point 3a: The questionnaire was completed immediately *before* treatment (*anxiety: UMACL-TA, VAS; pain: VAS)*

After treatment the participant was asked to respond to the following measures:

- ♦ Time point 3b: How he/she felt *during* treatment (*anxiety: UMACL-TA*)
- ♦ Time point 3c: His/her experience *after* treatment (*anxiety: UMACL-TA, VAS; pain: VAS; mood: POMS-37; rest benefits: VAS).*

Time point 4: Data was collected in the afternoon of a day of no session between sessions three and four the participant completed the fourth questionnaire (*anxiety: UMACL-TA, VAS; pain: VAS; rest benefits: VAS).* As for time point 2 the intervention groups additionally were required to respond to questions regarding their treatment GRM or ML respectively (*importance of music and of guiding: VAS)*.

Time point 5: Data was collected on the morning of discharge the participant completed the fifth questionnaire (*anxiety: UMACL-TA, VAS; pain: VAS; mood: POMS-37; rest benefits: VAS; satisfaction with hospitalisation: VAS).*

Time point 6: Follow-up data was collected four to five weeks after discharge for which the participant entered self-reported data into the sixth questionnaire (*anxiety: UMACL-TA, VAS; pain: VAS; mood: POMS-37; rest benefits: VAS; satisfaction with hospitalisation: VAS*. The intervention groups also completed questions regarding their experiences of the treatment similar to those completed at time points 2 and 4 (*importance of music and of guiding: VAS*).

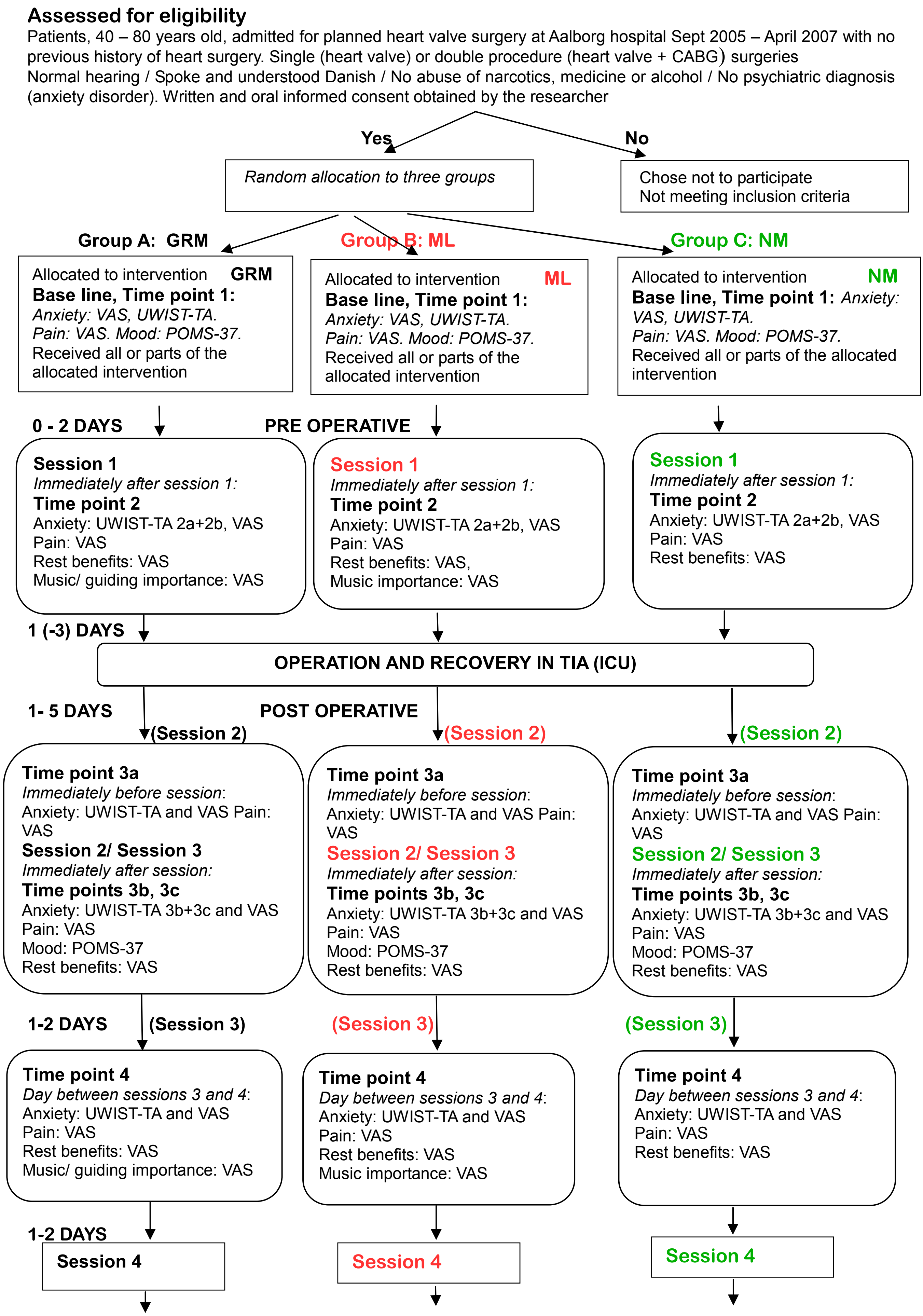
These time points were carefully selected after consultation with the research nurse, the supervisor and an external psychology consultant. The reason for asking the participants to complete the UMACL-TA at three time points (3a, 3b, and 3c) close to each other was to allow for comparison of changes immediately before to immediately after a session, and for investigating differences between the experience *before*, *during* and *after* treatment. As anxiety was the primary outcome, the UMACL-TA as a relatively simple Likert type instrument was chosen to address these possible changes.

At baseline (time point 1), before and after the postoperative session (time point 3a, 3b, and 3c), and at discharge (time point 5), all participants filled in the same questionnaires on the measures as outlined above. In order to address the supplementary questions and evaluate the participants' experiences of their treatment, the questionnaires regarding the interventions were developed for this study. At these three time points of measurements, time points 2, 4, and 6, the questionnaires were differentiated for each group regarding their treatment in the following way.

- The GRM group was asked to address specific questions in these questionnaires relating to the guiding procedure.
- The ML group additionally filled in questions regarding the music.

Both the intervention groups responded to questions regarding the music.

- The NM group only replied to questions common to all three groups including a question regarding their benefits of the rest/ relaxation.


Assessed for eligibility
Patients, 40 – 80 years old, admitted for planned heart valve surgery at Aalborg hospital Sept 2005 – April 2007 with no previous history of heart surgery. Single (heart valve) or double procedure (heart valve + CABG) surgeries
Normal hearing / Spoke and understood Danish / No abuse of narcotics, medicine or alcohol / No psychiatric diagnosis (anxiety disorder). Written and oral informed consent obtained by the researcher
Yes
No
Random allocation to three groups
Chose not to participate
Not meeting inclusion criteria
Group A: GRM
Group B: ML
Group C: NM
Allocated to intervention GRM
Base line, Time point 1:
Anxiety: VAS, UWIST-TA.
Pain: VAS. Mood: POMS-37.
Received all or parts of the allocated intervention
Allocated to intervention ML
Base line, Time point 1:
Anxiety: VAS, UWIST-TA.
Pain: VAS. Mood: POMS-37.
Received all or parts of the allocated intervention
Allocated to intervention NM
Base line, Time point 1: Anxiety: VAS, UWIST-TA.
Pain: VAS. Mood: POMS-37.
Received all or parts of the allocated intervention
0 - 2 DAYS
PRE OPERATIVE
Session 1
Immediately after session 1:
Time point 2
Anxiety: UWIST-TA 2a+2b, VAS
Pain: VAS
Rest benefits: VAS
Music/ guiding importance: VAS
Session 1
Immediately after session 1:
Time point 2
Anxiety: UWIST-TA 2a+2b, VAS
Pain: VAS
Rest benefits: VAS,
Music importance: VAS
Session 1
Immediately after session 1:
Time point 2
Anxiety: UWIST-TA 2a+2b, VAS
Pain: VAS
Rest benefits: VAS
1 (-3) DAYS
OPERATION AND RECOVERY IN TIA (ICU)
1- 5 DAYS
POST OPERATIVE
(Session 2)
(Session 2)
(Session 2)
Time point 3a
Immediately before session:
Anxiety: UWIST-TA and VAS Pain: VAS
Session 2/ Session 3
Immediately after session:
Time points 3b, 3c
Anxiety: UWIST-TA 3b+3c and VAS
Pain: VAS
Mood: POMS-37
Rest benefits: VAS
Time point 3a
Immediately before session:
Anxiety: UWIST-TA and VAS Pain: VAS
Session 2/ Session 3
Immediately after session:
Time points 3b, 3c
Anxiety: UWIST-TA 3b+3c and VAS
Pain: VAS
Mood: POMS-37
Rest benefits: VAS
Time point 3a
Immediately before session:
Anxiety: UWIST-TA and VAS Pain: VAS
Session 2/ Session 3
Immediately after session:
Time points 3b, 3c
Anxiety: UWIST-TA 3b+3c and VAS
Pain: VAS
Mood: POMS-37
Rest benefits: VAS
1-2 DAYS
(Session 3)
(Session 3)
(Session 3)
Time point 4
Day between sessions 3 and 4:
Anxiety: UWIST-TA and VAS
Pain: VAS
Rest benefits: VAS
Music/ guiding importance: VAS
Time point 4
Day between sessions 3 and 4:
Anxiety: UWIST-TA and VAS
Pain: VAS
Rest benefits: VAS
Music importance: VAS
Time point 4
Day between sessions 3 and 4:
Anxiety: UWIST-TA and VAS
Pain: VAS
Rest benefits: VAS
1-2 DAYS
Session 4
Session 4
Session 4

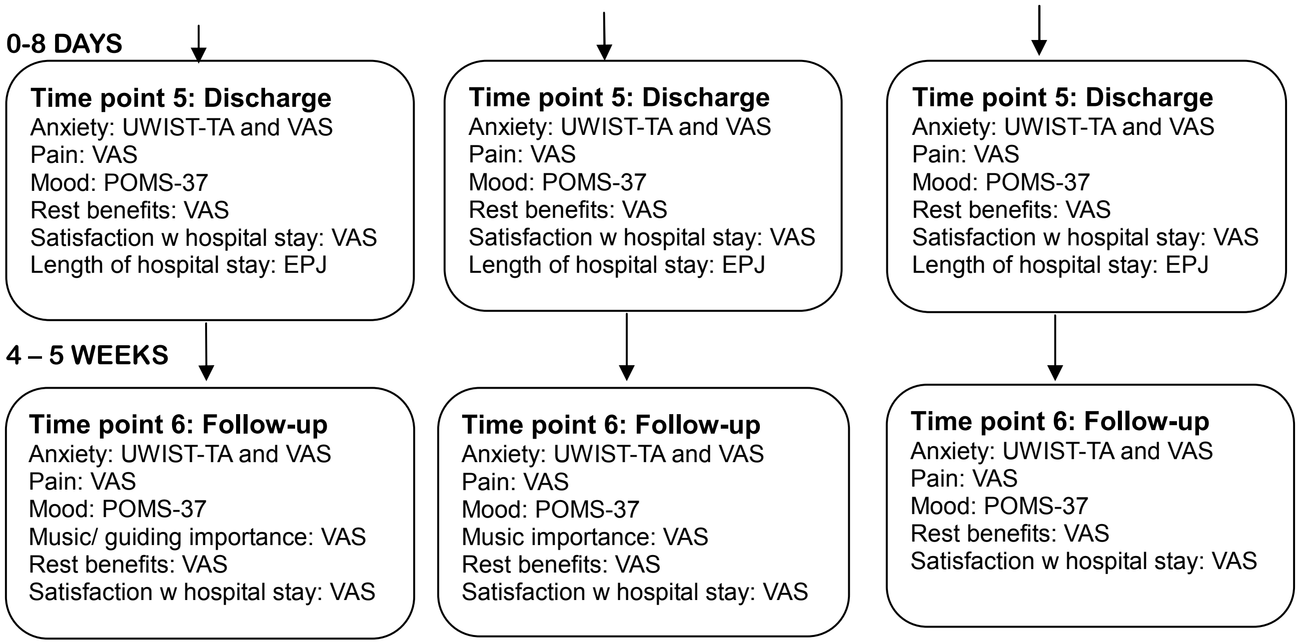


Figure 3.1. Flow diagram of study design.
Note. Group A: Guided Relaxation with Music, GRM. Group B: Music Listening, ML. Group C: No Music, NM. Information on the participants' analgesics intake were drawn from the Electronic Patient Journal, EPJ, at time points 1 – 5, and were self reported by the participants at time point 6.

Anxiety was assessed by a Visual Analogue Scale (VAS); the tense arousal sub scale of the University of Wales Institute of Science and Technology (UWIST) Mood Adjective Check List (UMACL-TA sub scale[31]). VAS were used to allow the participants to indicate the level of their pain and the degree to which their pain had increased or decreased respectively. The type and amount of analgesics were collected from the patient's medical record. A revised and validated version of the Profile of Mood States, POMS, with 37 items was used for assessing mood (Shacham, 1983; Danish version obtained from Zachariae through personal communication, 2005).

Information on the length of hospitalisation was collected from patients' medical record. All information obtained from the patients' medical records was collected in cooperation with the research nurse appointed as a contact for this study. The patient's satisfaction with overall treatment was measured by a Likert scale.

[31] The UMACL-TA questionnaire is illustrated in figure 3.3 in this thesis.

3.1.6 Ethics

The participants[32] recruited for this study were informed that they would be receiving a period of rest which would be monitored and evaluated. This statement represented the intention of all three conditions for these participants. The form by which this rest took place varied for each of the three conditions, and the participants were blinded to the differences between groups. Medical studies of the effect of medical interventions in the form of pills are carried out as double blind studies, but in this study staff were inevitably aware of the differences between groups. In order to keep the participants as ‘naïve’ and unbiased to the intervention as possible while at the same time providing them with sufficient information as a basis for deciding whether to participate, they were informed that the intervention they would receive was a 35 minute period of relaxation in a quiet, private place.

3.2. Developing the procedure: Protocols for administering the treatment and the procedure of implementing the trials

In developing the method, the researcher observed the transfer procedure of a post heart surgery patient from the Intensive Thoracic Unit to Unit T, in order to know what parameters were measured and what aspects of care were included. The observation in Unit T regarding the admission procedures for a patient admitted for a planned heart valve operation revealed a full program with 10 – 11 interviews with various staff members. At a follow-up meeting the logistics and practicalities of the study were considered with the clinical and administrative head nurses, particularly in relation to the following issues:

- Could the patients be moved to a separate room?
- Would there be a single room available for sessions?
- At what hours could sessions be fitted into the routines in the unit?
- Would it be possible for nursing staff to assist with moving beds and making sure oxygen connections and telemetric observation functioned properly?
- How long was the average length of hospitalisation?
- How many sessions were realistic to fit into the period immediately pre and post surgery?

---

[32] See section 3.8 in this thesis. The informed consent form is found in appendix 3.7 on the CD-R accompanying this thesis

It was agreed that patients could be moved to a separate room, and that a single room was available for sessions in the late afternoon when rooms were no longer required for examinations. Also, it was found possible that nursing staff could assist in moving beds and ensure that the necessary physiological and electronic equipment were functioning properly. The average length of hospital stay in Unit T for the heart valve surgery population was one week, and four sessions were agreed upon as a realistic number of sessions during this length of hospitalisation. Further, the age band of 40 to 60 years was expanded to an age band of 40 to 80 years, as the majority of the heart surgery patients were in their late sixties to late seventies.

In developing the design, and in order to ensure that experimental conditions were comparable, it was decided to control as much of the setting as possible. That was the reason for the control group of scheduled rest to be administered in the same individual room as was used in both the intervention groups. Also, the audio pillow replaced the participant's pillow in all three groups, though in the control group with out sound equipment attached.

3.2.1 Developing the procedure and protocols for the music therapy intervention

The procedure of the music therapy intervention and the questionnaires for evaluation was tested in four stages:

Stage one of the development of the therapeutic procedure happened in two steps:

- Peer Group discussion. A trial of the guided relaxation with music procedure was followed by a discussion in the group of PhD students. In its original form the guiding itself lasted 7 – 10 minutes[33] of a 35 minutes session. The question was raised whether the intention was to leave the participant on their own when the guiding stopped and if the participant was then going to just listen to the music for 20 - 25 minutes with no guiding. The concern was that the participant might feel abandoned. Further, the voice guiding in the relaxation was experienced as a supportive and holding element of the method underlining the need for it to continue during most of the session. The voice was experienced as blending well with the music as an instrument into the music programme.

- Professional consultation was undertaken regarding the wording and the duration of the guided relaxation with an experienced, GIM trained music therapist. This consultation

[33] The Guiding procedure, trial version, is found in appendix 3.3 on the CD-R accompanying this thesis.

confirmed that the majority of the heart valve surgery population are elderly (in their late sixties and seventies), have slightly reduced hearing due to normal aging, and are fragile. Post operatively the patients generally experience relief that the surgery was successful, anxiety is decreased, and the most prevalent or predominant emotion is likely to be relief. Physically the cardiac surgery patient experiences pain due to the large wound in the chest, which also means that breathing causes pain.

In order to meet these patients' needs for support and calm, and to make sure they understood the guiding, it was important to repeat instructions and to keep these simple. The protocol for the guiding was expanded to a duration of 30 minutes[34] allowing plenty of time, space, support and repetition in order for the participant to let go and relax. The guided relaxation with music intended to lead the participant into a relaxed state of body and mind. All instructions contained no wording referring to specific emotions, imagery, or sensations (Nilsson, 2003).

The development of the manual for the guided relaxation was informed by the principles of the Relaxation Response (Benson, 1975/2000), partly by the instructions provided by Bonny & Savary (1973, 1990), and also by the above mentioned consultancy from an experienced GIM therapist (personal communication, 2005).

Lying down flat on one's back is suggested as the most comfortable and the most successful position for a systematic relaxation (Bonny & Savary, 1973, 1990 p. 7), and was a practical position as the participants had their hospital beds available to them, and no chairs sufficiently comfortable were available in Unit T. The participants were offered pillows for support under their knees to relieve any tension in their lower backs. The hospital beds have the advantage that the head may be raised to the participants' preferred position. It was recognised that "systematic relaxation requires the aid of the mind" (Bonny & Savary, 1973, 1990 p. 7), and guiding was added to listening to relaxing music for optimal effect. In order to assist the participant’s experience a change from an ordinary waking state to a relaxed state as preparation for entering a music listening space, the participant's attention was drawn to the his/her breathing.

The relaxation began by inviting the participant to fix his/ her mind on the feet and relax them; then legs, arms, abdomen, chest, throat, facial muscles and eyes, as recommended by Bonny & Savary (1973, 1990). The process of relaxing was accompanied by a key word or phrase, as the words may act as 'a trigger' the next time a person wishes to relax. The body will remember the feeling it experienced when first hearing this phrase, and a similar feeling may be generated in following sessions of relaxation with less effort. A simple phrase was chosen for repetition based

[34] The Guiding procedure, final version, is found in appendix 3.4 on the CD-R.

on these authors who stated that the unconsciousness likes repetition and prefers simple, clear requests to vague ambiguous ones. The participant was guided back from the relaxed to a normal state following a clear procedure as suggested by these authors, the advantages being that this provides:

a) a simple pattern for the return
b) ensures that the participant may feel alert, rested, and charged with positive emotions
c) reinforces the path between normal and a relaxed consciousness

Similar to the therapeutic suggestions used in other studies (Nilsson, 2003; Nilsson, Rawal, Uneståhl, et al., 2001; Nilsson, Rawal, Enquist et al., 2003), the guided relaxation applied in the current study focus on relaxing the body systematically. The important differences are that all suggestions used in the guided relaxation script for this study are positive, and any negative suggestions such as *the absence of pain* are excluded. Secondly, the relaxation is guided live as opposed to taped suggestions.

Stage two: Revision of questionnaires

The second stage involved asking advice from a nurse experienced in intensive heart surgical units. She revised and commented on the questionnaires for their complexity, and pointed out especially the need for simplification, omitting questions that were too similar such as: "*How important was the music for your relaxation*?" and "*How beneficial was the music in helping you to relax*?", and for possibly reducing the total amount of questions asked. Two questions regarding the choice of music ("*What did you like about the music?*" and *"What about the music made you choose that style of music?"*) were reduced to the latter question only. In the trial version[35] the participants would give their answers to questions regarding the elements of the music by simply marking a cross at any element at the participant's choosing. This version did not allow for any differentiation whether one element was considered more important than another. In the revised version[36] the participant was asked to prioritise four elements of a list of seven items in relation to the music which made them chose the particular music style. This list of elements regarding the music was informed by Hevner (1937) who identified tempo, modality, and pitch to be of high effectiveness and importance of music in determining certain moods. Harmony, though less effective than the three aforementioned in terms of carrying meaning, in Hevner's studies proved to be of some importance in affecting mood. A further expansion regarding how important the

[35] Questionnaires, trial version, may be seen in appendix 3.5 on the CD-R accompanying this thesis.
[36] Questionnaires, final version, may be seen in appendix 3.6 on the CD-R.

participant found the music for the benefits of his/ her relaxation was made in the form of a question which asked the participant to prioritise which elements in regard to the music influenced their relaxation. The trial version of the questionnaire contained no questions regarding the guiding. The participant was asked to prioritise a list of five specific elements of the guiding. The relaxation (period of rest) was the common condition for all participants, and a question of how beneficial the participant found the rest, was added. In the trial questionnaire the VAS for measuring anxiety and pain, the maximum (10) was named 'severe' anxiety / pain respectively. This was replaced by 'worst possible' (Arendt-Nielsen & Mogensen, 2003, p. 57) in the revised and final version of the battery of questionnaires. Finally, space for the participant's possible comments remained in the questionnaires.

Stage three: Trialling the protocol and data collection.

During the third stage the protocol and data collection were trialled with six volunteers (three music therapy students and two staff members, all female in the age range from their mid twenties to mid fifties, and a retired male in his sixties, on medication for a newly diagnosed heart condition). The purpose was to test the procedures of both intervention groups (A and B), including the music selections, and of the procedure, the comprehensibility and content of the questionnaires. All participants in these trials had a relaxing experience whether they received the music therapy or the music listening procedure. Therefore only editorial changes in the protocols were made. Following this, permission and approval from the research committee to carry out the study at Unit T was sought. The protocol was read by the committee and their comments discussed at the July 2005 meeting. A concern was raised how this music therapy study could possibly influence the ongoing studies in the unit, and how the surgical studies might influence this study. The study conflicted with an ongoing national study (DOORS[37]) which involved all Coronary Artery Bypass Grafting (CABG) patients. At the time heart patients over the age of 70 having CABG were involved in psychological tests. Given the seriousness of a heart operation and the age of this population, it would be unethical to disregard the general rule that patients do not participate in more than one study at a time.

The population of heart surgery patients included different types of operation such as heart valve and by pass operations. In order to neutralise the influence of operation type it was discussed whether to change the population to the cardiovascular patients. However the music

[37] DOORS: The Danish On-pump, Off-pump Randomised Study. The purpose of the study is to compare the frequency of death, coronary and cerebral thrombosis, and self reported quality of life after CABG and Off-Pump Cardiac Artery Bypass (OPCAB) operations in patients over 70 years old. The study uses an open, randomised multi-centre design. The Danish protocol for this study, revised version 20.03. 2006.

therapy method was intended to reduce anxiety in surgical patients and instead of changing the population it was decided to reduce the inclusion criteria to heart valve surgeries only[38]. All patients who were admitted for a planned heart valve operation were possible participants in the study. This population was not involved with other studies, and the number of heart valve surgeries was increasing to an expected 120 per year. The age group was expanded to 40 – 80.

The information to be given to eligible participants was discussed and found to be a little complicated, and therefore needed some simplification and omission of (music therapeutic) technical terms such as 'individual sessions'. Instead they were named 'periods of rest in a separate room'. As research in the hospital setting is traditionally based in natural science, this paradigm was implied with this study.

The description of heart valve surgery and CABG needed some revision and expanding as for what these procedures involved for the patient and possible cerebral side effects. The approval from the hospital research committee to carry out the study at Unit T was obtained with the recommendation that a pilot trial was done with 6 - 10 participants. If the protocol was not changed these participants may be included in the sample. The research nurse was allocated to this study as a contact person who could assist with communicating information to the nursing staff, such as booking of a room for the individual sessions to take place.

Stage four: Initial trials.

In the fourth stage initial trials were carried out in Unit T with the first ten patients admitted for heart valve surgery in order to ensure the manageability and practicalities of the procedure and of the questionnaires. The procedure of four scheduled rest periods during the patients hospital stay was carried out with two participants, both men: one (age group 40 – 59 years) in the NM group and one (age group 60 – 80 years) in the ML group.

After these initial trials the protocol was found to be adequate and few adaptations were needed. Table 3.1 below provides an overview of the adaptations and when they were made. The adaptations were of a logistical, editorial or ethical nature. The left column shows the time of adaptation. In the middle column the nature of the adaptation is described, and to the far right column displays the number of the section in which the adaptation is explained respectively.

[38] The misunderstanding that heart valve surgery patients only were to be included – was clarified in February 2006 and led to an addition to this inclusion criterion: heart valve and CABG as the latter were not included in the DOORS study.

Table 3.1. *Overview of adaptations of protocol*

Time of adaptation	Adaptations of protocol	See section
November 2005 (Appendix 3.8 on the CD-R)	- Outcomes were prioritised; anxiety was identified as the primary outcome.	3.6.1
	The recruiting procedure was edited: - Interview on admission: Patients were advised to be prepared that following an operation they may feel tired and think of stopping their participation. They were informed that their participation was helpful to the study.	3.8.1
	- Flexibility was found to be necessary in the distribution of sessions: Session 2 may be administered on post operative day 1 or 2, or as soon as possible thereafter.	3.1.5 (Fig. 3.1)
	- Guidelines were developed for the role of the RTM in the ML group.	3.9.3
	- Guidelines were developed for the administration and monitoring of the NM group.	3.9.4
	- The New Age program was replaced by a light jazz program. The specially composed program was edited.	3.5.4.1
	- Researcher informed staff of participant's session plan when signed consent was obtained; nurse entered this information to EPJ. Monthly meetings with head nurse, research nurse and researcher were established.	3.9.7
February 2006 (Appendix 3.9)	- The inclusion criterion was expanded to include a) single procedure: heart valve surgery or b) double procedure: heart valve surgery and Cardiac Artery Bypass Grafting, CABG.	3.3.5.1
	- The sample size was decided to a minimum of 60 (expected 90)	3.3.2
May 2006 (Appendix 3.10)	- The first post operative questionnaire (M3) was postponed from session two to session three.	3.7
	- The Jazz program was edited. (Prior to the editing no participants had chosen this music program).	3.5.4.2
September 2006 (Appendix 3.11)	- RTM stays with the participant in the NM group following the protocol for the RTM in the ML group except for the music procedure).	3.9.4.1

The procedure was continued with the above adaptations after the initial trial, and data were included in the total study data. The reasons for implementing adaptations are explained in the sections in this chapter relating to each element.

3. 3 Participants

In the following sections the participants' diagnoses, information on the sample, age, and gender, how allocation was done, which inclusion and exclusion criteria were used, and the adaptation of these criteria are described. Further, the demographics and method in regard to attrition are presented.

3.3.1 Diagnosis

Participants in the study were all admitted to the heart – lung surgical unit for heart valve surgery. The heart valve malfunctions were of different types. When the valve does not function properly it is either too tight, not tight enough (insufficient) or both. When the heart valve is too tight this causes stenosis as the walls of the heart muscle have to work harder and harder in order to push the same amount of blood through the valve. When the valve condition is insufficient some of the blood runs back again and the heart needs to increase the volume by pumping more blood through the system. The heart grows bigger and the walls of the muscle grow thicker in order to manage this condition. This constant demand on the heart may result in permanent damages. Symptoms which can be signs of a heart disease are: chest pain and discomfort, and shortness of breath or even breathlessness. Palpitations, swelling of the legs, fainting fits and coughing may be further symptoms of a heart disease. In some cases fatigue and weight loss may be signs of illness of the heart. Visible signs to others may be blue lips and nails in the person with a possible heart disease (Petterson et al., 1999).

The different types of heart valves have different functions: tricuspid- and mitral prevent the blood from returning to the frontal ventricles; the aorta and pulmonary valves prevent the blood from returning to the heart when the ventricles relax after contraction. The surgery may include replacement of a valve by an organic or a plastic valve. Operations of the heart valve are usually performed with the use of heart and lung machine (with ECC), though recently a new minimally invasive method has been applied when possible. This type of surgery allows for the heart valve surgery to be performed through minor opening cuts in the side of the chest (in stead of opening the large chest bone through a sternotomy).

3.3.2 Sample

The sample was drawn from all patients meeting the inclusion criteria admitted for heart valve surgery at Aalborg Hospital, heart- lung surgical Unit T who gave their consent to participate[39] during the planned data collection period (see section 3.3.1). The sample size was expected to be 120 and was reduced to a planned total of 90 due to the reduced number of heart surgeries. Further reduction was made as the data collection progressed more slowly than expected due to patients dropping out, not wanting to give their consent to participate and to a wide variety of and decrease in the number of surgeries performed in some periods. The data collection period was extended to obtain a minimum of 60 participants.

The statistics of the numbers of heart surgeries performed in the previous five years, 2000 – 2004, was obtained from the IT-Health, Common Systems, Aalborg Hospital, and formed the basis for estimating a realistic sample size. The average number of heart surgeries (with ECC and off-pump) performed in Aalborg in this period was 492, averaging 98,4 a year. The study was evaluated in relation to other ongoing studies in Unit T as no patient may participate in more than one study at the time for ethical reasons. Therefore the sample in this study was limited to heart valve surgery procedures as by-pass surgeries were included in another study. The annual number of patients having heart *valve* surgeries was approximately 100 and is increasing. The expected number of heart valve surgeries for 2006 was estimated to be 120. The planned sample of this study represented approximately 94 % of the population and reflected the normal distribution. Patients who were excluded due to the exclusion criteria or dropped out were subtracted from this number.

3.3.3 Age and gender

Participants were heart valve surgery patients in the age range 40 – 80 years. Both men and women were included. In order to neutralise a skewed distribution as two thirds of the heart valve surgery population were men, a proportionate distribution by gender and age was based on statistics from 2000 – 2004. Men in the age band 60 – 80 account for the majority of the heart valve surgery population, as may be seen in the bar plot in figure 3.2, which illustrates the total number of patients who had heart surgery in the period of 2000 to 2004 (included). The statistics illustrated in this figure include all types of heart operations which were performed in the cardiovascular centre at Aalborg Hospital over this period of time. The operations were performed with or without the use of a heart-and-lung machine. The lavender blue parts of the bars depict the number of females and the purple section depict the number of males who had heart surgery during these years. The x-axis depicts the 5-year age bands of patients from 40 to 85; the youngest

[39] The Informed consent form is found in appendix 3.7 on the CD-R accompanying this thesis.

and the oldest groups are gathered in the lowest and highest age bands respectively. The y-axis depicts the number of participants in intervals of 100. Only few patients under the age of 40 and older than 80 years of age had heart surgery.

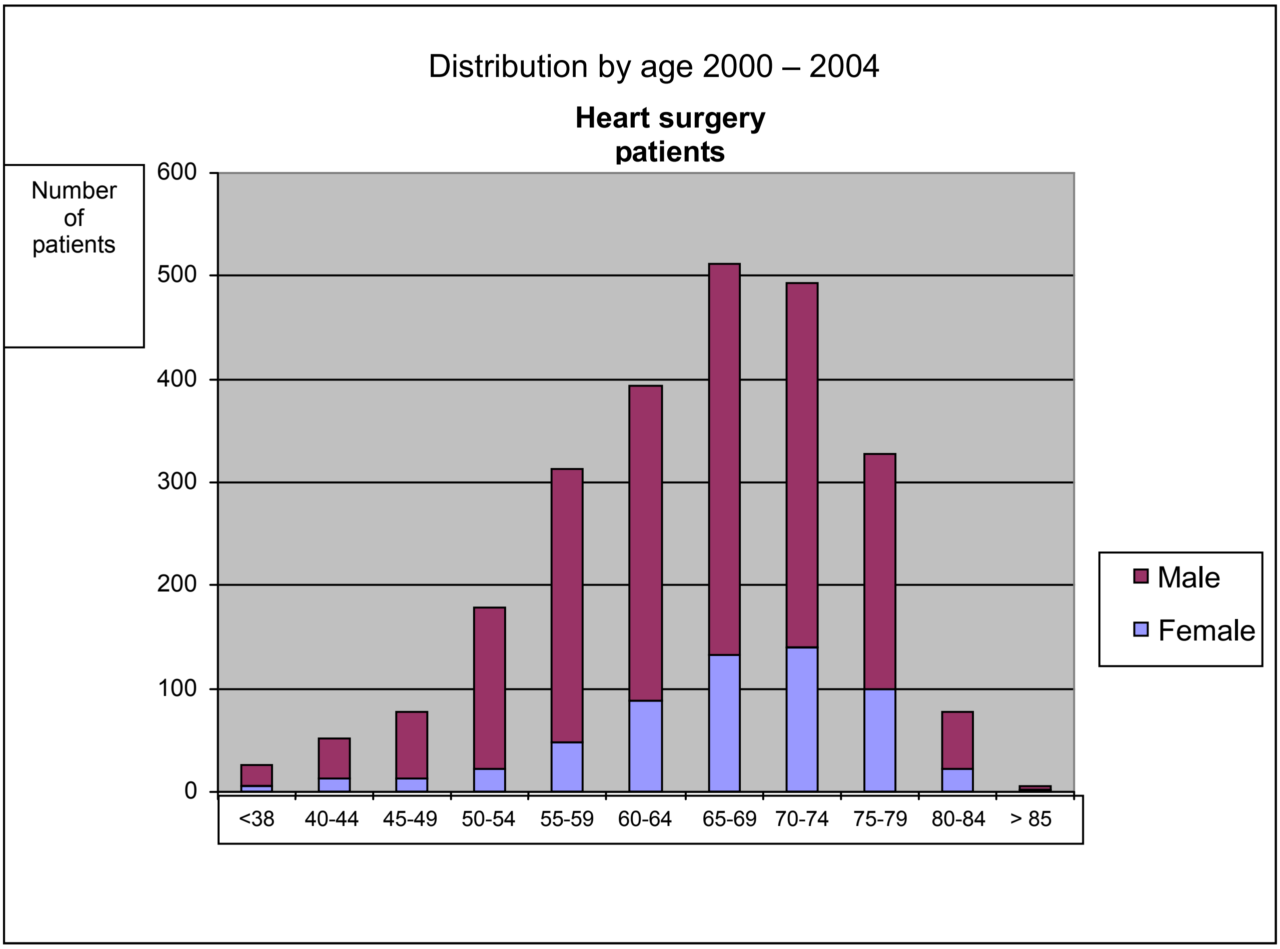


Figure 3.2. The total numbers of patients having heart surgery distributed by age and gender from 2000 to 2004 (inclusive).

3.3.4 Age bands and random allocation

Women and men were divided into two age bands of 40 – 59 years old in the 'younger' band and 60 – 80 years old in the 'older' age band. This distribution was done to ensure a proportionate distribution. The participants were randomly allocated to the three research groups A, B, and C. The author prepared a coded list of expected participants in age bands, identifying M for male and K for female (in Danish: *Kvinde*). For each age band, the gender codes were then combined with consecutive numbers (i.e. M1, M2, M3 etc. or K1, K2, K3 etc.). Cards labelled A, B and C were placed in a box with the letter concealed. The random allocation was done in batches of three for the two groups of women and men respectively of age 40 – 59 and in batches of six in the larger groups of the men and women aged 60 – 80. This procedure was followed in order to ensure that all three research groups were represented in the sub groups independent of a smaller sample size. The sequencing process for random allocation was undertaken by the author and supervisor. The author called out a code from a list one at a time, and supervisor randomly picked up a card labelled A, B or C from the box. The letters on the cards were concealed from both the supervisor and author. The letter shown on the card was written against the code in question. This procedure was followed until a list of the necessary number was made. Throughout the study the allocation was concealed from the nursing staff and participants by the above coding system. The research staff did know what treatment they were giving each participant.

3.3.5 Inclusion and exclusion criteria

Additionally the following *inclusion* criteria were applied in the admission interview:

- Planned admission for heart valve surgery
- Ordinary state of consciousness
- Normal hearing
- Spoke and understood Danish
- No history of previous heart surgery
- After surgery: the patient was extubated and transferred from intensive unit (TIA) to the heart – lung surgical unit (T)

In the admission interview the following *exclusion* criteria were applied:

- Psychiatric illness /diagnosis (anxiety disorder)
- Severe reduction in hearing
- Chronic pain
- Anaesthetized
- Severe short term or long term memory deficit
- Abuse of narcotics, medicine, or alcohol
- Emergency admission

In the first phase of the data collection period from 15th September 2005 to 19th February 2006 patients, who were to have double procedures such as heart valve surgery and Cardiac-Artery-Bypass-Grafting, CABG, were excluded from the study.

3.3.5.1 Adaptation of inclusion criterion

By the end of January 2006 the number of participants in the study was examined, since the progression in the data collection had been very slow. In spite of a normal production rate of heart valve operations in January only nine participants in the period from the 15th September till 31st January 2006 had completed their participation. This was substantially less than expected and thus an expansion of the sample was discussed. Due to the very low number of single procedure heart valve surgeries and in order to obtain an absolute minimum sample of 60 participants (originally an expected number of 90) within the time frame of the study this exclusion criterion was cancelled from 20th February. Thus *all* heart valve surgeries, single and double procedures, were included in the latter part of the data collection 20th February – 15th November 2006 and 1st March – 28th April 2007. In the case of surgery involving the double procedure, the patient was in need of a simultaneous bypass operation due to arteriosclerosis.

In consultation with Head of the Cardiovascular Centre, it was estimated that the biggest difference between the two procedures was the time of surgery which was prolonged by 15 to 45 minutes. The heart valve surgery part of an operation has the largest neurological after effect in the form of memory- or concentration difficulties. Therefore, the neurological effects of the prolonged operation (double procedure) were considered minimal. Statistical analyses of the results may reveal possible differences between the two types of surgery groups.

3.3.6 Demographics

Information on whether the participant was retired or still actively working were not accessible from the electronic patient journal and was there fore included in the first questionnaire, baseline one. Whether retirement or work had any influence on the dependent variables in the study was an open question as no studies in the literature search were found on this aspect.

The participants were not asked about their musical background. Also they were not asked regarding their prior use of music for relaxation or how they best did relaxation for themselves.

These decisions were informed by the finding of Voss et al. (2004) that reported no significant associations between potential confounding variables such as prior use of music for relaxation (among others) and baseline anxiety, pain sensation and pain distress.

3.3.7 Attrition

The informed consent contained information that the participant could at any time withdraw their consent and stop their participation with no consequence for their treatment in general. Voluntary and involuntary drop-outs were reported. When it was possible, the participants were asked to express their reason(s) for dropping-out, and these reasons were recorded in researcher's log.

3.4 Equipment

Some studies report playing music through head phones (Evans, 2002; Henry, 1995). In the studies of music accompanied by verbal therapeutic suggestions (Blankfield et al., 1995; Mynchenberg & Duncan, 1995; Nilsson, 2003; Nilsson et al., 2003a; Nilsson et al., 2003b; Nilsson et al., 2001; Tusek et al., 1999) these have involved the use of taped therapeutic suggestions. Only studies by Cowan (1991) and Short (2003) have included live guidance by a music therapist conducting the sessions. For this purpose the music needs to be audible to both the patient and the music therapist. Head phones do not allow for that. Early studies of Musica Humana (Thorgaard et al., 2005) have shown that patients do not like to use head phones. They feel isolated from the contact with the nurse, and excluded from what's happening around them. The head phones are not comfortable and prevent the patients from moving their head freely. Anecdotally the staff members involved in the Musica Humana studies report that head phones for the music listening do not work well for the patients, as they are dependent on being able to contact the nurses. The patients preferred listening to the music from the ceiling in-built loudspeakers (or a stationary CD system).

The MusiCure pillow has been developed with in-built loudspeakers and is connectible to a Compact CD player, a walk man or an MP3. The technical development of this equipment was only finalized while the clinical trial for the current study was in progress, and therefore not previously tested in controlled trials. The music may be heard by others in a short distance from the patient.

3.4.1 Audio pillow, CD player, and CD's

The music was played in stereo from a Sony CD player, D-EJ 250/ SC through an audio pillow, MusiCure pillow, with in-built loudspeakers and amplifier. The used version of the MusiCure pillow was a proto type version developed for research.[40] The CD player was connected to the audio pillow with an extension cord. The audio pillow was approved of for hygiene to be used in hospitals. The audio pillow was further covered with a cotton pillowcase (provided from Unit T) fitting the size of the audio pillow. The audio pillow replaced the participant's ordinary hospital pillow during the sessions of the research groups. Volume was displayed on the CD player with Sony's indication system on a scale from 0 to 9 with three categories at each level. As baseline the volume was set at 9 with one stick. The bed used in the sessions was a hospital bed with adjustable head rest, a firm foam mattress, and a duvet or a light blanket to keep the participant warm.

CD's of four different styles of relaxing music were copies made for this study (see list of music excerpts (tables 3.3 and 3.5), and music programmes (table 3.3, 3.6, 3.7, and 3.8).

In one session the defects in the transmission of the music was detected as a participant complained that the sound was poor. This participant then by his own choice dropped out if the study. The connecting cords between the CD player and the MusiCure pillow were immediately replaced. No other participants reported such distortion in sound.

3.5 Development of the music selections (soft ware)

Two principles are mentioned for selecting music for specific purposes: One is the 'iso' principle which forms the theoretical context for a model of music therapy developed by Benenzon et. al. (1997) who expanded the original concept of the iso principle from a foetal beginning to include the universal iso, the cultural iso, the group iso gestalt iso, and the complementary iso. Davis (2003) explicates that the mood or the tempo of the music in the beginning must be in 'iso' relation with the mood or tempo of the patient. Davis (2003) writes:

> Based on the observation that music could profoundly affect emotions when properly used, Altshuler endorsed the Iso Principle, by which the current mood of a client was matched with a corresponding style of music and then moved to a more desirable state by altering the musical components of rhythm, tempo, dynamics and melody.
> (Davis, 2003, p. 251)

The iso principle is extended also to volume and rhythm. The other is the principle of entrainment, which means a process whereby two objects vibrating at similar frequencies will tend to interact and come into sync with one another, thereby resonating at the same frequency (Bunt, 1994). The effects of this principle have been investigated in the study of Rider (1985). The effects of different types of music in pain relief, muscle relaxation (and pain relief imagery) in a population of spinal

[40] The MusiCure pillow has been further developed and a professional, new version may be found at the internet addresses: www.musicurepillow.dk or www.musicurepillow.com

pain patients were studied. The study used a randomised counterbalanced, repeated-measures design with 23 participants. The research was not set up in a surgical setting; however, it is of interest for this study to include the findings regarding pain, because this study purposefully used different and specific types of music for the investigation. The music interventions consisted of different conditions of a minimalistic selection (Steve Reich); conventional relaxing selection; and an entrainment selection. The entrainment selection of synthesised and acoustic guitar music "exhibited a definite mood shift from unpleasant to pleasant, with a climax of the former mood state occurring after 3 minutes" (Rider, 1985, p. 186). This shift in the music was intended to create a shift also from tension to relaxation. The author stated that this music intervention based on the principle of entrainment, proved to be significantly the most effective condition in reducing pain (Rider, 1985, p. 189).

3.5.1 Music for relaxation

The music is selected to be relaxing, calming and reassuring according to the needs of the patient and to the patient's preferred style of music. Different terms are used to describe music for relaxation. Bonny (1999) in her development of Guided Imagery and Music called the selected classical music for relaxation purposes trophotropic. This same term is used by Decker-Voigt (1991). Spintge (1985-1986; 1993; Spintge & Droh, 1983; 1992) uses the term anxiolytic, and in several studies (White, 1992; Mynchenberg & Duncan, 1995; Escher et al., 1996; Tusek et al., 1999; Nilsson et al., 2003; Thorgaard et al., 2005) the word soothing is used. For the music to be soothing[41] Nilsson (2003) describes the musical parameters rhythm, melody and harmony as being the most important. The different terms share the parameters which characterise relaxing music. These characteristics include a stable tempo, regular rhythm, predictable dynamics, consonance of harmony, structure and form, and stability or only gradual changes in for instance volume, tempo and harmony (Bonny, 1983; Barnason et al., 1995; Saperston, 1999; Spintge, 1993; and Wigram, 2004). Sedative music is characterized by few dynamic changes, predictability, a tempo of 50 – 70 beats per minute, flowing rhythm, regular and continuous melody, and in general few contrasts (Bonde et al., 2001). Wigram (2002, 2004) presented a tool for determining whether music is stimulatory or sedative/ relaxing in the form of Potentials in Stimulatory and Sedative Music (PSSM). The potential elements in sedative music as defined in the PSSM are shown in table 3.2.

[41] Hooper (unpublished paper, personal communication, 2005) investigated how to determine music to be stimulative, neutral or sedative, and found the categories to have some characteristics in common. This will be further elaborated in the discussion chapter of this thesis.

Table 3.2 *Potential elements in sedative music (Wigram 2004, p.215)*

- Stable tempo
- Stability or only gradual changes in: volume, rhythm, timbre, pitch and harmony
- Consistent texture
- Predictable harmonic modulation
- Appropriate cadences
- Predictable melodic lines
- Repetition of material
- Structure and form
- Gentle timbres
- Few accents

These elements were applied in selecting relaxing music for this study. Nilsson (2003) reported that no consensus regarding the type of music that has the best analgesic effect was found. On the basis of these findings the music selections for this study consisted of four programs of 35 minutes of relaxing music in the styles of easy listening, light classical, specially composed music, and new age shown in table 3.3 in the order as mentioned. The left column lists the track number on each CD, followed by the name of the artist (easy listening) or the composer (classical, MusiCure, and jazz). The right hand columns display the title, duration and the source of each track. At the end of each program the total time of duration is shown. The specially composed program, MusiCure consisted of one track only.

Table 3.3 *Music programmes of four styles (trial version)*

CD#	Artist	Title	Duration	Source
Music program 1: Easy listening				
1	Norge, Kaare	Song for Guy	3:55	Here Comes the Sun, #4 RecArt 5941032
2	Norge	(Everything I do) I do it for you	3:25	Here Comes the Sun, #5
3	Rowland, Mike	Magic Moment	6:01	Rowland, Mike: Within the Light. Oreade ORE 5287-2. #2
4	Norge	Why worry	4:16	Here Comes the Sun, #6
5	Rowland	Listen to your Heart	4:56	Within the Light, #3
6	Norge	Jesus to a child	4:47	Here Comes the Sun, #12
7	Rowland	Believe and See	3:34	Within the Light, #4
8	Rowland	Take my Hand	4:13	Within the Light #5
			(in total) 35:09	
Music program 2: Classical				
1	J.S. Bach	3rd Suite: Air	5:18	MfI[42]: Explorative CD #10
2	Pachelbel	Canon in D	7:11	Bonde et al. (2001) Cd #22
3	Warlock	Capriol Suite (Pieds en l'air)	2:18	MfI: Supportive CD #6
4	Mascagni	Cavalleria rusticana: Intermezzo	3:41	Naxos 8.660022, cd #11
5	Massenet	7th Orchestral Suite: Sous Les Tilleuls	4 :57	MfI. Positive Cd #6
6	Shostakovich	2nd Piano Concerto (Andante)	6:40	MfI: Supportive Cd #12
7	Grieg	Cradle song	4:00	MfI: Creative CD #5
			(in total) 34:22	

42 MfI= Music for the Imagination, Barcelona Publishers 1996

Table 3.3 continued

Music program 3: Specially composed

1	Sound track "Guided Relaxation with Music" Composer: Niels Eje Music selection: Niels Eje and Karin Schou	Excerpts from CDs: MusiCure 1 (Poem) and 4 (The North and Northern Light)	35:00	Gefion Records, unpublished recording, 2005.

Music program 4: New age

1	Gunnell, Megan	In the Meadow	7:08	Doorway to relaxation: #2 MT-BC. Bon Secours Cottage Health Services, Michigan
2	Gunnell, Megan	Lullaby Dream	7:57	Doorway to relaxation: #3
3	Gunnell, Megan	Wind and Water	5:59	Doorway to relaxation: #4
4	Gunnell, Megan	Those Who Are Dear	2:29	Doorway to relaxation: #5
5	Gunnell, Megan	In the Meadow	7:08	Doorway to relaxation: #2
6	Gunnell, Megan	Those Who Are Dear	2:29	Doorway to relaxation: #5
			(in total): 33:25	

3.5.2 Music Preference

There are more reasons for asking patients their preferred style of music for relaxation. For one, participants' responses to music cannot be predicted specifically as individuals may show opposite responses to the same music (Bunt, 1994). Secondly, a music therapy intervention based on the subject's preferred style of music for relaxation will provide the patient with some influence on their treatment and thus possibly reducing the patient's experience of loss of control (Good et al., 1999). In these studies patients controlling the music express that they are able to focus on their healing rather than pain, fear and frustration. Thirdly, if the patient is familiar with the music (style), the music may function as a bridge to the normal life situation (Spintge, 1985-1986; Cowan 1991). Spintge stated, that it is most important that the patient can choose his music, and not the doctor or the nurse (1985-1986, p. 195)

Furthermore, Standley (1995) has identified music preference as the most important factor for mediating the beneficial effects of music. This finding is supported by Aldridge (1996), who referred to a study by Vincent and Thompson (1929) showing the effects of music to be influenced by how much the participants appreciated the music. In another study by Nilsson (2003) it was suggested that patient's preference was key to the effectiveness of the music intervention. A Chinese study (Yung et al., 2003) supports this finding, as 80% of the patients in their CT investigating the effect of music in preoperative stress, preferred the Chinese slow songs when listening to music. This may indicate that (cultural) familiarity with the music is an important factor in reducing the preoperative stress. Inconsistent with this finding is the study by Rider (1985 p. 190) who presented an interesting finding that the least preferred types of music (minimalistic and entrainment music selections) were the most effective for pre-post test differences in pain. This author suggested that the music in these selections may have distracted the patients from their pain because of the musical qualities of surprise or unpredictability.

The effect of music preference was reported to be of less influence in the meta analysis by Dileo & Bradt (2005, p. 63) who found it rather surprising that in studies examining the effect of music listening "the use of patients-selected (preferred music) (k=75, r= .28) led to very similar results as the use of researcher-selected music". The authors underline that in relation to surgery the ‘use of patient-selected music did lead to a higher mean effect size (r=.34 vs. r= .15) than the music selected by the researchers. The difference (p= .07) approached statistical significance.

3.5.2.1 Styles of music

An example of the reporting of what music the participants selected when given a free choice to bring their own preferred music was found in the empirical investigation by MacDonald et al. (2003). Their study evaluated the anxiolytic and pain reducing effects of music post operatively, and was carried out in two experiments, both of which involved participants selecting music of their own choice. The age range was 21 - 60 years. In the first experiment following minor foot surgery, 17 participants in the experimental group listened to music, and 23 participants were in a control group receiving standard treatment. Pain was assessed by the Pain Rating Index (PRI) from the McGill Pain Questionnaire and by a Visual Analogue Pain Question (VAPQ). Anxiety was measured by Spielberger State Anxiety Inventory (SAI). In the second experiment, the participants were 58 females (age range 32-62 years) undergoing hysterectomy, and assessment of pain was done by the PRI and the VAPQ; anxiety was measured by SAI, and an additional assessment was made on the amount of Patient Controlled Analgesics (PCA). In this experiment, the participants in the control group were asked not to listen to music. In the first experiment, the participants experienced a low level of pain, and a pain reducing effect of music was not found, as participants at all times of measurement reported low scores, thus suggesting a floor effect. The music listening group did report less anxiety, than the control group. In the second experiment, gradually less anxiety and pain was reported over time in both groups, and no significant differences were found between groups. The authors stated, that the results suggested no evidence that self-selected music listening successfully alleviates post operative pain and anxiety for women undergoing hysterectomy.

How the participants' music selections were recorded was not reported. In using 'a broad categorisation system of popular, classical and jazz', a preference for popular music was found. Table 3.4 shows the preferred styles of music, and the percentages and number of participants who chose each of these styles respectively in the two experiments.

Table 3.4 *Participant-selected styles of music in two experiments (MacDonald et al., 2003)*

	Experimental group	popular	classical	jazz
	n		% (*n*)	
Study I (*n*= 40)	*17*	82.35 (*14*)	11.77 (*2*)	5.89 (*1*)
Study II (*n*= 58)	*30*	70[1] (*21*)	20 (*6*)	10 (*3*)

Note. [1]In study two, percentages were reported with no decimals.

The majority of the participants in both experiments selected popular music. The styles of music used in the investigation of the anxiolytic and pain reducing effect of music were not controlled, and it is not possible to draw clear conclusions on the lack of evidence for an anxiety and pain reducing effect of the music listening. The properties of the music are not reported. When asked after the treatment why they had selected a particular piece of music, participants reported that they felt this music could help them relax in the hospital. The authors suggest that asking patients to bring their own music can help the patients feel more in control (MacDonald. et al, 2003, p. 197) in the situation.

3.5.3 Duration of session

Specific recommendations for the optimal duration of a listening to relaxing music session have not been reported (Henry, 1995). Often the music listening sessions used lasted 20 – 35 minutes (Bonny, 1983; Nilsson, 2003; Tusek et al., 1999; Updike, 1990). In relation to music interventions offered pre-operatively right to the moment of the anaesthesia in function sessions are suggested to be of 15 minutes duration (Spintge & Droh, 1983). In the study by Bonny (1983) the tapes for the music listening sessions lasted from 25 to 35 minutes.

Different methods for relaxation in participants (Miller & Bornstein, 1977) have used half hour treatments. This brief period of time for relaxation in various approaches, including progressive relaxation (PR), progressive relaxation with music, (PRM), intermediate relaxation (IR), intermediate relaxation with music (IRM), mental relaxation (MR), mental relaxation with music (MRM), self-relaxation (SR), and self-relaxation with music (SRM), proved effective. In the comparison of the various methods undertaken by Miller and Bornstein, significant decreases were found in anxiety and muscle tension over the short period of relaxation that they were using, and music itself was not found to have an enhancing effect upon relaxation. In their study only a single trial of a 30 minute session was used, and they suggested that greater numbers of sessions might reveal improved results.

A later RCT study (Reynolds, 1984), on five different relaxation training procedures, in which participants were offered eight 25-minute sessions, support the value of a greater number of sessions, as this author found that both music (MU) and autogenic training phrases and music (ATP & MU) groups highly significant differences when compared with the control group. The ATP & MU group reported the lowest post session arousal level as measured by Electro Myo-Graphy, EMG. There was no particular reason argued in Reynolds's study for the length of session set to 25 minutes. In this study the duration of sessions were chosen based on the above, on clinical considerations and on a practical aspect. Given the elderly population with heart disease and their needs for a calm atmosphere, sufficient time was needed in order to provide such. It was necessary to allow time for repetition and a calm pacing of the guiding. Finally, a practical reason informing the duration of sessions was that a specially composed music program, MusiCure, available for this study, was of a duration of 35 minutes. This period of time was chosen for the duration of sessions in this study. There was no intention at any time of the present investigation to compare effects of different durations of treatment.

3.5.4 Protocol of choosing preferred style of music (forced choice)

The procedure of choosing a preferred style of music was common to the intervention groups A (GRM) and B (ML) which both included music listening to relaxing music (with and without a guided relaxation respectively).

The following describes the procedure by which the participant was assisted in choosing their preferred style of music for their relaxation. The participant was given a forced choice between four different styles of music by the following examples (excerpts from the main music selection) as shown in table 3.5.

Table 3.5 *Music excerpts of four styles (trial version)*

CD #	Artist/ Composer	Title	Duration	Source
1	Norge	Why Worry	0:40	Here Comes the Sun #6 RecArt 5941032
2	Bach	Air		MfI: Explorative CD #10
3	Eje	Excerpts (0:00 – 0:40) from the sound track to "Guided Relaxation with Music"		Unpublished recording, 2005. Gefion Records
4	Gunnell	Lullaby Dream		Doorway to Relaxation #3. MT-BC. Bon Secours Cottage Health Services, Michigan

The RTM used the following instructions consistently with all participants (translated from Danish):

> *Before the start of your rest period I will ask you to choose which music you prefer to listen to for your relaxation. There are four different styles of music to choose from. I will play four examples (excerpts) for you, before you decide.*
> *Now, this is example no. 1 which sounds like this. (Play example #1). Now, example no. 2 sounds like this. (Play #2, 3, and 4 till you have played all four examples). Which music do you prefer for your relaxation? (The RTM may play the example of the chosen style of music for the participant if they need to listen to it one more time). This is the style of music we will use for your relaxation and music sessions.*

Before starting to play the music the participant was asked how the volume suited them. The same 35 minute music program of the chosen style of music was used for all four sessions that the participant received.

> *Draw the curtains if the room has windows and turn off the lights (leave enough light for the guide to manage the equipment).*
> *Start the music – Music is playing.*

After the choice of the preferred style of music was made by the participant, the procedure for the two intervention groups A and B varied and is therefore described separately in the following sections.

3.5.4.1 Adaptation: Music selections revised November 2005

The two programs of specially composed music, MusiCure, and the New Age programme with music by Megan Gunnell, were very similar in style and some parameters such as free pulse, floating sounds, and in choice of instruments (harp). The original thinking of music selections included compositions from a jazz CD "Forever You" by Ulf Wakenius. In initial non research trials of this music it was suggested that this programme might be too challenging and stimulating for cardiac patients' relaxation, which lead to the elimination the program from the selection in the initial trials. After a discussion and further testing of the music selections, it was decided to optimise the variation in the styles of music by compiling a jazz programme to replace the New Age music programme. The jazz selection consisted of the title composition from the Wakenius CD together with a number of compositions from a CD by Charlie Haden & Pat Metheny "*Beyond the Missouri Sky*". The criteria listed for relaxing music were applied to this programme exactly like the other music programs. The specially composed programme (MusiCure) was changed to a selection of compositions with a steady pulse and in line with the iso principle such that the tempo was gradually reduced during the course of the programme.

A careful re-listening to the J.S. Bach 'Air' recording in the classical program revealed that the dynamics of this particular recording were too varied for the purpose of relaxation, and the cembalo was very differentiated from the instrumental group as a whole. This piece was replaced by a Stokovski version (Bonde et al., 2001, CD # 25) which was found to be slightly faster (by 2 b/m) and of a more romantic style. This style carries a more supportive timbre which is necessary for a client to feel safe in order to relax (Bonde et al., 2001, p. 141).

The four music examples which were played to the participants in their first session of the intervention groups as the basis for the participant's choice were edited according to the changes of music programmes. Further, the music examples were re-recorded with fading in and out so they all lasted between 38 and 40 seconds. They were recorded as four independent cuts, which allowed for time to mention the next number on the current music example which was about to be played / had just been played.

Table 3.6 provides an overview describing which music examples were played to the participants before they chose their preferred style of music for their period of rest. After that follows an overview of the final music selection and each programme in each of the four styles of music.

Table 3.6 Music examples of four different styles (excerpts) (edited)

CD #	Music style	Title	Duration	Source
1	Easy listening	Why Worry	0:40	Here Comes the Sun #6 Kaare Norge; RecArt 5941032
2	Classical	Air		Bonde et al. 2001, CD #25 Orchestre de Chambre Jean-Francois Paillard/ Paillard RCA Viktor: 09026654682
3	Specially composed	Secret Path		Fairy Tales #2 Gefion Records, GFO 20136
4	Jazz	Cinema Paradiso (love theme)		Beyond the Missouri Sky #11 Charlie Haden & Pat Metheny, Verve 537 130-2

The Easy Listening program remained the same except for improvements in recording quality. The final four edited music programs are presented below. The Easy Listening program remained the same except for improved recording. One compilation of a program was made, and each RA had a copy of the original compilation for their training and practice. Two identical sets of CD's were kept at the hospital to be used in sessions.

Table 3.7 *Music programmes of four styles(edited): Easy listening, classical, specially composed, and jazz*

CD#	Artist	Title	Duration	Source
Music programme no.1: Easy listening				
1	Norge, Kaare	Song for Guy	3:55	Here Comes the Sun, #4 RecArt 5941032
2	Norge	(Everything I do) I do it for you	3:25	Here Comes the Sun, #5
3	Rowland, Mike	Magic Moment	6:01	Rowland, Mike: Within the Light. Oreade ORE 5287-2. #2
4	Norge	Why worry	4:16	Here Comes the Sun, #6
5	Rowland	Listen to your Heart	4:56	Within the Light, #3
6	Norge	Jesus to a child	4:47	Here Comes the Sun, #12
7	Rowland	Believe and See	3:34	Within the Light, #4
8	Rowland	Take my Hand	4:13	Within the Light #5
			(in total) 35:09	

Table 3.7 continued …

Music programme no. 2: Classical

1	J.S. Bach	3rd Suite: Air	5:12	Bonde et al. (2001), CD #25
2	Pachelbel	Canon in D	7:11	Bonde et al. (2001) CD #22
3	Warlock	Capriol Suite (Pieds en l'air)	2:18	Mfl[43]: Supportive CD #6
4	Mascagni	Cavalleria rusticana: Intermezzo	3:41	Naxos 8.660022, CD #11
5	Massenet	7th Orchestral Suite: Sous Les Tilleuls	4 :57	Mfl. Positive CD #6
6	Shostakovich	2nd Piano Concerto (Andante)	6:40	Mfl: Supportive CD #12
7	Grieg	Cradle song	4:00	Mfl: Creative CD #5
			(in total) 34:16	

Music program no. 3: Specially composed

1	Eje, Niels	Deep Woods & Village (excerpt)	13:06	Fairy Tales: #1 Gefion Records, GFO 20136
2	Eje, Niels	Enchantment	8:44	The Journey: #4 Gefion Records, GFO 20132
3	Eje, Niels	Secret Path (excerpt)	5:34	Fairy Tales: #2
4	Eje, Niels	Midnight Sun	8:11	Northern Light: #3 Gefion Records, GFO 20138
			(in total) 35:45	

Music program no. 4: Jazz

1	Danielsson, Lars	Forever You	4:03	Ulf Wakenius 2003. Forever You: #1 Stunt Records 03192
2	Morricone, Andrea	Cinema Paradiso (love theme)	3:36	Charlie Haden & Pat Metheny, 1997 Beyond the Missouri Sky: #11 Verve 537 130-2
3	Haden, Charlie	Our Spanish Love Song	5:40	Beyond the Missouri Sky: #2
4	Metheny, Pat	Two for the Road	5:16	Beyond the Missouri Sky: #4
5	Webb, Jim	The Moon is a Harsh Mistress	4:05	Beyond the Missouri Sky: #6
6	Trad. arr. by Metheny & Haden	He's Gone away	4:18	Beyond the Missouri Sky: #8
7	Morricone, Andrea	Cinema Paradiso (love theme)	3:35	Beyond the Missouri Sky: #11
8	Danielsson, Lars	Forever You	4:03	Forever You: #1
			(in total) 34:56	

Due to technical problems in the recording of the four music examples and of the classical program these were re-recorded and new CD's replaced the first edition by March 2006.

[43] MfI= Music for the Imagination, Barcelona Publishers 1996

3.5.4.2 Adaptation: Music program no. 4 revised May 2006

During an additional test of the music programs in music therapy master students the combination of pieces number three and four in the jazz program were found to be more stimulating than relaxing, as the tempo was faster especially in a longer passage (pulse 84) than preferable for the purpose of relaxation. Further, the guitar solo in this part of the music proved to be relatively unpredictable such that the music evoked stress and mere discomfort in one of the students. Cut no 3 in the original jazz program was therefore removed and the piece "Bibor No Azora" which better meets the criteria for relaxing music was added. Table 3.8 shows the contents of the jazz program in its revised version. The piece "Two for the road" (including the guitar solo as described above) remained in the first half of the program which was considered acceptable even if the piece did not in all its sections meet all criteria for relaxing music. The piece was followed by pieces which did meet these criteria.

Table 3.8 *Music program no. 4: Jazz (edited)*

Cd #	Composer	Title	Duration	Source
1	Danielsson, Lars	Forever You	4:03	Ulf Wakenius 2003. Forever You: #1 Stunt Records 03192
2	Morricone, Andrea	Cinema Paradiso (love theme)	3:36	Charlie Haden & Pat Metheny, 1997 Beyond the Missouri Sky: #11 Verve 537 130-2
3	*Metheny, Pat*	*Two for the Road*	5:17	*Beyond the Missouri Sky: #4*
4	*Ryuichi Sakamoto*	*Bibor No Azora*	5:25	*Forever You: #7*
5	Webb, Jim	The Moon is a Harsh Mistress	4:05	Beyond the Missouri Sky: #6
6	Trad. arr. by Metheny & Haden	He's Gone away	4:18	Beyond the Missouri Sky: #8
7	Morricone, Andrea	Cinema Paradiso (love theme)	3:36	Beyond the Missouri Sky: #11
8	Danielsson, Lars	Forever You	4:03	Forever You: #1
			(in total) 34:42	

In the initial trials, one participant had chosen the New Age program as his preferred style of music for his relaxation, and therefore the editing would have limited influence on the collected data. The music examples forming the basis for the participants' forced choice of music style remained unchanged as did the three other music programs of easy listening, classical and specially composed music.

3.5.5 Environment – setting

Patients in Unit T stay in rooms of one to four beds, men and women in separate rooms. All rooms are very similar except the staff dining room which was used for sessions on occasion. This room is much larger than the four-bed rooms and has a lot more furniture (desks with computer work spaces; tables and many chairs).

The rooms have white walls, high ceilings and curtains with a light pattern. All rooms have a ventilation system installed that produces a constant noise. Next to each bed is a bedside table with cupboard and drawer space. Sessions usually took place in a room used for doctor's examinations. This room is equipped to the same specification as the patients' rooms and the size of a small one-bed room. A desk with computer, printer and fax machine were installed in this room and were turned off or on stand by during sessions. A cupboard contained the equipment and materials to be used in sessions. The room had concealed lighting in the wall and a desk lamp on the bedside table. The desk lamp was used in the dark seasons to allow for orientation and monitoring of the equipment. The timing of sessions was scheduled according to the routines of these examinations when the room was available for research sessions.

It was not possible to ensure a constancy of location so that all sessions were given in the same room. A certain amount of flexibility was needed, as unplanned and unforeseeable factors influenced the treatment routines. After the initial trials, the locations used for the trials were identified in order to ensure consistency. Participants staying in single rooms could receive their rest periods in their own room.

Visitors are allowed at specific hours outside scheduled appointments, rest and meals. The RTMs wore their usual working clothes and a name tag. All sessions took place late afternoon, before supper, in a room in unit T used for clinical sessions. The door to the room was kept closed and a sign on the door informed the time period that a session was in progress in order to avoid interruptions. Sounds from the hallway could not be avoided completely as the room was placed next to the unit entrance. The sounds were part of the general sound environment in the unit. The room temperature was regulated according to routines in the unit and kept the rooms warm in the cool or cold seasons, and was turned off in the summer. The room temperature was not adjusted especially for the research conditions in this study.

The participant lay in bed in a position comfortable to him/her for the relaxation / rest. The light was dimmed / turned off, and curtains were drawn. The lighting must be sufficient to allow for the RTM to orientate and administer the equipment. When the doctor's examination room designated for the sessions was not available another room in the unit was used. Participants staying in a single room received their sessions in their own room if the doctor's examination room was not available or if particular circumstances (the need for humid oxygen, Lumholdt, or seeping from the operation wound in the chest) complicated a move or made it too strenuous for the participant. Only the dry oxygen could be connected in the room used for sessions.

3.6 Dependent and independent variables

The following sections outline the rationale for outcome and the predictor variables in this study.

3.6.1 Anxiety

The literature review revealed a number of publications reporting the use of relevant physiological measures of anxiety such as blood pressure (Almerud & Petersson et al., 2003; Barnason et al., 1995; Chlan, 1998; Chlan et al., 2001; Mynchenberg & Duncan, 1995; Vollert et al., 1999), and heart rate (Abel et al., 1996; Almerud & Petersson, 2003; Bonny, 1983; Chlan, 1998; Chlan et al., 2001; Nilsson et al., 2003; Vollert et al., 1999; White, 1992). These studies were relevant for the process of selecting appropriate measurement tools in the current study.

Many studies were found utilising psychological measures of anxiety (Barnason et al., 1995; Blankfield et al., 1995; Bonny, 1983; Chlan, 1998; Elliott, 1994; Evans, 2002; MacDonald et al., 1999; Mynchenberg & Duncan, 1995; Nilsson et al., 2003b; Robb et al., 1995; Spintge & Droh, 1983; Tusek et al., 1997; Tusek et al., 1999; Chlan et al., 2001; Voss et al., 2004 White, 1992; Winter et al., 1994; Yung et al., 2003).

Moderate effect sizes were found in studies using the State Trait Anxiety Inventory (STAI) across populations (Dileo & Bradt, 2005) who also reported a large mean effect size ($r=0.79$) for anxiety (Non-STAI) in cardiology/ICU. These authors suggested that music listening may decrease anxiety in surgical patients. At Unit T these parameters are controlled medically by beta-blockers and an external pace maker in the early post operative rehabilitation phase. In consulting the nursing staff (during the initial trial) it was advised against using physiological measures as a measure of the effect of music on anxiety. Yet anxiety was not monitored as part of standard care, and it was therefore decided to identify it as a primary outcome in this study.

3.6.2. Pain

Studies on the effect of music on pain were also found in the literature review (Abel et al., 1996;

Butler & Butler, 1997; Henry, 1995; MacDonald et al., 1999; McCaffrey & Good, 2000; Nilsson et al., 2001; Nilsson et al., 2003a; Nilsson et al., 2003c; Spintge & Droh, 1983; Rider, 1985; Reilly, 1996; Zimmerman et al., 1996; Tusek et al., 1999; Voss et al., 2004). Dileo & Bradt (2005) reported inconsistent findings of the effects of music medicine or music therapy which led to their recommendation that additional studies were urgently needed (Dileo & Bradt 2005, p. 69).

In Unit T, analgesics for pain relief were prescribed by the physician, administered by the nursing staff and were an important area of concern in postoperative care.

3.6.3 Mood

Studies on mood were found in the literature search (Barnason et al., 1995; Bonny, 1983; Chlan, 1995; Evans, 2002; MacNay, 1995). Music therapy interventions were found to have a greater effect in improving mood than did music medicine interventions (Dileo & Bradt, 2005, p. 73), and interestingly they found that patient-preferred music "resulted in greater treatment effectiveness than researcher selected music" in regard to enhancing mood in general (Dileo & Bradt, 2005 p. 73).

Mood was not monitored as part of the standard care in Unit T.

3.6.4 Satisfaction with hospitalisation

Only a few studies were found that reported on the influence of music medicine and music therapy on satisfaction with overall treatment during hospitalization (Nilsson et al., 2001; 2003; Thorgaard et al., 2005). Interestingly Thorgaard et al. (2005) reported that the patient experience of satisfaction with the hospitalisation was strongly correlated with their opinion of the Designed Music Environment that was created for the study.

3.6.5 Length of hospitalisation

Studies of this outcome measure were found to report inconsistent results. The studies included in the meta analysis by Standley (1995) show the smallest effect of music on length of hospital stay in hospital. This finding is supported by the study of Blankfield et al. (1995) that found no significant differences between groups to music played intra-operatively during coronary artery bypass surgery in length of postoperative hospitalisation, and by Nilsson et al. (2001) who in their study reported no significant results in the length of hospitalisation. In contrast, Butler & Butler (1997) in their study of the effect of physio-acoustic therapy on cardiac surgery patients in the immediate recovery phase reported a decrease in the use of pain and sedative medication, and "patients are mobilized earlier". These results have reduced the average length of hospital stay "from an average of nine days to an average of five days" (Butler & Butler, 1997). The costs for the cardiac surgery patients have as a result thereof been cut substantially. The study of Tusek et al. (1999) also demonstrated a reduction in length of hospital stay by two days of an average hospitalisation of seven days. Schwartz and Ritchie (1999) in their study of the effect of music in neonatal care found a decrease in length of hospital stay from 31 to 26 days in average. Dileo & Bradt (2005) found no significant effects (r =.00) for reduction in length of hospital stay as for the surgical patients. The inconsistency suggested it worth while to include this outcome in the study in order to add to the findings.

3.6.6 Independent variables

There were two independent variables:

1) Therapist's guided relaxation
2) Music for relaxation. The music was made of CD recordings of relaxing music played via audio pillow

The GRM, group A, included the therapist/RTM guiding the participant in a relaxation and could be compared to a ML group (B) of not giving guided relaxation. The intervention groups both included music for relaxation and were compared to the control, NM, group of no music (C).

3.7 Data collection

The data collection[44] was done at the admission interview (baseline 1), after the preoperative session (time point 2), pre and post the first post operative session on the day after surgery (time point 3), on the day of no sessions between session 3 and 4 (time point 4: new baseline), after session 4, on the morning of discharge (time point 5) and four weeks after discharge (time point 6).

In the course of the data collection the questionnaires proved to be both distressing and challenging to the patients in the first post-operative session (the second planned session out of the four). According to the protocol this session took place in the afternoon on the day the patient was transferred from the ICU to the heart- and – lung surgical unit; at a time when they were very likely to feel the after effects of the operation and the anaesthesia. Thus trying to complete a questionnaire became contraindicated for the patient at this time while they received a treatment

[44] See figure 3.1.Flow diagram of study design in this chapter of the thesis.

intending to promote rest and relaxation. In light of this, the completion of the first postoperative questionnaire (time point 3) was postponed until the third period of rest. This was mentioned to the patient in the recruiting interview to reassure them that no immediate demands would be placed on them post-operatively.

3.7.1 Instruments for measuring anxiety

Various instruments for measuring anxiety by self-reporting were considered. The State Trait Anxiety Inventory (STAI), (Spielberger, 1983) was referred to in several studies (Barnason et al., 1995; Elliott, 1994; Mynchenberg & Duncan, 1995; Nilsson, 2003) and is a standardised anxiety measure. Nilsson (2003) used STAI in a Swedish translation. In this study it was reported that "quite a lot of the participants" had negative reactions when responding to two particular items in the STAI of which one was translated into a very strong statement from the original in English into Swedish (from the English "I feel indecisive" to "I feel that I'm almost going to explode" (Nilsson 2003 p. 42). Following advice sought from the author (Nilsson, 2003) a researcher working in the thoracic surgical field (anaesthesia) it was decided not to use this instrument. Further, the need for keeping measuring instruments as simple as possible was important in relation to the elderly population of heart surgery patients. Visual Analogue Scales (VAS) were chosen for their simplicity and ease of understanding and completion.

Voss et all. (2004) reported that concurrent validity of the VAS to measure self-reported anxiety was demonstrated when scores on this instrument were compared to Spielberger's (1983) State Anxiety Inventory (SAI): a strong correlation was found between the SAI and the VAS in 56 critical care patients with unstable angina pectoris or acute myocardial infarction (r=0.70) (Elliott, 1993).

Research using refinement of existing measures of mood, the UWIST Mood Adjective Checklist (UMACL), is reviewed in Matthews et al. (1990). The objective of this review was to present psychometric and validation evidence on a refinement of the existing UMACL. The authors reported that a factor analysis (N=388), using a validated criterion for assessing the number of factors to be extracted, confirmed that the UMACL measures dimensions of energetic arousal, tense arousal and hedonic tone. Psychometric properties of UMACL scales were found satisfactory. Significant correlations between the arousal scales and psychophysiological measures of autonomic arousal demonstrate concurrent validity. Matthews et al. further reported that the UMACL scales are sensitive to stress, and to assess the specificity or generality of such effects. The correlational and experimental data reviewed in Matthews et al. (1990) show satisfactory predictive and discriminant validity.

In combination with the VAS, the Tension Arousal (TA) sub scale of the UMACL (Matthews et al., 1990) was considered. The UMACL consisted of four scales: hedonic tone for measuring depression; energetic arousal measuring vigour; tension arousal (TA) measuring anxiety, and General Arousal measuring overall levels of arousal. Matthews et al. found that the UMACL was validated (in English) in seven studies in which all participants were students. In one unpublished study (Mathews, Jones and Chamberlain) cited in a later publication (Matthews et al., 1990) had a sample of 63 men and 95 women of the age range 17 to 62. This was the only study including participants of ages > 50, and the UMACL was not found to be tested on the older or the heart surgery population. The instrument applies to the present mood of the participant and is answered by a Likert type scale on four grades.

When coming to conclusions about the refining of the UWIST Mood Adjective Checklist the authors suggest that the UMACL provides a tool for distinguishing "between depressed (low hedonic tone) and anxious (high tense arousal) mood states" (Matthews et al., 1990, p. 39). This underpins the usefulness of UMACL-TA as being a reliable measure of anxiety. The UMACL-TA sub scale was selected for measuring anxiety. The eight adjectives comprising the TA sub scale describe the following moods: anxious, jittery, tense, nervous, calm, restful, relaxed, and composed.

3.7.1.1 Scoring procedure: UMACL-TA

The refined version of the TA factorial scale consisted of eight items; four positive Anxious, Jittery, Tense, Nervous, representing high level of tense arousal, and four negative items: Relaxed, Restful, Composed, and Calm, representing low levels of tense arousal.

In the questionnaire the UMACL-TA looked like illustrated in figure 3.3. The participant was asked, "Does the adjective describe your present state?" and "Please, circle the word(s) that fit(s) the best (researcher's translation).

	Absolut *definitely*	Næsten *slightly*	Næsten ikke *slightly not*	Absolut ikke *definitely not*
1. Afslappet *Relaxed*	1	2	3	4
2. Nervøs *Nervous*	1	2	3	4
3. Anspændt *Tense*	1	2	3	4
3. Dirrende *Jittery*	1	2	3	4
5. Fattet *Composed*	1	2	3	4
6. Fredfyldt *Restful*	1	2	3	4
7. Ængstelig *Anxious*	1	2	3	4
8. Rolig *Calm*	1	2	3	4

Figure 3.3. UMACL-TA from questionnaires
*Note: The English translations (in italics)*of each item are added to this figure for comprehension purposes.

For the TA scale the individual item scores are added together to give the total score at each time point of measurement. As an illustration of the scoring procedure, a participant responding 'slightly' (2) to the *'Relaxed'* item would be assigned an item score of the TA scale of -2, and a participant responding 'definitely not' (4) were assigned to a score of -4. A participant responding 'slightly not' (3) to the 'Nervous' item would be assigned an item score of +2, and a participant responding 'definitely' to a score of +4, and so on.

ITEM	**RESPONSE**		**SCALE SCORING**
Relaxed	1 2 3 4	TA-	1-1 2-2 3-3 4-4
Nervous	1 2 3 4	TA+	1-4 2-3 3-2 4-1
Tense	1 2 3 4	TA+	1-4 2-3 3-2 4-1
Jittery	1 2 3 4	TA+	1-4 2-3 3-2 4-1
Composed	1 2 3 4	TA-	1-1 2-2 3-3 4-4
Restful	1 2 3 4	TA-	1-1 2-2 3-3 4-4
Anxious	1 2 3 4	TA+	1-4 2-3 3-2 4-1
Calm	1 2 3 4	TA-	1-1 2-2 3-3 4-4

Adapted with permission from Wigram (1996)

This TA sub scale of the UMACL may be scored within the range of 8 - 32. The Tension-Anxiety factor of the Profile of Mood States (POMS) includes six items describing the following moods of tension and anxiety: tense, irritable, uneasy (anxious), restless, nervous, and worried. By these different measures, anxiety was reported through the VAS, TA sub scale of the UMACL, and the Tension-Anxiety factor of the POMS-37.

3.7.1.2 Pain

Tools for measuring pain are numerous and McGuire (1992) provided a useful overview. A number of instruments (16 of 19) were characterised with 'Unclear reliability/ validity', though easy and simple (7) and five were considered comprehensive. The three remaining instruments for measuring pain found valid and reliable were Verbal Descriptor Scales (VDS), measuring pain intensity on a scale; The McGill Pain Questionnaire (MPQ), and Visual Analogue Scales (VAS). Pain must be assessed by the patient him/- herself as medical staff tend to rate patients' pain lower than the patients would report themselves (Arendt-Nielsen & Mogensen, 2003, p.56). Using standardised instruments for measuring pain does not mean that measures are objective and comparable between patients as people experience pain individually and have different pain thresholds.

The advantages of the VDS's were that they were 'brief, easy, versatile (table 20-1, p. 351), and applicable to many types of patients with acute or chronic pain (McGuire (1992, p. 338). The disadvantage may be the artificial categorization of pain, and the instrument may not be precise in reflecting the patient's experience of pain.

The MPQ is used for both clinical and research purposes and includes verbal and drawing modes to describe and indicate the location of a patient's pain. The MPQ was found reliable and valid as an instrument for multidimensional measure of pain (McGuire, 1992, p. 346). However, this may not apply in all settings because the instrument is comprehensive and may require up to 30 minutes for completion. The population in this study were fragile and elderly, having undergone complex surgery. It was therefore not considered appropriate to use the MPQ for the population in this study. It would be too time consuming and exhausting given the needs of the elderly heart surgery population for its simplicity.

The VAS were developed to measure subjective phenomena such as pain and have generally been used to measure pain intensity (e.g. Blankfield et al. 1995; Chan et al. 2003; Heitz et al., 1992; Nilsson et al., 2001; Nilsson et al., 2003; Nilsson et al., 2003a; Nilsson et al., 2003b). VAS consist of a 10 cm long line with verbal 'anchors' at each end (0= no pain; 10 = worst possible/ or pain as bad as it could possibly be). The straight line as a continuum is considered more sensitive measures of pain intensity than VDS which use categorical responses (McGuire, 1992, p. 338). The VAS scales were adapted from Johnson (1973) numeric rating scales. Construct validity of the original scales was supported by Johnson, whose laboratory studies showed that subjects could differentiate between sensation and distress during induced ischemic pain. Concurrent validity was good when comparing the original scales to the Melzack (1975) McGill Pain Questionnaires Pain Rating Scale-Ranked, with positive correlations for sensation (r=.44, p<

.001), and distress of pain (*r*=.55, *p*< .001; Good, 1995).

The VAS are easy to administer and for the patient to score. VAS may be a sensitive way of measuring pain though McGuire (1992) also points out that it may be confusing to some patients to perceive pain as a line or to express their experience of pain on a straight line and therefore find it easier to use the VDS (Arendt-Nielsen & Mogensen, 2003). The simplest way of measuring pain is either by a verbal (VDS) or a visual analogue scale (VAS), both one dimensional measures. If the line in a VAS does not contain anchor words, patients tend to make their mark aesthetically by following the 'golden measures' (66% or 33% pain), (Arendt-Nielsen & Mogensen, 2003). In order to keep the questionnaires at a manageable size as far as the number of questions were concerned it was decided to use the VAS for it simplicity.

3.7.1.3 Mood

In selecting an instrument for measuring mood it was important to find a validated instrument, preferably already translated into Danish, which was easily completed by an elderly population. Using a validated instrument would strengthen the validity of the study. The Profile of Mood Scales (POMS), originally proven to be useful for assessing psychiatric outpatients (McNair, Lorr, & Doppleman, 1992), consists of six mood factors with a total of 65 items measuring the affective states: Tension-Anxiety (T); Depression-Dejection (D); Anger-Hostility (A); Vigor-Activity (V); Fatigue-Inertia (F); and Confusion-Bewilderment (C). The authors suggest that the POMS long form[45] may easily be completed by persons with at least a 7th grade education, whereas a short form with 30 items is used quite often with the elderly and with those recovering from surgery. In a revised version (Zachariae[46]; Shacham, 1983), POMS-37, the number of items was reduced to 37 from the original 65 (McNair et al., 1992) in order to facilitate the use of this instrument with patients under stress or pain (Shacham, 1983, p. 305). Shacham (1983) reported that the short scales were formed using the Reliability program from Statistical Package for the Social Sciences (Hull & Nie, 1979). This programme assesses the contribution of items to the internal consistency of a scale. Items were eliminated according to a two-fold criterion: (a) the contribution to internal consistency (coefficient alpha) of the scale, and (b) the face validity of the items in relation to the scales. In order to assess the capability of the short scales for substitution of the original scales, the shortened scales were correlated with original ones, indicating a very high correlation (all above *r*=.95) between the original and the short scales (Shacham, 1983). This study reported results that demonstrated 'that the POMS can be shortened significantly without losing information or internal

[45] The long form refers to the POMS with 65 items.
[46] Personal communication, 2005

consistency' and the author further suggested that in case of 'time limits or patient limitations' the shortened version may be used (Shacham, 1983, p. 306). The possible after effects of anaesthesia and fatigue following surgery were considered to be 'patient limitations' and the shorter version of the POMS was chosen in order to accommodate these limitations. The POMS-37 was selected in the Danish version[47] (Zachariae, 2005) though it has not specifically been validated with the cardiac surgery population.

Table 3.9 shows the six factors which make up the POMS, the scores and number of items in the Total Mood Disturbance Score, TDMS, and in each of these factors. The left column displays the label of the individual factors respectively, followed by a column displaying the scoring range for the TMDS and the factors. The column 'Item no.' refers to the item number in the POMS original version of 65 items. The two right hand columns show the items by their English and their Danish labels respectively.

Table 3.9
Items and scores of POMS-37 Total Mood Disturbance Score, TMDS, and six factors

Factor	Number of items	Total score	Item no.	Items	Item in Danish
TMDS	37	-24 - 124		All	
Tension-Anxiety	6	0 - 24	2.	Tense	*Anspændt*
			16.	On edge	*Irritable*
			26.	Uneasy	*Urolig*
			27.	Restless	*Rastløs*
			34.	Nervous	*Nervøs*
			41.	Anxious	*Bekymret*
Depression-Dejection	8	0 - 32	5.	Unhappy	*Ked af det*
			14.	Sad	*Trist*
			18.	Blue	*Melankolsk*
			21.	Hopeless	*Håbløs*
			32.	Discouraged	*Modløs*
			36.	Miserable	*Ulykkelig*
			48.	Helpless	*Hjælpeløs*
			58.	Worthless	*Værdiløs*
Anger-Hostility	7	0 - 28	3.	Angry,	*Vred*
			12.	Peeved	*Gnaven*
			17.	Grouchy	*Tvær*
			31.	Annoyed	*Ærgerlig*
			33.	Resentful	*Fortørnet*
			39.	Bitter	*Bitter*
			53.	Furious	*Rasende*
Vigor-Activity	6	0 - 24	7.	Lively	*Livlig*
			15.	Active	*Aktiv*
			19.	Energetic	*Energisk*
			38.	Cheerful	*Munter*
			56.	Full of pep	*Livfuld*
			63.	Vigorous	*Livskraftig*

[47] The POMS-37 questionnaire as presented to the participants can be seen in appendix 3.12 on the CD-R accompanying this thesis.

Fatigue-Inertia	5	0 - 20	4. 29. 40. 49. 65.	Worn-out Fatigued Exhausted Weary Bushed	*Udkørt* *Træt* *Udmattet* *Mat* *Udbrændt*
Confusion-Bewilderment	5	0 - 20	8. 28. 50. 59. 64.	Confused Unable to concentrate Bewildered Forgetful Uncertain about things	*Forvirret* *Ukoncentreret* *Konfus* *Glemsom* *Usikker på ting*

The POMS-37 in total, TMDS, were used to measure mood.

3.7.1.4 Administration and interpretation of the POMS-37

In the questionnaire the POMS-37 appeared as illustrated in appendix 3.12. The Participants was instructed in the following way: "Below is a list of words that describe emotions. Please, read each word carefully. Cross out the answer which best match how you have felt during the past week, including today. The numbers refer to the following statements:

0 = not at all, 1 = a little, 2 = to some degree, 3= very much, 4 = to a high degree"

All scores are added together and the sum is a measure of the total mood disturbance in the participant(s). The Vigor-activity factor is recoded into negative values.

The POMS in the long form was suggested to be considered suspect or the protocol invalid, if more than two items per factor in the long form or more than 10% of the total items were left blank (McNair et al., 1992). POMS scores are affected by background differences to a low degree, and older patients (<50 years of age) tended to obtain somewhat lower scores on anger and confusion.

The POMS manual (McNair et al., 1992) reports factor scores for the POMS short form (30 item questionnaire) which are derived from the long form (65 items). These scores are drawn from a fairly well balanced sample of males N=1130) and females (N=1230) taking part in a smoking cessation programme at the Stamford centre for research in disease prevention. The Total Mood Disturbance score is not given, but the individual factors are provided. The mean score for Tension (males and females combined) is 6.6, Depression 3.7, Anger 5.0, Vigor 9.9, Fatigue 5.8, and Confusion 4.7. A decrease in the POMS scores is indicative of distress reduction and mood improvement

Results of measures of all factors are reported in total as a measure of the Total Mood Disturbance Score, TDMS, and individually.

3.7.1.5 Satisfaction with hospitalisation

The participants self-reported on the Visual Analogue Scales, VAS, their experience of satisfaction with their hospitalisation. It was up to the participants to apply their own understanding of 'satisfaction', whether it related to the research sessions they had received, their overall medical treatment, or both. No limitations to their way of understanding satisfaction were provided. Given the controlled design that was used, it was assumed that possible differences between groups in this measure would be reflected in the results.

3.7.1.6 Length of hospital stay

Length of hospital stay, in this study was defined as the number of days from the participants' admission to their discharge. Information on the duration of hospital stay was obtained from the participants' Electronic Patient Journal, EPJ.

3.7.2 Semi structured interviews

In the protocol of the data collection, a qualitative part of the study regarding further investigation of patient's experience was planned in the form of semi structured interviews of three cases, one from each of the three groups. The purpose for this was to gather further descriptions and possibly adding in nuances of patient's experiences. The inclusion criteria for these interviews were: women aged 50 – 65 of normal intelligence. The rationale for interviewing women was that they responded more to music (Standley, 1995; Pelletier, 2004) than men, and it was assumed that they may speak more freely about their musical experiences. The interviews were to be administered by the researcher after the conclusion of the data collection in general (expected to terminate by August 2006). The interviews were to be recorded on mini discs, transcribed and analysed by way of thematic analyses. Due to a very prolonged data collection period this approach was reconsidered and discussed. As the data collection period was long and the inclusion of participants happened unevenly during this period it meant that some participants had their experience 1 – 1½ years prior to the interview process. It was a concern whether the participant would feel bad being reminded of their experience in hospital that long after the actual event, if they would remember, or if they would feel like answering any more questions. Further, the participants had not been asked whether they could be contacted beyond the four weeks after discharge when they signed the informed consent form.

3.7.3 Late follow-up

It was decided to replace the semi structured interviews with structured interviews in the form of a questionnaire of eight closed questions which could be answered in Likert scale type answers, except for one regarding the participant's rating of how relaxed they felt after their sessions in which the data collection instrument was a VAS. A sample of 12 participants was drawn from the total sample. Inclusion criteria for this sample were adjusted as the study had a very small number of female participants. The inclusion criteria for the late follow-up were:

- the participant had (preferably) had all four sessions; if not possible then a minimum of three sessions
- the patient's participation had taken place within the past 6 – 12 months

The 12 participants of the late follow-up sample consisted of four chosen participants from each research group, and were selected on the basis of the following criteria:

- one younger male (age band 40 – 59 years old)
- two older males (age band 60 – 80 years old)
- one female (age band 40 – 80 years old)

The questionnaires were sent to the participants including a letter asking the participant to sign whether they agreed to fill in the questionnaire; whether they wanted information on the study results when available, and a CD for the intervention groups (A and B). The letter included a stamped and addressed envelope for returning the questionnaire. If participants did not respond within a week, a phone call would remind them or check if they did not agree to respond. The late follow-up procedure was administered by the author.

The questionnaires[48] contained eight questions. Six of these questions (no. 1, 3, 4, 5, 6, and 8) applied to all three groups; two questions were formulated to reflect the research group toward which they were directed (2a and 7a) and applied to the GRM and the ML groups. Finally questions no. 2b and 7b applied to the NM group only. The questions in the late follow-up questionnaire were:

[48] The late follow up questionnaires are shown in appendix 3.14 on the CD-R accompanying this thesis.

1. How did you like the atmosphere while resting?
2a. How did you like that someone was with you while you were resting?
2b. How did you like resting on your own?
3. How relaxed did you feel after the resting periods?
4. Did filling in the questionnaires affect your benefits from the rest?
5. Did the rest periods influence your total experience of your hospital stay?
6. Do you think you could use this kind of rest another time at similar treatment?
7a. Did you like the music you chose for your rest?
7b. Would you have benefited more from the rest if you had listened to music?
8. Would you recommend this type of rest to others?

The late follow-up data were analysed and frequencies summarized by way of descriptive statistics.

3.8 Protocol for recruiting participants

The protocol for recruiting participants was based on both written and oral information and was organised in cooperation with the secretary at Unit T. As a standard procedure at Unit T, a letter of information was sent to the heart patient 8 – 10 days in advance informing them of the time of their planned heart valve operation and of the time of their admission to the hospital. Included with this letter was the informed consent on this study. The secretary administered this part of the protocol on the basis of the inclusion criteria regarding type of operation and of age. She was informed when adaptations of the protocol were made.

3.8.1 Recruiting interview

Prior to the implementation of the initial trials the procedure of recruiting participants for the study was clarified and organised with the secretary of Unit T. The secretary included the written patient information in the letter which was sent to the heart valve patients informing them of the date of admission for their operation. The secretary applied age, planned operations, type of operation (valve surgeries) as criteria for who was to receive the patient information. Information on the scheduled heart valve operations was obtained on a weekly basis. On the day of admission for their operation the patient was approached for a recruiting interview for the study. This interview was administered by the researcher and lasted 15 – 20 minutes. It took place in a separate room when available or in one of the secluded areas in the hallway where some quiet space could be provided. The written information was given orally; the patients were invited to ask any question regarding their possible participation. If a patient did not give his/her consent the reason was noted.

The following editorial adaptation was made in order to clarify and standardise the protocol for the recruiting interview. In addition to the written information the following comments were made prior to the patient's signing of the consent form.

Possible drop outs due to feelings of exhaustion or that the participant did not have the energy to continue their participation was prevented by being mentioned in the interview in the following way:

> *After the operation you may feel very weak and maybe fragile. You do not need to worry if you are not up to writing and filling in questionnaires. We can help you with completing them after your surgery, and you can confirm your responses. Later in the week you can easily manage filling in questionnaires yourself.*

The participant's freedom to stop their participation at any time was communicated to them like this:

> *You may at any time stop your participation in the study as your participation is voluntary. You need to know, that it is of great help to us, if in any way you can manage to go through with the four periods of rest (one before your operation and three after) while you are in hospital. It will be of help to the study.*

When the patient had signed his/her consent to participate, the participant filled in the first questionnaire, (time point 1), while the researcher made a copy of the signed informed consent form.

In concluding the admission interview an agreement was made regarding the time for the first period of rest; who would meet the participants for their session; and upon the randomised allocation they would be informed which kind of rest they would receive (guided relaxation with music; music listening while relaxing; rest).

The participant did not receive information as to which of these were the interventions or the control group. Finally the participant was again thanked for his/her consent to participate.

3.9 Protocols for intervention and control groups

In the following section the protocols for what are common conditions in the three research groups are described and are followed by the description of each protocol specific to the interventions (GRM and ML) and control (NM) groups respectively.

3.9.1 Protocol for interventions: Protocol common to all three groups

The participant was taken to the room for his/her session and warmly welcomed and thanked for his/her participation in the study. The RTMs administered questionnaires as required by the data collection protocol. In preparing for the administration for both intervention groups (GRM and ML) the CD player was set up with the graded intensity of the amplifier at level nine, category one, in order to establish and maintain a consistent volume level at the beginning of all trials. The protocol allowed for the participant to request an adjustment of the volume level, and on rare occasions that happened. The pillow case on the audio pillow was changed after each session.

3.9.2 Protocol for guiding in the Guided Relaxation with Music, GRM (group A)

In order for the RTMs to conduct the GRM sessions consistently in their role, attitude, quality of voice and tempo in the guiding procedure of the participants, a set of guidelines formed an instruction. The guide lines were as follows:

> *The following guidelines outline the role, attitude, and quality of voice of RTM in sessions of guided relaxation with music, and how the tempo may be organized.*
>
> ***Role***
>
> *The role of the RTM is primarily supportive. Disturbing sounds or other disturbing elements from outside the room are contained by the RTM and are commented if necessary. It is the responsibility of the RTM before the session to put a sign: "Session in progress" on the door (Starting and ending times are marked), in order to avoid interruptions from others.*
>
> ***Attitude***
>
> *The RTM relates to the participant empathically and observing. The RTM follows the relaxation in her own body while guiding the participant. Thus she listens both inwards and outwards.*
>
> ***Quality of voice***
>
> *The RTM may colour her voice to make it sound warm, supportive and with a rounded, soft timbre. The RTM uses her voice in its middle- to lower register. At the same time it is important that her voice sounds relaxed and slightly airy. The pronunciation must be sufficiently distinct for the participant to be able to hear and understand the words.*
>
> ***Tempo and timing***
>
> *The guiding may last up to 30 minutes, which allows plenty of time for pausing between the given instructions. The pauses are marked by a dash (–).*
> *The tempo of the guiding is calm and is as much as possible attuned to the participant's breathing and / or the music. Instructions describing action in the participant, e.g. moving awareness from one body part to the next by saying "Now, be aware of ..." may follow the*

participant's in-breath. When the participant is given instruction beginning with "Let …" the RTM may follow the participant's out-breath. The RTM may match the shift of awareness with changes in the music when it seems natural.

Text

The word 'now' is parenthesised to allow for variation. The RTM decides when to include or exclude it. It is recommended to use 'now' regularly (e.g. every other or every third time) in order to support the participant in being aware of the present now.

Comments from participants

The RTM notes in the study log the possible responses from and comments regarding how the participant is doing at the start and end of the current session.

Process

As the purpose of the guided relaxation with music is to support the participant in relaxing, the RTM avoids engaging in conversation. The RTM must refrain from asking opening questions which may stimulate processing. If the RTM observes or senses signs of pain or discomfort in the patient (e.g. grimaces, voice sounds, tight fist, irregularities in the breathing pattern), she may support the participant by commenting these signs with words like for instance "If parts of your body need further attention this is OK. Try to let it be, while you listen to the music. I will guide you."

A protocol was administered consistently for the guided relaxation procedure[49] (group A). In the pre operative session[50] the phrase "deep breathing" may be included. In the postoperative sessions the phrasing is slightly altered, and the phrase "deep breathing" is excluded. The protocol included the preparation for relaxation, the induction and ending of the session. At the conclusion of the session the participant was given the questionnaire and filled it in while the RTM was present[51]. The RTM only answered questions relating to understanding or clarifying the procedure for completing the questionnaire. The questionnaire left space for the patient to give comments. After completing the data forms and ending the session the RTM instructs the participant:

It is time to end for today. I will see you when you have returned from TIU (Thoracic Intensive Unit). Thank you for now. Thanks again for participating.

In the post operative sessions the same text was used except for a small change in the section guiding through the upper part of the body – midriff and chest. This change allowed for some general rather than specific attention to the chest of which sternotomy had been performed for the heart surgery and left the patient with a large steel wired sternum wound.

[49] The protocol for the Guiding procedure is found in appendix 3.4 on the CD-R accompanying this thesis.
[50] Specific protocols for the pre operative session, and for the post operative sessions were developed.
[51] Explained in section 3.9.5 in this thesis.

In addition, in the first post operative session (session 2) the RTM gave a specific instruction regarding a questionnaire:

> *Session 2*
> *The questionnaire Tt3[52] is given to the participant who fills in questions 1 – 3 BEFORE the rest, and questions 4 – 10 AFTER the rest, while the RTM is present. The RTM only answers questions regarding the participant's understanding or clarification of the procedure for completing the questionnaire. The questionnaire leaves space for the participant's comments.*

3.9.3 Definition of and protocol for the role of the RTM attending the music listening (group B)

The music listening (ML) intervention included the presence of an RTM attending in the session. Guidelines were written to provide boundaries for the RTM in maintaining this role. These guidelines, which included clear instructions, aimed to clarify the role of the RTM in order to avoid any interactions with the participant that they may perceive as therapeutic. In the ML group without guiding, it is important that the person with the participant is in the role of an attendant, rather than that of a therapist. The study requires that someone is with the participants, but not engaging them in any way. This is difficult, if the patient starts trying to have a conversation with the person about what he/she is experiencing. That is why it is relevant to refer to the RTM's role as that of an 'attendant' in the ML group. Therefore, the guidelines for how they should act in this group were defined and all RTMs monitored the sessions according to these guidelines[53]. These guidelines for the ML group are now followed by a description of the procedure for the NM group.

3.9.4 Protocol for administering the control group of No Music, NM (group C)

The control group (NM) was given a session of no music / scheduled rest. The instructions for the RTMs will be specified here as they are short and straight forward.

> *The participant is taken to the research room by the researcher (RTM). The participant's pillow is replaced by the audio pillow. (No music is played). The curtains are drawn and the light switched off. When necessary, the hospital bed is adjusted, and pillows placed under the patient's knees and/or arms, and a light blanket or duvet to keep the patient warm. The RTM says to the participants:*
> *It is now for you to rest and relax as it is helpful for you now.*
> *I will come back to you when your rest is over in about 35 minutes.*

The RTM left the room. When the rest period was over the RTM returned to the room and said:

> *Your rest has now ended.*

[52] Tt3: refers to measurements made at time point 3
[53] The Guidelines for RTMs attending sessions in the comparison condition are found in appendix 3.13 on the CD-R.

Questionnaire (time point 2) was handed to the participant who filled it in the presence of an RTM. The RTM only answered questions regarding the participant's understanding or the procedure in relation to the participant's completion of the questionnaire. The questionnaire left space for the participant's possible comments. The RTM ended the session with the following comment:

> *RTM: It is time to end for today. I will see you when you return from the TIA[54]. Thanks for now.*

The participant was assisted to his/her room by the RTM.
The post operative sessions followed the same protocol and instructions. The only difference was the questionnaire in the second session, (first postoperative) which was filled in partly pre - and partly post session.

3.9.4.1 Adaptation of protocol for the No Music / scheduled rest group, September 2006

During August- September 2006 two participants in the NM group experienced an increase in anxiety and felt insecure being left to rest on their own in a separate room. They withdrew their consent to participate and dropped out after their first and second session respectively. These experiences of increased discomfort were a contraindication to the intention of the study and to the patient's recovery after their heart surgery. Therefore the NM group was changed for the remaining data collection period in the following way. The RTM stayed in the room with the participant following the guidelines[55] for their role as described for the ML group. Further, the RTMs shared administering this group. This change to the protocol was undertaken when 14 participants had already had trials in the NM group (including the two mentioned here). Consequently the remaining 5 participants in the NM group had their sessions with an RTM attending who did not interact.

3.9.5 Protocol for administering questionnaires

For reliability it would have been preferable that staff other than the RTMs administered the questionnaires. The nursing staff were considered for undertaking this task, and this was discussed with the research nurse at Unit T. The NM group and questionnaires could have been administered by nurses. However, the research nurse advised against asking the nurses to take on this

[54] TIA=Thoraxkirurgisk Intensiv Afdeling (In English: *Thoracic Intensive Care Unit*)
[55] Guidelines for the RTM attending in comparison condition, see appendix 3.13 on the CD-R accompanying this thesis.

administration as the schedule was tight and busy as it was. The concern was that administering completing the questionnaires would be left out at times of increased pressure, over booking in the unit, or other changes in the planned routines and schedules. In order to control bias from the RTMs a protocol for the procedure of administering the questionnaires was formulated. The protocol contained the following instruction:

> *The participant fills in the questionnaire while an RTM is present. The RTM only answers questions relating to the participant's understanding or procedure regarding the participant's completion of the questionnaire.*

The participant's possible bias of wanting to please the RTM was not controlled further.

3.9.6 Duration and 'dosage' of treatment (Pre- and post operative)

All participants received one preoperative and three post operative, individual sessions for a duration of 35 minutes in one of three research groups: GRM, ML, NM (see section 3.1.1). The sessions were done in the afternoon between 15.30 and 17.30 except for one post operative session which, for practical reasons, was given to a participant at 12.30. The GRM sessions consisted of a guided relaxation lasting approximately 30 minutes within a music program lasting 34 - 35 minutes. The ML sessions involved listening to relaxing music with an RTM attending the session. The NM (control) sessions consisted of a period of rest. The preoperative session in the intervention groups additionally lasted 5-8 minutes longer to allow for the participant to choose their preferred style of music.

3.9.7 Cooperating institution

Close cooperation at several levels was necessary in order to undertake this study. To obtain permission to carry out the trials at Unit T, the approval from the research committee was needed; the research nurse in Unit T assisted in communicating with nursing staff with matters concerning logistics or communicative issues, and she made the access to participant's EPJ for information on analgesics possible; the secretary at Unit T who was in charge of mailing a notice to heart valve surgery patients informed the author on eligible participants. During the clinical trials cooperation from participant's close relatives was important as scheduled sessions happened during visiting hours. The assistance from nursing staff was needed when participants had to be moved from their own room to the research room, and/or were in need of oxygen to be disconnected and reconnected. Finally the collaboration of the RTMs was of great importance as the study design called for a large amount of flexibility. During the clinical trial period of approximately one and a half years, all mornings (10 am - 1 pm) of weekdays were reserved for recruiting interviews (the author) and all afternoons (3 - 6 pm) of the week including week ends were in principle reserved for clinical trials at Unit T in Aalborg Hospital.

This study was the first research trial undertaken in Unit T by someone from 'outside' the hospital, someone not medically trained and from an 'unusual' discipline such as music therapy, which although a profession complementary to medicine, is more typically associated with psychotherapeutic areas of intervention Therefore communication was of the utmost importance in order to develop manageable logistics to both nursing staff and the RTMs, as well as to the participants and their close families. Monthly meetings between the research nurse, the head nurse of Unit T, and the author (researcher) provided a forum for dialogue designed to promote a collaborative atmosphere, and for solving communicative or logistic issues. During the times of collecting data on analgesics from EPJs in cooperation with the research nurse the author had the opportunity to gain some understanding on how a busy hospital unit concerned with heart surgery may function.

3.9.8 Research Team Members assisting with the data collection

This author took the role of both researcher and music therapist managing the research team and clinical trials. There were reasons for including staff other than the researcher herself. If only the researcher administered sessions it may be argued that results from the treatment depended on the personality of the researcher. The validity may be questioned in relation to the researcher being the only person both offering the intervention and being present when participants filled in questionnaires. In order to control for the influence of personality, it was decided to include one or more RTMs. Staff were chosen by the researcher based upon discussion with supervisor. The amount of hours was unpredictable as they would depend on how many patients would agree to participate. The following criteria were chosen for selecting RTM for consistency and functionality:

- female
- available at flexible hours including weekends
- trained music therapist or music therapy student
- friendly attitude and willing to learn

RTMs signed a contract of agreement for research assistants agreeing to confidentiality as all medical staff. Training of RTMs was administered by the researcher. The training of RTMs for the data collection was done individually and included an introduction to the study as well as the experience of a GRM session. Prior to an introductory meeting a handout of the study protocol including the manuscript for the guided relaxation and the protocols for each research group, was given to the research assistant in training to be read as the first introduction to the study. The rationale was explained as well as providing an understanding of the needs of the heart valve surgery population. Particularly for the younger RTMs it was important to be aware of the need to modulate their own pace and for them to have a calm presence with the elderly participants. A second meeting was held at the hospital unit in order for the RTM to be introduced to the head nurse and some of the staff members, and in order to learn of the practical conditions in the unit, to clarify procedures and get a feel of the setting in which the sessions were held. Meeting patients happened only when sessions were administered. The RTMs were asked to communicate any difficulties to the researcher if they could not be solved directly with the present nursing staff. This way of communication was set up in order to avoid misunderstandings and to keep communication as direct and straightforward as possible.

The use of well-defined manuals for intervention and control groups was intended to provide the basis for the investigation of whether the results could be generalized across different therapists/ RTMs. A trained GIM therapist who had agreed to participate in the research trials as an RTM, found it very challenging to have to administer a session following a defined manual. Further, the unpredictability of when participants were recruited was demanding to such a degree that this RTM withdrew from the study. A trained music therapist and a music therapist in training participated in the research trials for almost one year, and a music therapist in training who was also an experienced nurse, participated briefly in the research trials.

For the majority of the research trial period the author monitored the NM group. The intervention groups were shared between the author and the RTMs. Mostly sessions were carried out by one RTM at the time; only at busy times when more than two sessions in one afternoon were scheduled, these were administered by two RTMs. At such times the RTMs had the opportunity to assist each other practically, and to share experiences of working with the population of people with heart valve diseases.

3.9.9 Concurrent treatment

The participants were given the standard care and treatment according to routines in the thoracic unit. No additional treatment was administered over and above the standard care during the actual session of this study.

3.10 Ethics

The consent form and information on the study were in Danish as all participants spoke this language (and were Danish). Informed consent was obtained from patients on the basis of written and oral information about the study. A separate consent form was sent to the participants in the late follow-up part of the study. The researcher (author) administered these procedures, except for a few occasions when the research nurse substituted the researcher.

3.10.1 Patient information

The written information sent to the patients had the following wording (translated by the author from the Danish[56]) introducing the patient to the study.

> *This paper informs you on a study in the heart & lung unit which is about investigating how scheduled rest and relaxation may help you recover after a heart valve operation. At the same time we take the opportunity to ask for your participation in this study.*
> *The study is part of a PhD training program under supervision from Aalborg University.*

A brief comment was made on the need for rest in relation to heart surgery in this way:

> *Before as well as after a heart operation it is necessary to rest. Rest is an important part of the rehabilitation process after the surgery. Therefore, rest is part of your treatment.*

How the study was applied in Unit T, and what it implied as for filling in questionnaires was informed upon in the following way:

> *The study takes places in Unit T, where patients admitted before and after their heart surgery will stay typically for about one week. During this time patients admitted for heart valve surgery are offered periods of scheduled rest. All participants in the study receive the treatment which is always offered to heart surgery patients in Unit T, whether they agree or not to participate in this study. During the course of your stay you will be asked to answer some simple questions in the form of questionnaires, which takes approximately 10 minutes to fill in. Patients, who agree to participate in the study, will receive personalised periods of scheduled rest. These rest periods take place in a single room.*

The patient was further informed about the responsible staff and that his/her possible participation was voluntary, done in the following way:

> *On the day of admission you will meet the person responsible for this study, Karin Schou, who will inform you verbally on the study. It is voluntary to participate in the study, and you*

[56] The informed consent form is found in appendix 3.7 on the CD-R accompanying this thesis.

may at any time end your participation with no consequence for your treatment in general. If you decide to give your consent to participate you will sign a consent form. You will receive a copy of this consent form.

Possible risks involved in participating in the study were commented like this:

The rest, which you will be offered, has no expected side effects, and involves no risk for your physical or mental health. Rest is a natural part of your treatment. The nursing staff is available to you as usual.

The patient was informed of his/her anonymity and that all staff associated with the study were included in the professional confidentiality as all staff in the unit. Finally the written information mentioned the formal avenues of public registration and communication on results in the following way:

The study has been registered with the Danish Data Protection Agency and follows the agency's guidelines and terms. The result of the research will be published in relevant scientific journals following the expected conclusion of the PhD thesis 2007.

3.10.2 Consent form

The same information was provided orally. If the patient agreed to participate they signed the consent form. A copy was made for the participant to keep. The consent form was included in the written information and was formulated as follows:

I hereby confirm that I have received the above mentioned information in writing and verbally, and that I agree to participate in the study as described: The Effects of Scheduled Rest in Heart Valve Surgery Patients in Heart-Lung Surgical Unit. I am informed that my participation is voluntary, and that I may at any time withdraw my consent to participate with no consequences for my current or future treatment.

3.11 Statistical analyses

Data were entered into the researcher's personal laptop into the computer programme SPSS for Windows. A statistical computer programme R, version 2.5.1, available through the Internet under the General Public License (GPL), Dalgaard (2002) was used for all statistical analyses which were performed in consultation with an experienced researcher specialized in using R. For the statistical analyses the international standards as defined in the CONSORT statement (Altman et al., 2001) were applied. Participants who did not receive all of the allocated treatment were included in the analyses based on the Intention To Treat principle, ITT, (Altman et al., 2001).

All participants are analysed in the group to which they were randomised. Participants were not excluded or moved to another group if they received the wrong intervention, no intervention or only a part of the intervention, or if it turned out after randomisation that they met an exclusion criterion for the study. Imputation was not used, and the available data were analysed using linear mixed-effects models which takes into account that missing data occur.

The distinguishing feature of a longitudinal study is that the respective variables are measured several times on each individual in the study. The main objective when analysing longitudinal data is to characterize change in the repeated values of the dependent variable and to determine the explanatory variables that are most associated with any change (Everitt & Hothorn, 2006). This means that the individual development of a certain outcome variable over time can be studied, and that it may be related to the individual development of other variables (Twisk, 2003).

3.11.1 Descriptive statistics

Descriptive statistics analysed data for central tendencies and to provide an overview of the material. Data regarding single and double procedure were treated together.

Table 3.10 Overview of descriptive analyses in total sample and three groups

Variable	Measure	Time points of measurement
Age in sample, and by gender	Age in years from EPJ	-
Operation type	Registered from EPJ	-
N in sessions 1 to 4	Registered from research log	Day of session 1, 2, 3, and 4
Anxiety	VAS, participants' self-	1, 2, 3ac, 4, 5, and 6
	UMACL-TA participants' self-report	1, 2ab, 3abc, 4, 5, and 6
Pain	VAS, participants' self-report	1, 2, 3a,b +c, 4, 5, and 6
Analgesics: a, b) strong and mild opioids, c) paracetamol	Registered from EPJ Participants' self-report	1 , 2, 3, 4, 5 6
Mood	POMS-37 TMDS and six factors participants' self-report	1, 3, 5, and 6
Satisfaction with stay	VAS, participants' self-report	5, 6
Length of stay	Registered from EPJ	Difference between day of admission to day of discharge
Benefits of music (GRM+ML)	VAS	2, 4, 6
Benefits of guiding (GRM)	VAS	2, 4, 6
Benefits of rest/relaxation	VAS	2, 4, 6

Note. EPJ: Electronic Patient Journal. TMDS: Total Mood Disturbance Score.
GRM: Guided Relaxaion with Music, group A. ML: Music Listening, group B

3.11.2 Inferential statistics

In longitudinal studies, missing data or attrition causes methodological problems, as not all participants in a study complete all the measurements in the trials (Twisk, 2003). In case of participants' missing data at the end of a study, attrition is also referred to as drop-out (Carpenter et al., 2002; Twisk, 2003). Intermittent missing data occurs when participants 'miss' measurements during the trials and returns to the study at a later point. (Twisk, 2003). A distinction is made in the literature between data which is missing *completely at random*, which means that data is missing independent of both unobserved and observed data, and data that is missing *at random* whereby the data is missing dependent on observed data, but not dependent on unobserved data (Carpenter et al., 2002; Little & Rubin, 1987). Whether the attrition was completely at random or at random, it has implications for the statistical analyses due to the missing data (Carpenter et al., 2002). Twisk points to two important issues in relation to the interpretation of the results of longitudinal analysis. Twisk writes that it is important

1) to investigate whether or not missing data depend on earlier observations
2) to determine whether or not certain predictor variables are related to the occurrence of missing data. (Twisk, 2003, p. 204).

In case of missing observations in the data, it is (highly) recommended to apply more sophisticated statistical analyses to the data (Twisk, 2003, p. 201) such as Linear Mixed-Effects models, LME. This type of statistical analysis is analogous to repeated measures ANOVA and was applied as recommended when the number of repeated measurements varies between subjects. One-way Analysis Of Variance, ANOVA was applied to the data on length of hospital stay.

3.11.3 Planned comparisons

Data from the NM and ML groups were compared with the GRM group (i.e. A versus B and C combined) in order to look at specific relationships regarding anxiety, pain, and mood. An overall comparison between GRM (group A) and NM (group C) would show whether participants in the GRM group demanded less analgesics than did the NM's.

A comparison of days with a music intervention and days without music intervention (A and B) would reveal whether there was less demand on medication in the GRM group (A) on days when they had received GRM sessions than on days when they did not receive GRM sessions; and whether there was a difference in demand for analgesics between intervention groups (A and B).

3.11.4 Overview of inferential statistical analyses in relation to hypotheses

The table 3.11 presents an overview of the analyses planned and performed in relation to the hypotheses. The initial column describes the reason for each analysis. In the second column the measure used for each outcome is mentioned. In the column 'Analysis' the numbers refer to the time points of measurements in question for comparison. The results of these analyses are presented in the order of appearance in this table.

Table 3.11

Overview of analyses in relation to hypotheses

Reason for analysis	Measure	Analysis
Comparison 1: To compare the changes from immediately before to immediately after the postoperative session	Anxiety VAS; Pain VAS UMACL-TA	3a to 3c 3a to 3b + 3c
Comparison 2: To compare the changes from before to after the 4th session	Anxiety VAS; Pain VAS UMACL-TA	4 to 5 4 to 5
Comparison 3: To compare changes over time from admission to discharge	Anxiety VAS; Pain VAS UMACL-TA POMS six factors POMS TMDS	1 to 5 1 to 5 1 to 5 1 to 5
Comparison 4: To compare changes over time from post operation to discharge	Anxiety VAS; Pain VAS UMACL-TA POMS TMDS POMS six factors	3a to 5 3a to 5 3 to 5 3 to 5
Comparison 5a, b, c: To measure differences between groups on a day between sessions and after treatment in use of analgesics: a) strong opioids, b) opioids, and c) paracetamol	Analgesics	4 5
Comparison 6: To measure differences between groups in satisfaction with hospital stay at discharge and follow-up	Satisfaction w. stay VAS	5 6
Comparison 7: To measure differences between groups in length of hospital stay at discharge	Length of stay	5

Note. The numbers in the column 'Analyses' refer to the following measurement time points:

1: self reported after signing the informed consent form on admission

2: self reported post pre operative session regarding participant's experience
participant's experience post session (self reported post session 1)

3: self reported post operative session regarding participant's experience
a) participant's pre session 2 (or 3)
b) participant's experience during session (self reported post session 2 (or 3)
c) participant's experience post session (self reported post session 2 (or 3)

4: self reported in the afternoon on a day with no session between sessions three and four.

5: self reported at the morning / noon of the day of discharge

6: Participant's experience at follow-up (self reported four to five weeks after discharge)

3.11.5 Analyses in relation to supplementary research questions

The data in relation to the supplementary research question were treated by way of descriptive analyses. These analyses were concerned with data regarding the participants' choice of music style, what informed this choice, and which aspects of the music were helpful for their relaxation in both intervention groups. Further, data relating to which aspects of the guiding were helpful for the participants' relaxation in the GRM group (A) were also descriptively analysed.

3.11.6 Analyses in relation to late follow-up

The data from the late follow-up were treated by way of descriptive analyses.

3.12 Music analyses relating to music choice

In relation to the results of the participants' choices of their preferred style of music, the four music examples (all of a duration of 40 seconds) were played to the participants as part of the procedure forming the basis for their choice of preferred style of music for their relaxation (section 3.5.4). For the purpose of comparing the four pieces and styles of music the Structural Model of Musical Analysis, SMMA, developed by Grocke (1999; 2007) was used. This model was used in order to identify and describe the musical elements characteristic of these music examples and consider why some was preferred more than others.

The SMMA was developed to analyse the music that underpinned clients' experiences of pivotal moments in GIM sessions (the Bonny Method) and therefore on the basis of mostly classical and orchestral music. The analysis method was recommended by Wigram (2004) as it was found to satisfy both content and construct validity. "The SMMA serves a purpose when music therapy researchers are interested in the structural elements of a single piece of music, or comparing several pieces of music for similarities and differences" (Grocke, 2007, p. 160). The SMMA consists of a set of criteria which may be used as a check list during analysis in order to describe part or the whole of a piece of music, and functions "as a frame by which to determine the presence and quality of musical and some non-musical parameters" (Wigram, 2004, p. 214) in order to provide a comprehensive description as the first step in analysing a piece of music. Furthermore the concept allows for the relevant elements to be drawn from the list (Grocke, 2007). The author suggested that the SMMA may be used to "compare a number of possible selections of music, for receptive music therapy experiences" (Grocke, 2007, p. 160). It is underlined that using the SMMA may enhance the choice of music that music therapists make, and improve their awareness of the characteristics of music that may bring about certain responses in clients. For the analyses in this study, Grocke's edited version was applied (Grocke 1999; 2007).

In addition, intensity profiles were used to compare the music styles regarding this element. These intensity profiles were a computer generated Intensity Profile made in the Music Imaging Analysis (MIA, version 0.3 Beta). This charting program is a means of depicting the intensity of the music in a comprehensible, visual manner and incorporating sound and time.

> "MIA charts the progression of the musical sound against time, providing a visual contour line on your computer screen. In other words, with perfect synchronization of line, sound and time, MIA draws a chart, mapping the contour of the selection as the music progresses." (Rickman, 2005 as cited by Bonde, 2007, p. 266).

The intensity profiles were made of the music excerpts and of the music programs respectively in order to graphically illustrate the contour of the music selections and their sedative nature.

3.13 Conclusion

The method for this study was developed for the purpose of undertaking an outcome based (fixed design) study investigating the effect of a particular receptive music therapy method, guided relaxation with music (GRM), on anxiety, pain, mood, length of hospitalisation and satisfaction with hospital stay. This fixed design included the data collection concerned with what aspects of the music therapy intervention, guiding and music helped the participant in relaxing. Protocols for the manualised music therapy were defined in order to ensure that sessions were consistently monitored, as well as the validity and replicability of the study. Defining the role and attitude of the RTMs was included in the protocols for all three research groups. Reflections on these matters were discussed in regard to the effect of the method.

The clinical work and data collection for this study were conducted between September 2005 and May 2007, with an interruption of two and a half months from November 2006 till end of February 2007. The data were entered into the researcher's personal laptop and statistically treated as outlined in this chapter. The results of the study are reported in the following chapter on the basis of recommendations stated and defined by the **Con**solidated **S**tandards **O**f **R**eporting **T**rials, CONSORT (Altman et al., 2001). The results will be reported for the sample in total, and for the three research groups separately.

CHAPTER 4

RESULTS

In this chapter the results of the pooled data are presented. Statistical treatment and analyses of the pooled data were performed in order to determine what patterns and trends may emerge from the data, and whether these were statistically significant. In order to provide the reader with information in a consistent form, the results of the analyses are presented in the following order:

- The results in relation to the research hypotheses and each of the outcome variables (sections 4.1 to 4.8)
- The results in relation to the supplementary research question and the predictor variables (sections 4.9 to 4.11)
- The results of the late follow-up are presented in section 4.12
- The results in regard to the attrition in this study are presented in the final section (4.13)

The hypotheses of this study were that cardiac valve surgery patients, receiving personalised sessions of guided relaxation with music (group A) when compared with those receiving sessions of relaxing music listening (group B), and those receiving sessions of scheduled rest with no music (group C), would report

a) greater reduction in anxiety (self report by UMACL-TA and VAS)
b) greater reduction in pain (self report by VAS)
c) greater improvement in mood (self report by POMS-37)
d) greater satisfaction with their hospitalisation (self report by VAS)
e) shorter length of hospital stay (by report from EPJ).

Anxiety was defined as the primary outcome variable.

A supplementary research question was formulated to determine what aspects of (the intervention) guided relaxation with music have an effect on the patient's experience of relaxation. To answer this in more detail, two further questions were formulated:

a) What elements in the *music* helped the patient to relax?
b) What elements in the *guiding* helped the patient to relax?

4.1 Presentation of results

The presentation of results is followed by analyses undertaken through descriptive statistics, followed by analyses undertaken through inferential statistics. In all the tables which are concerned with the descriptive analyses, the initial columns present the means (M) and standard deviations (SD) for the total number of subjects reported at each measurement time point, followed by columns displaying the mean and standard deviation for each of the three research groups separately. The total sample (*N*) and the sample in each group (*n*) represents the number of participants who have responded to the measure in question at each point in time on the dependent measures of anxiety and pain VAS scores (seven times); UWIST Mood Adjective Check-list - Tension Arousal sub scale (UMACL-TA) scores (nine times); Profile of Mood States (POMS-37) (four times); and satisfaction with hospitalisation (twice). Data on length of stay were obtained from the Electronic Patient Journal. In the presentation of the results of the inferential statistics a number of comparisons are presented[57]. Comparisons are numbered such that the same number refers to the comparison of measures made between the same time points across the different outcomes. The tables regarding the inferential statistics and the results of these comparisons the source in question in the left column and the right column shows the degree of freedom (*df*) in relation to the source. The final right column displays the value of the effect as '*F*'.

The results regarding the *supplementary* research questions described above are presented in sections 4.9 to 4.11. The results in relation to the sub question a) What elements in the *music* helped the patient relax? is presented first including the distribution in the participants' choice of style of music (intervention groups A and B). This is followed by a structural musical analysis of this result in order to possibly identify why some styles of music were preferred for relaxation over others. The results in relation to sub question b) 'What elements in the *guiding* helped the patient relax?' are then presented (GRM). Following, the descriptive analyses of the reported measures in relation to the predictor variables relaxing music and guiding (VAS) are presented followed by the results of the analyses of what *aspects* of these variables the participants found helpful for their relaxation. Additionally the results of the descriptive analyses of the self-reported measures of how helpful it was for the participants to rest (VAS) are presented. The final section presents the results in regard to attrition from the study.

[57] An overview of the analyses and comparisons in relation to the research hypotheses is provided in Table 3.11 in chapter 3 of this thesis.

4.1.1 Terms and abbreviations

The following abbreviations are used in the reporting of results in the text as well as in tables and figures:

CABG	**C**ardiac **A**rtery **B**ypass **G**rafting
GRM	**G**uided **R**elaxation with **M**usic (Group A)
ML	**M**usic **L**istening with attendant (Group B)
NM	**N**o **M**usic, scheduled rest (Group C)
EPJ	**E**lectronic **P**atient Journal
ICU	**I**ntensive **C**are **U**nit (in *Danish*: **T**horax-kirurgisk **I**ntensiv **A**fdeling, TIA)
RTM	**R**esearch **T**eam **M**ember

The abbreviations regarding the outcome variables are as follows:

UMACL-TA	UWIST Mood Adjective Check-list - Tension Arousal sub scale
POMS	POMS-37 to measure mood. Total Mood Disturbance Score, TMDS

POMS factors (six sub scales):

T	Tension-Anxiety
D	Depression-Dejection
A	Anger-Hostility
V	Vigor-Activity
F	Fatigue-Inertia
C	Confusion-Bewilderment
Time points	measurement time points
stay	hospital stay / hospitalization

The measurement time points refer to the following:

Preoperative

Time point 1	baseline measures upon admission
Time point 2	post session 1 measures: a) regarding the participants experience during treatment and b) post treatment

Post operative

Time point 3	postoperative session when measures were made: a) pre session measures b) and c) post session measures
Time point 4	measurements on a day of no session, between session three and four
Time point 5	measurements on the morning/ noon on day of discharge; post treatment
Time point 6	measurements at follow-up four to five weeks after discharge

4.1.2 Interpretation of figures (interaction plots, box plots, histograms, and dot plots)

This section first provides explanations as to how the interaction plots in relation to the descriptive statistics may be interpreted, and is followed by explanations for interpreting the box plots, the dot plots and histograms respectively.

4.1.2.1 Interaction plots

Interaction plots were chosen to illustrate the results of the descriptive analyses as they are an effective graphical means of interpreting and displaying results when a response to one factor (outcome variable) depends on the level of another factor such as group (Crawley, 2007, p.172). The descriptive statistics are presented in graphs in the form of interaction plots illustrating the overall changes of the outcome variables over time, together with the means and confidence intervals for the three groups. The graphs illustrate the results of pre-, in between, post treatment, and follow-up measures. The scoring ranges for each measurement are depicted on the y-axes. The six separate measurement time points are depicted on the x-axes. In order to be able to compare different outcomes measured at different times, the numbers on the x-axis are kept to the six occasions when participants completed a questionnaire, and a, b, and c are added to illustrate that measures were made close to each other in time. The black line represents group A, who received the Guided Relaxation with Music (GRM). The red line represents group B, who received sessions of Music Listening (ML). The green line represents group C, who had sessions of scheduled rest with no music (NM). The vertical lines at the measurement time points depict 95% confidence intervals and are indicated in the same black, red, and green lines for each group respectively as described above.

4.1.2.2 Box-and-whiskers-plot

The box plots (box-and-whiskers plot) presented in this chapter are a graphical summary of the distribution of numerical data (Dalgaard, 2002). To construct a box plot, a box with ends ("whiskers") at the lower and upper quartile is drawn (Everitt, 1996: 30-32). The quartiles (25%, 50%, 75%) correspond to the division of data into four parts (Dalgaard, 2002), and the rectangular box represents the inter-quartile range (IQR) which is the middle fifty percent of the scoring range (from 25 to 75%). The bold horizontal line in the box depicts the median. 'Whiskers' are drawn extending above and below the box to the greatest and least observed values to maximum 1.5 times the inter-quartile range. Open dots depict *outliers*, which means values outside the ends of the whiskers. An outlier lies more than 1.5 times lower than the first quartile, or 1.5 times higher than the third quartile (Rowntree, 1981). The x-axis depicts the three groups, and the y-axis depicts the outcome variable in question. The value of the y-axis is explained in the presentation of the specific box plot. On the x-axis the three groups are depicted with their labels attached.

4.1.2.3 Histograms

A histogram is a common and recommended plot for single samples to show a frequency distribution, and particularly for displaying the symmetry or skew in a set of data (Crawley, 2007). The histograms in this chapter present the spread and the skewed data particularly regarding the outcome 'satisfaction with hospital stay'. The histogram is a means of providing a 'reasonable impression' (Dalgaard, 2002, p. 61) of the shape of the distribution in the three groups. The x-axes in the histograms presented in this chapter (section 4.7) depict the data range of the VAS in which scores were self-reported by the participants. In measures made at discharge (time point 5) participants have reported their satisfaction within the range from 6.5 to 10, whereas at follow-up (time point 6) they have reported these measures within a range from 0 to 10. Thus the x axes depict different ranges of the VAS at the two times of measurement. The y-axes depict the frequency of scores in satisfaction with hospital stay at both measurement time points.

4.1.2.4 Dot plots

The dot plots as presented in this chapter were made as trellis graphics for the purpose of producing multiple plots (Crawley, 2007, p. 173). Trellis graphics were developed by Becker, Cleveland and others at Bell Laboratories. In referring to Cleveland (1993) Crawley refers to the development of ideas about what makes graphic illustration effective. Among others these ideas concern aspects such as layout, colour, style, and symbol sizes.

In this chapter the multiple plots which report results from the analysis of musical aspects display seven items in regard to the music aspects for the intervention groups (GRM and ML) in adjacent panels for three different time points. For the guiding aspects the dot plot deals with five aspects and one group (music therapy) for the similar time points. The y-axes in each dot plot depict the response variables in the form of musical aspects (soloist, instrument, familiarity, tempo, harmony, melody, and timbre), and guiding aspects (voice, tempo, voice timbre, associations, and fitting the music). The x-axes depict the score (range 0 to 4). Three adjacent panels represent the pre and postoperative time points of measurement (time points 2, 4 and 6). The figure legend above the dot plot explains the 'O' for GRM, and the '+' for ML scores. For each dot plot in the respective sections the exact scoring procedure and how to understand the dot plot is explained.

4.1.2.5 Bar plots

Bar plots are appropriate to use for a graphical presentation of counts when the explanatory variable is categorical (Crawley, 2007). The bar plot is an effective way of communicating counts in a visual form that may be more easily grasped and more easily remembered (Everitt, 1996). In the bar plots found in this chapter the x-axis depict the programmes of four different styles of music from which the participants could choose their preferred style for their relaxation (in both intervention groups, GRM and ML), and the y-axis depict the counts (number) of participants who chose each style of music. The intervention groups are combined in the bars. The height of the bars is proportionate to the counts of participants who chose the four music programmes respectively. A bar that consists of a horizontal line that lies close and parallel to the baseline of the x-axis indicates that the number of participants who chose the music programme in question was zero.

4.2 Results in relation to eligible patients

The total number of eligible participants within the period of the clinical research who were approached for a recruiting interview upon their admission to Unit T was 120. Fifty-two patients did not participate in the study for different reasons: Thirty-one chose not to participate. Not all eligible participants gave reasons, and each patient may have given more than one reason for choosing not to participate in the study. (Therefore the totals vary depending on the number of reasons given). These reasons were not reported consistently at the beginning of the data collection, but they were recorded after the initial trial. The reasons for not wanting to participate were categorised according to the reasons given, and quotes from a patient are put in inverted commas:

1) Wanted to be with family (11)
2) Felt too old for "such modern stuff" (2)
3) Questionnaires were too much to deal with on top of the heart operation (4)
4) Felt too worried to cope with participation in a study (2)
5) Unique circumstances (3)

Twelve patients did not meet the inclusion criteria due to the following reasons:

1) hearing deficit (3)
2) previous heart operation (2)
3) type of operation (1)
4) mentally confused (1)
5) alcohol abuse (2)

6) acute or too late admission for a recruiting interview (2)
7) unique circumstances (1)

Before randomisation five patients had their operations cancelled; and four were cancelled due to the researcher's sick leave causing an interruption in the clinical research including data collection. The total sample was 68 participants, 54 males and 14 females, who were randomly assigned to one of three research groups. Demographic data and baseline measures are shown in table 4.1. Analyses of variance identified no significant differences between the groups for age, gender, work (retired or working), nor in any of the baseline measures of the outcome variables anxiety (VAS and UMACL-TA), pain (VAS), analgesics, and mood.

Table 4.1

Demographic data and baseline measures of outcome variables.

No statistically significant differences between groups (Pr>F)

	Sample		GRM	ML	NM
			n M (SD)		
	Males	Females			
Age (years)	*54* 64.24 (9.36)	*14* 68.14 (9.95)			
	68 65.04 (9.54)		*25* 66.52 (9.75)	*23* 64.09 (10.07)	*20* 64.30 (8.89)
Anxiety: VAS	*68* 2.98 (2.65)		25 2.82 (2.41)	*23* 2.52 (2.55)	*20* 3.73 (3.00)
UMACL-TA	*65* 14.31 (5.02)		*24* 14.00 (3.99)	*22* 14.50 (5.65)	*19* 14.47 (5.62)
Pain: VAS	*68* 0.76 (1.50)		*25* 0.79 (1.69)	*23* 0.54 (1.00)	*20* 0.99 (1.73)
Analgesics:	*68*		*25*	*23*	*20*
Strong opioids (ml)	0.29 (2.43)		0 (0.00)	0 (0.00)	1 (4.47)*
Mild opioids (mg)	3.68 (21.71)		10 (35.36)	0 (0.00)	0 (0.00)
Paracetamol (g)	0.15 (0.58)		0.12 (0.44)	0.34 (0.88)	0.00 (0.00)
Mood:	*57*		*22*	*18*	*17*
POMS-37 TMDS	11.42 (19.21)		10.82 (21.03)	14.83 (18.25)	8.59 (18.31)

Note*. One patient randomised to the NM group had a preoperative dosis of 20 mg strongopioid (ketogan), but had his/her operation cancelled and did not participate in any further analyses.

Table 4.1 shows that the mean age of the participants in the GRM group was two years older compared to the mean ages in the ML and the NM groups. The standard deviations were similar in all three groups with small variations between groups. The mean age of the female participants were 4 years more than in the males, and the standard deviations were rather similar in both gender as they were found to be within a range from 9.36 (males) to 9.95 (females). The age range was also similar: the youngest male participant was 41 and the oldest was 80 years old; in females cases the minimum age was 42 and the maximum age was 79 years.

The participants had either heart valve operation as a single procedure or heart valve operation in combination with a CABG operation, a double procedure. The number of participants having had single or double procedure type surgery is displayed in table 4.2. The gender is indicated in the left column and the following four columns show how many participants received the two types of surgery respectively in the total sample and in the three groups.

TABLE 4.2

Operation type in total sample and three groups

	Total sample	GRM	ML	NM
Operation procedure		Single / *Double*[1]		
Males	34 *20*	12 *8*	11 *6*	11 *6*
Females	11 *0*	3 *0*	5 *0*	3 *0*

Note. [1] *Double procedure in italics*

All female participants had a single procedure heart valve surgery, and the number of men who had this type of surgery was evenly distributed between the three groups. Single procedure type surgery was used in 63 % of male cases (n=34), and double procedure in 37% of male cases (n=20). Two women were found inoperable (GRM and ML groups), and for one male patient the operation type was not available. The bar plot in figure 4.1 graphically illustrates the numbers of participants having had single or double procedure type surgery in the total sample.

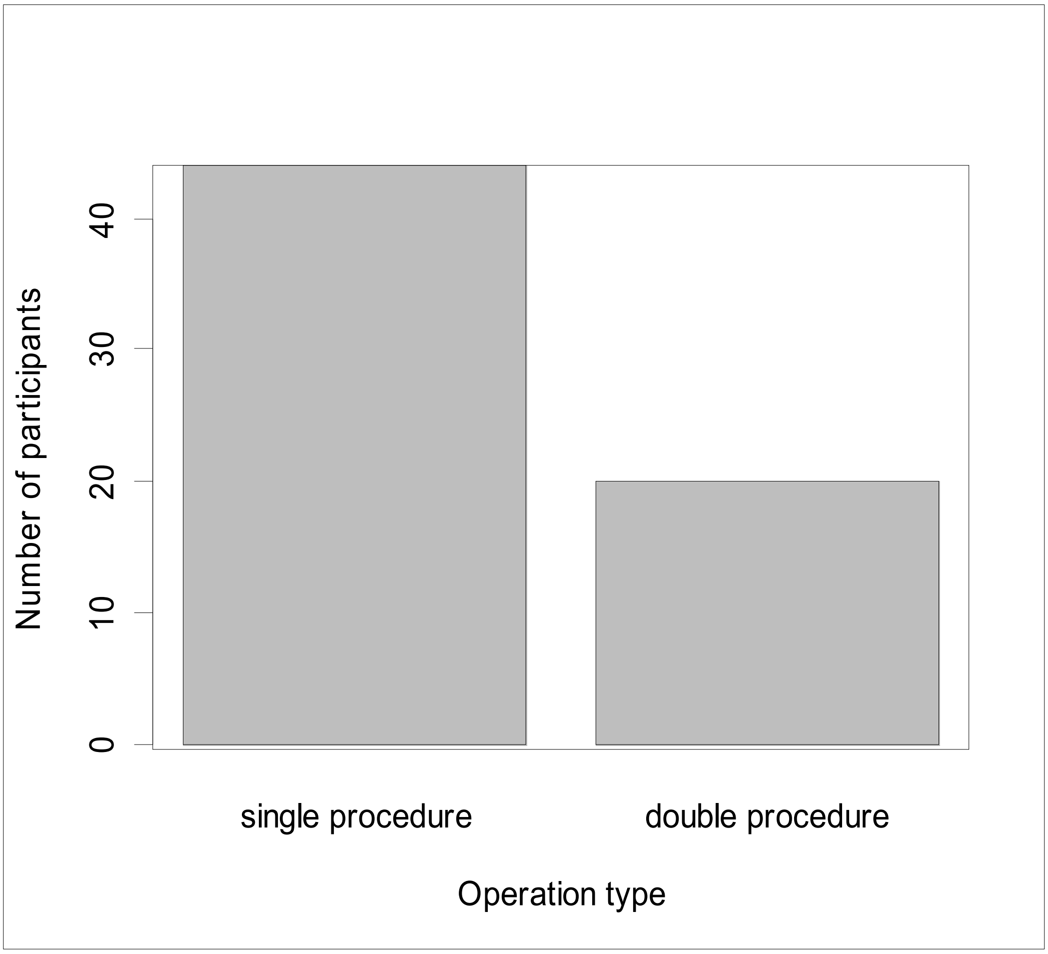


Figure 4.1. Numbers of participants receiving single or double procedure heart valve surgery in total sample

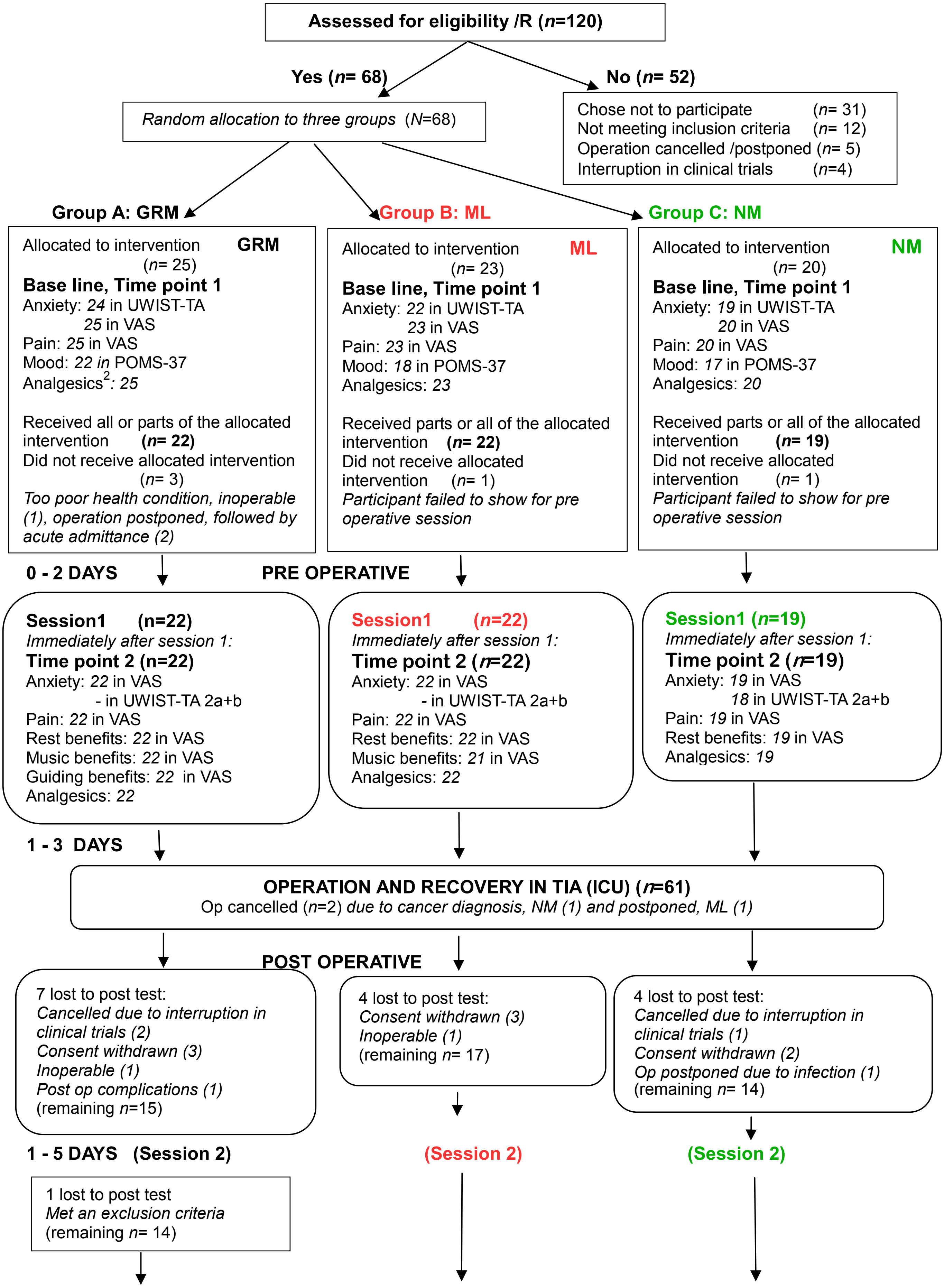
4.3 Results in relation to recruited participants randomly allocated to three groups

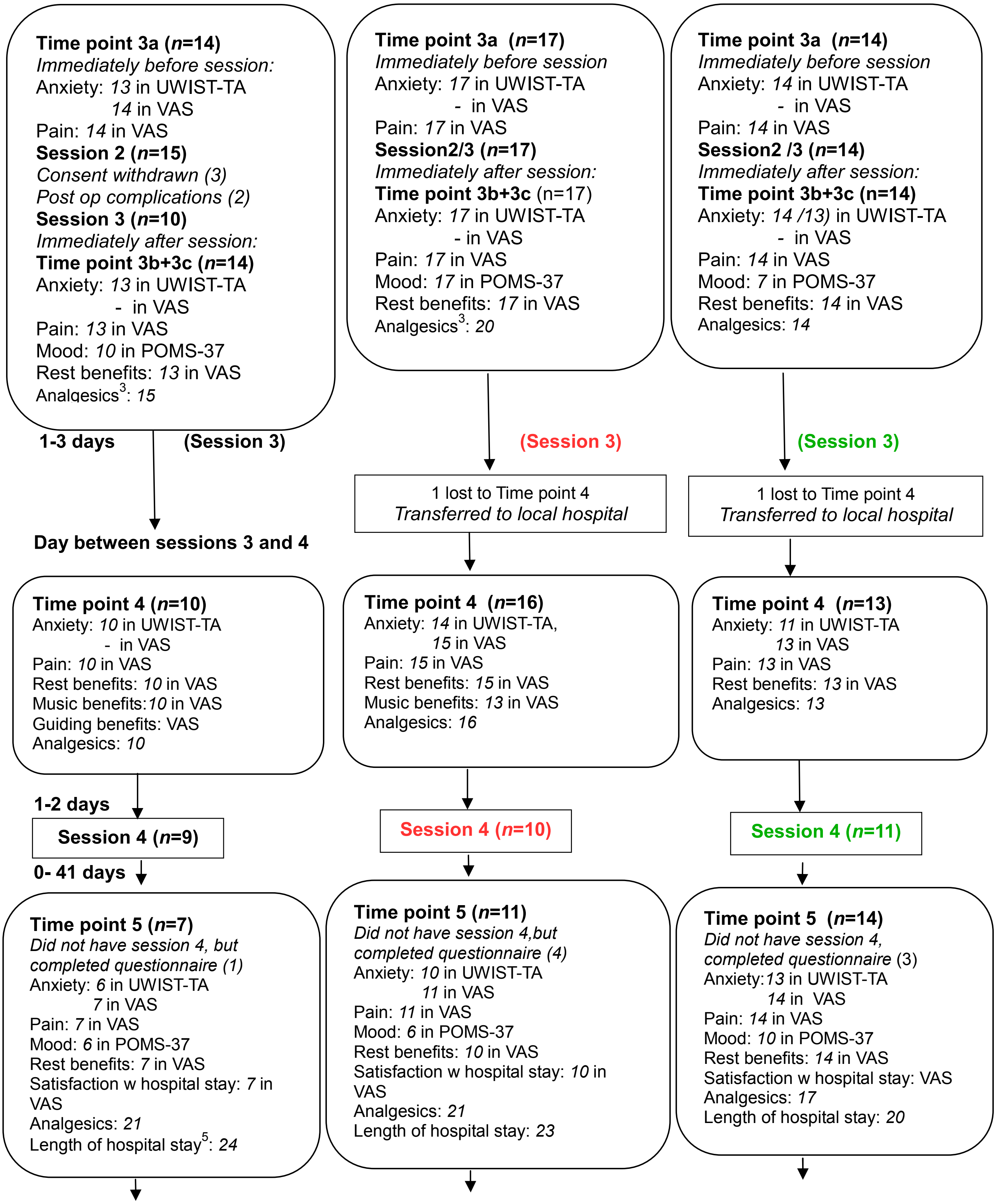
The sample, n=68, filled in baseline measures (time point 1) and were randomly allocated to one of the three research groups: GRM (25), ML, (23), and NM, (20). Five did not receive the allocated group: Three participants allocated to GRM did not receive the allocated treatment (one due to a poor health condition was denied surgery and two due to cancellation of surgery followed by acute admission). One participant in each of the ML and the NM groups failed to come for their preoperative session and were excluded from the study. Sixty-three participants (GRM: 22, ML: 22, and NM: 19) following recruitment remained. The details of the participants' flow through the study as explained above are illustrated in figure 4.2. At each stage in the study and for each group the number of participants randomly assigned, receiving the intended research condition, completing the protocol, and analysed for the primary outcome are reported in the detailed flow diagram, which also details the data collection instruments and measures that were used. Patients' reasons for not wanting to participate in the study and other reasons for attrition are also included in the flow chart in line with the CONSORT statement (Altman et al., 2001), and are further described in section 4.13. Due to the adaptation of the protocol which postponed the completion of the third questionnaire by some subjects from session two to session three, the data from time points 3a, 3b and 3c were analysed together. Eight participants in each of the three groups completed this questionnaire in connection with their second session, and six participants in the GRM and the NM groups respectively, and nine in the ML group completed this questionnaire in relation to their third session.

Figure 4.2 provides a complex array of information to comprehensively explain the flow of the participants through the study. The following abbreviations are used*:*

CABG= **C**ardiac **A**rtery **B**ypass **G**rafting. **EPJ**: **E**lectronic **P**atient **J**ournal. Information was obtained from the EPJ by the researcher in cooperation with research nurses. **TIA**: **T**horax-kirurgisk **I**ntensiv **A**fdeling /ICU: (Thoracic) **I**ntensive **C**are **U**nit. **OP**: Operation. **Group A**: **GRM, G**uided **R**elaxation with **M**usic. **Group B**: **ML**, **M**usic **L**istening. **Group C**: **NM**, **N**o **M**usic.

The Numbers of participants (*n*) who remained in each analysis of the data collection instruments are reported in italics for each time point of measurement (i.e. Base line, time point 1: Anxiety: *25* in VAS, *24* in UMACL-TA).


Assessed for eligibility /R (n=120)
Yes (n= 68)
No (n= 52)
Random allocation to three groups (N=68)
Chose not to participate (n= 31)
Not meeting inclusion criteria (n= 12)
Operation cancelled /postponed (n= 5)
Interruption in clinical trials (n=4)
Group A: GRM
Group B: ML
Group C: NM
Allocated to intervention GRM (n= 25)
Base line, Time point 1
Anxiety: 24 in UWIST-TA
25 in VAS
Pain: 25 in VAS
Mood: 22 in POMS-37
Analgesics2: 25
Received all or parts of the allocated intervention (n= 22)
Did not receive allocated intervention (n= 3)
Too poor health condition, inoperable (1), operation postponed, followed by acute admittance (2)
Allocated to intervention ML (n= 23)
Base line, Time point 1
Anxiety: 22 in UWIST-TA
23 in VAS
Pain: 23 in VAS
Mood: 18 in POMS-37
Analgesics: 23
Received parts or all of the allocated intervention (n= 22)
Did not receive allocated intervention (n= 1)
Participant failed to show for pre operative session
Allocated to intervention NM (n= 20)
Base line, Time point 1
Anxiety: 19 in UWIST-TA
20 in VAS
Pain: 20 in VAS
Mood: 17 in POMS-37
Analgesics: 20
Received parts or all of the allocated intervention (n= 19)
Did not receive allocated intervention (n= 1)
Participant failed to show for pre operative session
0 - 2 DAYS
PRE OPERATIVE
Session1 (n=22)
Immediately after session 1:
Time point 2 (n=22)
Anxiety: 22 in VAS
- in UWIST-TA 2a+b
Pain: 22 in VAS
Rest benefits: 22 in VAS
Music benefits: 22 in VAS
Guiding benefits: 22 in VAS
Analgesics: 22
Session1 (n=22)
Immediately after session 1:
Time point 2 (n=22)
Anxiety: 22 in VAS
- in UWIST-TA 2a+b
Pain: 22 in VAS
Rest benefits: 22 in VAS
Music benefits: 21 in VAS
Analgesics: 22
Session1 (n=19)
Immediately after session 1:
Time point 2 (n=19)
Anxiety: 19 in VAS
18 in UWIST-TA 2a+b
Pain: 19 in VAS
Rest benefits: 19 in VAS
Analgesics: 19
1 - 3 DAYS
OPERATION AND RECOVERY IN TIA (ICU) (n=61)
Op cancelled (n=2) due to cancer diagnosis, NM (1) and postponed, ML (1)
POST OPERATIVE
7 lost to post test:
Cancelled due to interruption in clinical trials (2)
Consent withdrawn (3)
Inoperable (1)
Post op complications (1)
(remaining n=15)
4 lost to post test:
Consent withdrawn (3)
Inoperable (1)
(remaining n= 17)
4 lost to post test:
Cancelled due to interruption in clinical trials (1)
Consent withdrawn (2)
Op postponed due to infection (1)
(remaining n= 14)
1 - 5 DAYS (Session 2)
(Session 2)
(Session 2)
1 lost to post test
Met an exclusion criteria
(remaining n= 14)


Time point 3a (n=14)
Immediately before session:
Anxiety: 13 in UWIST-TA
14 in VAS
Pain: 14 in VAS
Session 2 (n=15)
Consent withdrawn (3)
Post op complications (2)
Session 3 (n=10)
Immediately after session:
Time point 3b+3c (n=14)
Anxiety: 13 in UWIST-TA
- in VAS
Pain: 13 in VAS
Mood: 10 in POMS-37
Rest benefits: 13 in VAS
Analgesics[3]: 15
Time point 3a (n=17)
Immediately before session
Anxiety: 17 in UWIST-TA
- in VAS
Pain: 17 in VAS
Session2/3 (n=17)
Immediately after session:
Time point 3b+3c (n=17)
Anxiety: 17 in UWIST-TA
- in VAS
Pain: 17 in VAS
Mood: 17 in POMS-37
Rest benefits: 17 in VAS
Analgesics[3]: 20
Time point 3a (n=14)
Immediately before session
Anxiety: 14 in UWIST-TA
- in VAS
Pain: 14 in VAS
Session2 /3 (n=14)
Immediately after session:
Time point 3b+3c (n=14)
Anxiety: 14 /13) in UWIST-TA
- in VAS
Pain: 14 in VAS
Mood: 7 in POMS-37
Rest benefits: 14 in VAS
Analgesics: 14
1-3 days
(Session 3)
(Session 3)
(Session 3)
1 lost to Time point 4
Transferred to local hospital
1 lost to Time point 4
Transferred to local hospital
Day between sessions 3 and 4
Time point 4 (n=10)
Anxiety: 10 in UWIST-TA
- in VAS
Pain: 10 in VAS
Rest benefits: 10 in VAS
Music benefits: 10 in VAS
Guiding benefits: VAS
Analgesics: 10
Time point 4 (n=16)
Anxiety: 14 in UWIST-TA,
15 in VAS
Pain: 15 in VAS
Rest benefits: 15 in VAS
Music benefits: 13 in VAS
Analgesics: 16
Time point 4 (n=13)
Anxiety: 11 in UWIST-TA
13 in VAS
Pain: 13 in VAS
Rest benefits: 13 in VAS
Analgesics: 13
1-2 days
Session 4 (n=9)
0- 41 days
Session 4 (n=10)
Session 4 (n=11)
Time point 5 (n=7)
Did not have session 4, but completed questionnaire (1)
Anxiety: 6 in UWIST-TA
7 in VAS
Pain: 7 in VAS
Mood: 6 in POMS-37
Rest benefits: 7 in VAS
Satisfaction w hospital stay: 7 in VAS
Analgesics: 21
Length of hospital stay[5]: 24
Time point 5 (n=11)
Did not have session 4,but completed questionnaire (4)
Anxiety: 10 in UWIST-TA
11 in VAS
Pain: 11 in VAS
Mood: 6 in POMS-37
Rest benefits: 10 in VAS
Satisfaction w hospital stay: 10 in VAS
Analgesics: 21
Length of hospital stay: 23
Time point 5 (n=14)
Did not have session 4, completed questionnaire (3)
Anxiety:13 in UWIST-TA
14 in VAS
Pain: 14 in VAS
Mood: 10 in POMS-37
Rest benefits: 14 in VAS
Satisfaction w hospital stay: VAS
Analgesics: 17
Length of hospital stay: 20

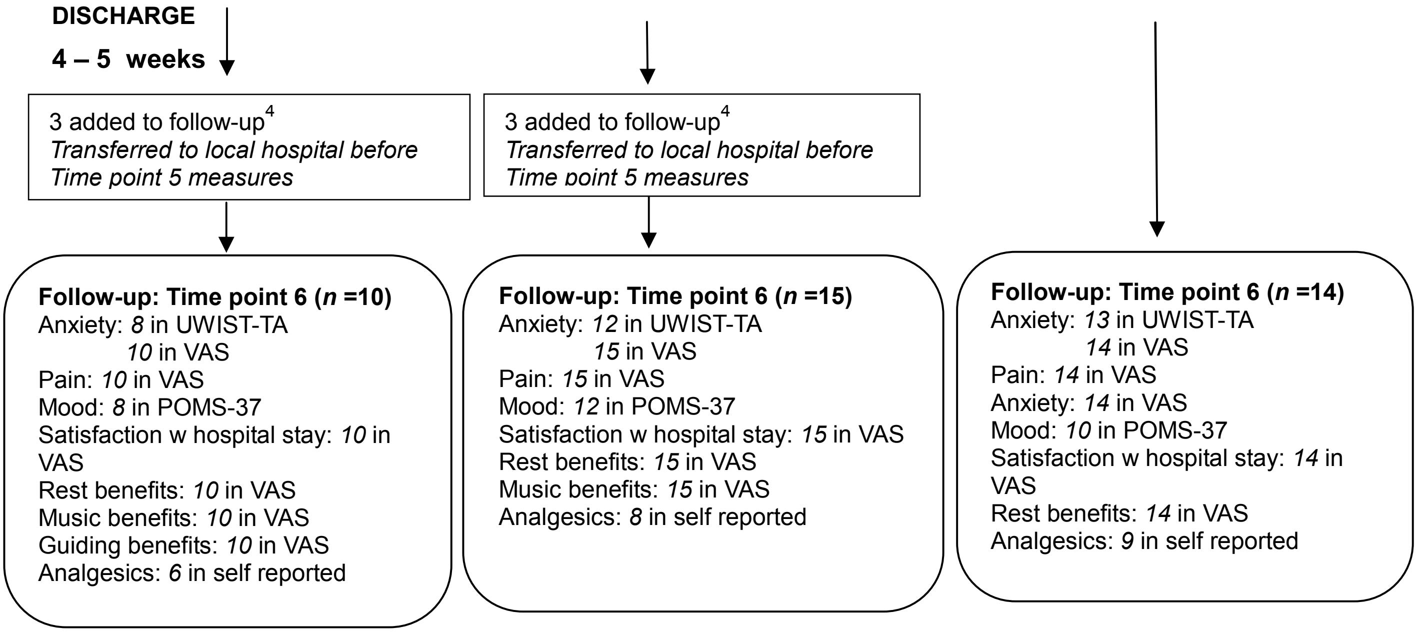


Figure 4.2 **Flow diagram. Participants' flow through the study: treatment and data collection**

[1] Not all eligible participants gave reasons, and each participant may have given more reasons for choosing not to participate. These reasons were not reported consistently at the beginning of the data collection.
[2] Information on all participants' analgesics intake were obtained at all time points 1-6 from the EPJ.
[3] One participant in the GRM group and three participants in the ML group who withdrew their consent immediately before the session at time point three remained in the analyses for analgesics intake.
[4] Three participants in the GRM and the ML groups respectively were transferred to their local hospital before they managed to complete the questionnaire at time point 5. Four of these had all four sessions (GRM group: 3, ML group: 2), and one participant had three sessions.
[5] Data on length of hospital stay were obtained (from the EPJ) for all participants except from one participant In the GRM group who experienced fatal complications.

After the preoperative session (session one) two participants were lost to further participation (their operations were cancelled due to one from the NM group being given a cancer diagnosis and the other from the ML group having his / her operation postponed). The attrition in this study is further defined in section 4.13. Table 4.3 shows the distribution of sessions in the three groups. The left column indicate the label of allocation. The following column shows the numbers of participants at each stage of the allocation in the total sample (*N*). The three remaining columns describe the number of participants (n) and the percentage distribution of sessions in three groups, GRM, ML, and NM.

TABLE 4.3

Numbers of participants in sessions 1 to 4 by research conditions

Allocation	Total sample		GRM		ML		NM	
	N	%			*n*	%		
Allocated to condition	*68*		*25*		*23*		*20*	
Did not receive allocated condition	*5*		*3*		*1*		*1*	
Received allocated condition:								
Session 1	*63*	92.6	*22*	88	*22*	95,7	*19*	95
Session 2	*46*	67.7	*15*	60	*17*	73.9	*14*	70
Session 3	*41*	60.3	*10*	40	*17*	73.9	*14*	70
Session 4	*30*	44.1	*9*	36	*10*	43.5	*11*	55

A little less than half the number of participants had all the sessions they were supposed to have in the groups to which they were allocated (30 of 63 participants = 47.6%). In the three groups the participants who completed all four sessions was as follows: in the GRM group 40.9%; in the ML group 45,5%, and in the NM group 57,9%. The pattern of dropping out after the first session was found in all three groups with the largest drop out reported in the GRM group. The differences in the distribution of sessions between groups were due to a number of factors such as post operative complications in the form of infections, confusion, and withdrawal of consent to participate which was greater in the GRM group than in the other two groups. This may have occurred by chance, or due to possible factors which will be discussed later. In the GRM group one participant returned to the ICU for several weeks due to ultimately fatal sternum infections and thus did not have the allocated treatment after his first post operative session. In the ML group it is worth noting that the large number of drop outs after session three was due to the participants' transfer to their local hospital before they could receive their fourth session.

4.4 Results regarding the primary outcome variable Anxiety

In the following sections descriptive statistical analyses are presented first, and are followed by the presentation of the results of the inferential statistical analyses. The analyses were done regarding several measurement time points in order to measure the effects of a post operative session (comparison 1) in anxiety (VAS); of the effects from before to after a session (comparison 2); of the post operative treatment (comparison 4); and of the full treatment protocol (comparison 3). Similarly analyses were carried out for tense arousal (UMACL-TA). In the following the results of the analyses (comparisons 1 - 5) of the effects on anxiety measured by VAS and the UMACL-TA are presented.

4.4.1 VAS (descriptive analyses)

Anxiety (VAS) was measured at measurement time points 1, 2, 3a, 3b, 4, 5, and 6. Table 4.4 shows the means and standard deviations for the changes in anxiety measured by the participants' self-reported experience of anxiety on a VAS (range 0 - 10) for the three groups. The left column 'Measurement time points' shows the seven measurement time points for the anxiety VAS. The column 'Total sample' (*N*) displays the number of participants who have completed this measure at these seven different times, pre and post operatively, and the means and standard deviations for the sample in total. The three following columns display the means and standard deviations for each of the three research groups separately including the number of participants (*n*) who completed this measure at these seven different measurement time points. These data are represented visually in figure 4.3 where the development over time can be seen graphically.

TABLE 4.4

Means and standard deviations for changes in anxiety (VAS) in total sample and three groups

Measurement time point	Total sample	GRM	ML	NM
Pre operative	*N* M (SD)		n M (SD)	
1 Baseline	*68* 2.98 (2.65)	*25* 2.82 (2.41)	*23* 2.52 (2.55)	*20* 3.73 (3.00)
2 Post 1st session	*63* 1.70 (1.97)	*22* 1.70 (1.78)	*22* 1.75 (2.21)	*19* 1.65 (1.99)
Post operative				
3a Pre 2nd/3rd session	*45* 2.10 (2.27)	*14* 1.71 (1.82)	*17* 2.00 (2.54)	*14* 2.61 (2.39)
3b Post 2nd/3rd session	*44* 1.89 (2.23)	*13* 1.72 (2.49)	*17* 1.78 (2.15)	*14* 2.17 (2.21)
4 Day between 3rd and 4th session	*38* 1.89 (1.96)	*10* 1.72 (1.78)	*15* 1.69 (2.09)	*13* 2.25 (2.03)
5 Post treatment/ at discharge	*32* 1.61 (1.93)	*7* 0.87 (0.97)	*11* 1.86 (2.62)	*14* 1.79 (1.67)
6 Follow-up 4-5 weeks after discharge	*39* 1.18 (1.45)	*10* 0.96 (0.79)	*15* 1.13 (1.54)	*14* 1.40 (1.75)

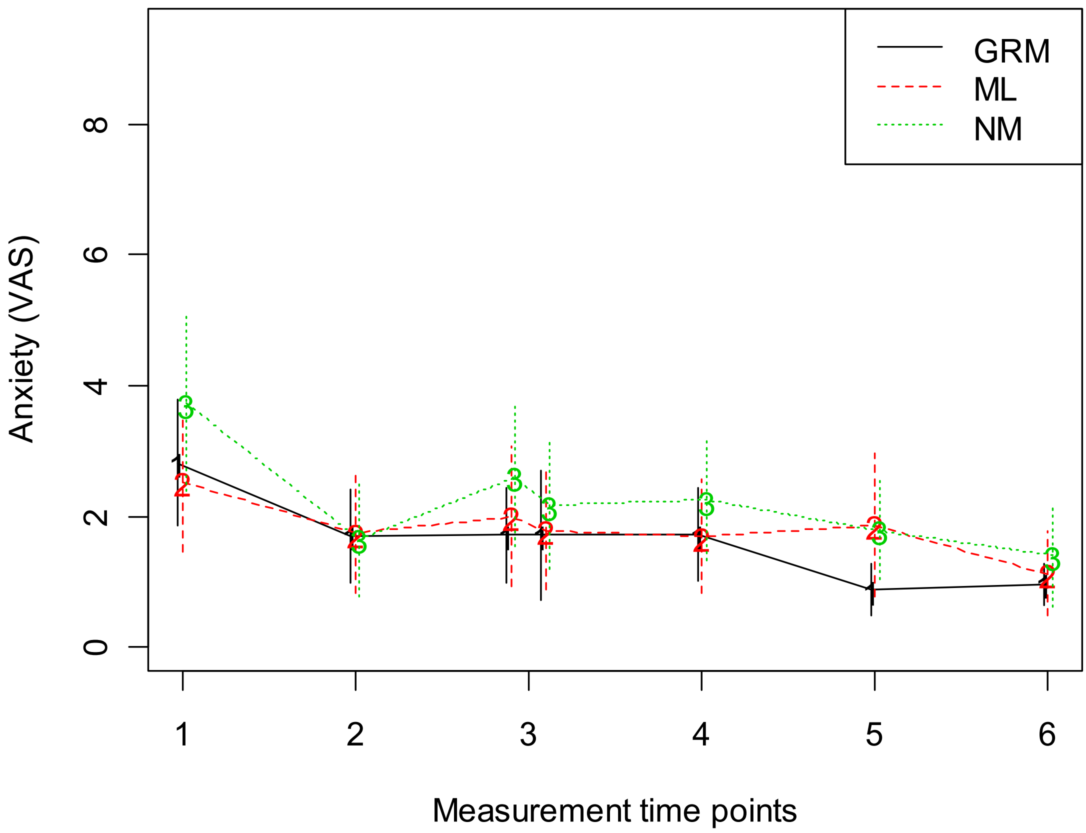


Figure 4.3. Changes in anxiety (VAS) over seven measurement time points in three groups

Preoperative measures of anxiety (VAS) show a participant reported decrease in anxiety in all groups when comparing baseline (time point 1) to after the preoperative session (time point 2). Pre and post measures (time points 3a and 3b) of a postoperative session (session 2/ session 3) showed no difference in the GRM group as the pre operative decrease was sustained until measure at time point 4 (the day of no session). At discharge when participants had had their last session, further decreases in anxiety were reported in the GRM group and the NM group when compared with baseline and time point 4 whereas the ML group reported a small increase. At discharge the lowest level of anxiety was reported in the GRM group. At follow-up the groups reported similar levels of anxiety. The ML group reported a pattern of decrease and increase in anxiety throughout the course of time point measurements, reporting a small decrease in anxiety similar to the mean level reported in the GRM group at time points 3b and 4, and a slightly lower mean level than reported by the NM group when compared at time points 3a, 3b, 4 and 6. The ML group was the only group reporting an increase in anxiety in their VAS scores from before to after a session (time points 4 to 5). In the NM group a similar pattern of fluctuation was reported, and anxiety was reduced after the preoperative session, yet had increased when measured before the post operative session. The NM group reported a smaller overall reduction in their postoperative anxiety than did the participants in both the intervention groups, GRM and ML when compared from after the post operative session (time point 3b) to discharge and follow-up (time points 5 and 6).

4.4.2 Results of analyses undertaken with a linear mixed-effects model on anxiety data from the VAS

The following analyses (comparisons 1 to 4) of changes in anxiety were performed in order to test hypothesis 1a that the GRM group would report greater reduction in anxiety when compared with the ML and the NM groups. The results of the analyses of changes in anxiety are presented in the order of the measures scored by the participants on the VAS, followed by the results of UMACL-TA.

4.4.2.1 Anxiety (VAS) Comparison 1

The objective of comparison 1 was to compare the changes in anxiety (VAS) from immediately before to immediately after the post operative session (time points 3a to 3b) when data were collected. The results of this comparison are reported in table 4.5.

Table 4.5

Comparison 1: Effects of time of measurement, group and their interaction in anxiety (VAS) from immediately before to immediately after a session (time points 3a to 3b)

Source	*df*	F^1
Time: Pre and post $2^{nd}/3^{rd}$ session	1	0.25
Group	2	0.44
Interaction between time and group	2	0.15

Note. $^1p > 0.6$. At time points 3a/ 3b: N= 45/44. GRM (n=14/13), ML (n=17), NM (n=14).

Table 4.5 shows no significant differences when comparing measures taken before and after the respective session between groups. No significant effect was found in the interaction between time and group.

4.4.2.2 Anxiety (VAS) Comparison 2

Comparison 2 was performed in order to compare the changes from before to after a session (time points 4 to 5) in anxiety (VAS). The session in question here was the third postoperative session, the final of four sessions in total. The effects of time of measurement, group and the interaction between these factors in anxiety as measured by VAS is reported in table 4.6.

Table 4.6

Comparison 2: Effects of time of measurement, group and their interaction in anxiety (VAS) from before to after session 4 (time points 4 to 5)

Source	*df*	*F*
Time: Day of no session to discharge	1	0.70
Group	2	0.39
Interaction between time and group	2	0.91

Note. At time points 4/5: *N*= 38/32. GRM (*n*=10/7), ML (*n*=15/11), NM (*n*=13/14).

Table 4.6 shows that very small and non significant differences were found in anxiety (VAS) when comparing measures made before to after the fourth session between groups. The interaction between time and group showed no significant effect.

4.4.2.3 Anxiety (VAS) Comparison 3

The objective of comparison 3 was to compare changes over time from admission to discharge (time points 1 to 5) in anxiety (VAS). This comparison was concerned with the changes in anxiety over time during the full duration of the participant's hospitalisation. Table 4.7 shows the results of comparison 3 in regard to the effects of the time of measurement from baseline to discharge, of group condition, and the interaction between the measurement time point and group.

Table 4.7

Comparison 3: Effects of time of measurement, group and their Interaction in anxiety (VAS) from baseline to discharge (time points 1 to 5)

Source	*df*	*F*
Time: Baseline to discharge	1	8.43**
Group	2	1.19
Interaction between time and group	2	0.35

Note. ***p*< .01. At time points 1/5: *N*= 68/32. GRM (*n*= 25/7), ML (*n*= 23/11), NM (*n*= 20/14).

Table 4.7 shows that a large and significant difference ($p < .01$) in anxiety (VAS) was identified in effects over time when comparing measures made on day of admission to day of discharge (time points 1 to 5). No significant differences were identified between groups, and the interaction between time and group showed no significant effect.

4.4.2.4 Anxiety (VAS) Comparison 4

Comparison 4 was performed in order to compare changes over time from after the operation to discharge (time points 3a to 5) in anxiety (VAS). The results of this comparison are reported in table 4.8.

Table 4.8

Comparison 4: Effects of time of measurement, group and their Interaction in anxiety (VAS) post operation to discharge (time points 3a to 5)

Source	*df*	F
Time: post operation to discharge	1	2.32
Group	2	0.66
Interaction between time and group	2	2.78[1]

Note. [1]*p* = .08. At time points 3a/5: *N*= 45/32. GRM (*n*= 14/7), ML (*n*= 17/11), NM (*n*= 14).

Table 4.8 shows that no significant differences between groups were found in anxiety (VAS) when comparing participants' self-reported measures made from after their operation to discharge. This was illustrated graphically in figures 4.3 and 4.4 as the GRM group showed a larger decrease and the ML group reported a larger increase in this measure in the postoperative period measured from after operation (time point 3a) to discharge (time point 5) when compared to the NM group.

4.4.3 UMACL-TA (descriptive analyses)

In the following section the results of the descriptive analyses of the changes in anxiety measured by the UMACL-TA are presented. Measures from the Tense-Arousal (TA) sub scale (used as a measure of anxiety) were made at nine measurement time points: 1, 2a and b, 3a, b, c, 4, 5, and 6. Table 4.9 shows the means (M) and standard deviations (SD in parentheses) for the changes in tense arousal measured by the participants' self-reported experience of tension / anxiety on UMACL-TA for the total sample and for three groups respectively. The UMACL-TA may be scored[58] within the range 8 - 32. The left column 'Measurement time points' shows the nine measurement time points for the UMACL-TA. The column 'Total sample' (*N*) displays the number of participants who have completed this measure at these nine different times, pre and post operatively, and the means and standard deviations for the sample in total. The three following columns display the means and standard deviations for each of the three research groups separately including the number of participants (*n*) who completed this measure at these nine different measurement time points. These data are represented visually in figure 4.4 where the development over time is illustrated graphically.

[58] Scoring procedure of the UMACL-TA in section 3.7.1.1 in chapter 3 of this thesis.

TABLE 4.9

Means and standard deviations for changes in tense arousal (UMACL-TA) in total sample and three groups

Measurement time point	Total sample		GRM		ML		NM	
Pre operative	*N*	M (SD)	*n*	M (SD)				
1 Baseline	*65*	14.31 (5.02)	*24*	14.00 (3.99)	*22*	14.50 (5.65)	*19*	14.47 (5.62)
2a Post 1st session	*62*	11.13 (3.71)	*22*	10.64 (2.59)	*22*	10.91 (3.91)	*18*	12.00 (4.58)
2b Post 1st session	*62*	10.66 (3.68)	*22*	10.1 (3.08)	*22*	10.50 (3.33)	*18*	11.44 (4.72)
Post operative								
3a Pre 2nd/3rd session	*44*	13.27 (4.22)	*13*	12.62 (3.50)	*17*	13.76 (5.08)	*14*	13.29 (3.89)
3b Post 2nd/3rd session	*44*	11.36 (4.46)	*13*	8.92 (1.19)	*17*	12.06 (4.52)	*14*	12.79 (5.54)
3c Post 2nd/3rd session	*43*	11.23 (4.33)	*13*	8.85 (1.46)	*17*	12.00 (3.82)	*13*	12.62 (5.91)
4 Day between 3rd and 4th session	*35*	12.91 (3.83)	*10*	13.70 (4.06)	*14*	12.43 (4.07)	*11*	12.82 (3.54)
5 Post treatment/ at discharge	*29*	13.14 (5.13)	*6*	11.50 (3.51)	*10*	13.90 (5.61)	*13*	13.31 (5.56)
6 Follow-up 4-5 weeks after discharge	*33*	18.94 (3.67)	*8*	18.38 (4.57)	*12*	18.42 (3.87)	*13*	19.77 (2.98)

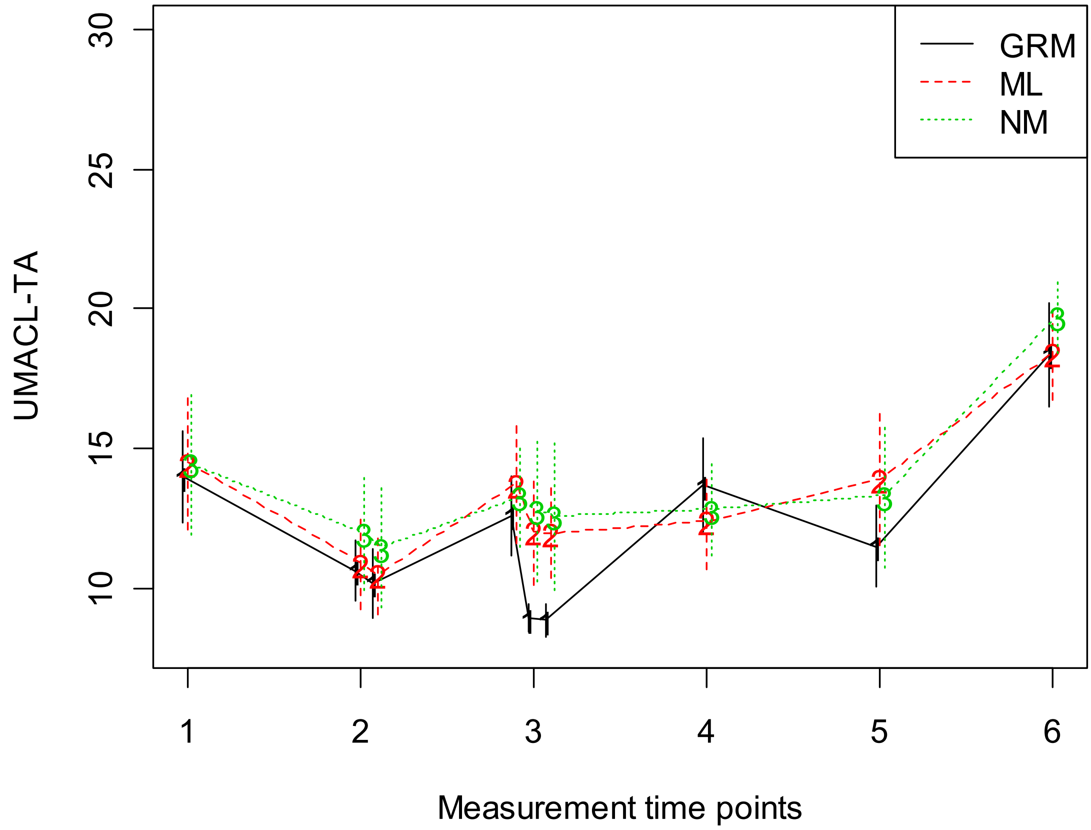


Figure 4.4. Changes in Tense arousal (UMACL-TA) over nine time points of measurement

Preoperative measures of tense arousal (TA) anxiety (as measured by UMACL-TA) show a participant reported decrease in all groups when comparing baseline (time point 1) to after the preoperative session (time point 2). Pre and post measures of a postoperative session (from time points 3a to 3b/3c) when measures were made, show a greater decrease in the GRM group when compared to the ML and NM groups. At the same time point the lowest level of TA within and between groups was reported in the GRM group. Measurements made close together after the postoperative session regarding the participants' experience of TA during and after the session (time points 3b and 3c) show very, very small differences in all three groups. This suggests that the participants did not differentiate their experience (when comparing their responses regarding their experience during and right after the session), as both measures were reported within a few minutes immediately after the session. A greater fluctuation in postoperative measures were found in the GRM group than in the other two groups when comparing from before a postoperative session (time point 3a) to the following two time points of measurement (time points 4 and 5). On the day of no session (time point 4) the GRM group reported a greater increase in TA than the two other groups. The fluctuation in the GRM group continued to discharge (time point 5) at which the GRM group reported a decrease in measures of participants' experience of TA. At discharge (time point 5) when participants had had their last session, the ML and NM groups both reported a slight increase in TA when compared to the day of no session (time point 4), and a very small overall decrease when compared from admission (time point 1) to discharge (time point 5). All three groups reported an increase in TA from discharge to follow-up (time point 6) where the GRM group reported TA at a level similar to the value reported by the ML group.

4.4.4 Results of analyses undertaken with a linear mixed-effects model on anxiety data from the UMACL-TA

The results of the statistical analyses by linear mixed-effects models of changes in anxiety as measured by UMACL-TA (comparisons 1 - 4) are presented in the following sections. The left column in tables displays the aspect having an effect on the measure in question. The right column displays the *p* indicating whether the effects were significant.

4.4.4.1 UMACL-TA Comparison 1

The objective of comparison 1 was to compare the changes from immediately before to immediately after a session (time points 3a to 3b + 3c) in tense arousal (TA) measured by UMACL-TA. Table 4.10 displays the effects in TA of time, group and their interaction.

Table 4.10

Comparison 1: Effects of time of measurement, group and their interaction in tense arousal (UMACL-TA) from immediately before to immediately after a session (time points 3a to 3b + 3c)

Source	*df*	*F*
Time: before to after a session	2	9.05 **
Group	2	2.14
Interaction between time and group	4	1.66

Note. ** $p < .01$. At time points 3a/3b+3c: N= 44/43. GRM (n= 13), ML (n= 17), NM (n= 14/13).

Table 4.10 shows significant difference when comparing measures made before and after the respective session ($p < .01$) similar to changes displayed in figure 4.4. No significant differences were identified between groups, and the interaction between time and group also showed no significant effect.

4.4.4.2 UMACL-TA Comparison 2

Comparison 2 was performed to compare the changes from before to after a session (time points 4 to 5) in tense arousal (TA) measured by the UMACL-TA. The results of this comparison are reported in table 4.11.

Table 4.11

Comparison 2: Effects of time of measurement, group and their interaction in tense arousal (UMACL-TA) from before to after a session (time points 4 to 5)

Source	*df*	*F*
Time: before to after a session	1	0.06
Group	2	0.05
Interaction between time and group	2	0.64

Note. At time points 4/5: *N*= 35/29. GRM (*n*= 10/6), ML (*n*= 14/10), NM (*n*= 11/13).

Table 4.11 shows that no significant differences were identified between groups when comparing changes from before to after the fourth session. The interaction between time and group also showed no significant effect.

4.4.4.3 UMACL-TA Comparison 3

The objective of comparison 3 was to compare changes over time from admission to discharge (time points 1 to 5) in tense arousal, TA (UMACL-TA). The effects of time of measurement, group and the interaction between the two factors are reported in table 4.12.

Table 4.12

Comparison 3: Effects of time of measurement, group and their interaction in tense arousal (UMACL-TA) from baseline to discharge (time points 1 to 5)

UMACL-TA	*df*	*F*
Time: Baseline to discharge	1	0.71
Group	2	0.10
Interaction between time and group	2	0.35

Note. At time points 1/5: *N*= 65/29. GRM (*n*= 24/6), ML (*n*= 22/10), NM (*n*= 19/13).

No significant differences were identified over time, between groups or in the interaction of time and research condition (group) when comparing from the time of baseline to discharge as reported in table 4.12.

4.4.4.4 UMACL-TA Comparison 4

Comparison 4 was done in order to compare changes over time from after the operation to discharge (time points 3a to 5) in tense arousal, TA (UMACL-TA). The results of this comparison are reported in table 4.13.

Table 4.13

Comparison 4: Effects of time of measurement, group and their interaction in tense arousal (UMACL-TA) from post operation to discharge (time points 3a to 5)

Tense arousal	*df*	*F*
Time: post operation to discharge	1	0.85
Group	2	0.27
Interaction between time and group	2	0.28

Note. At time points 3a/5: *N*= 44/29. GRM (*n*= 13/6), ML (*n*= 10/11), NM (*n*= 14/13).

This comparison found no significant differences in the effects of treatment when comparing changes in the postoperative phase from after the operation to discharge as reported in table 4.13. No significant differences were identified between groups, and the interaction between time and group showed no significant effect similar to the very small differences which may be seen in the graphical illustration in figure 4.4.

4.4.5 Summary of results relating to Anxiety

The results regarding the effects of treatment on anxiety showed significant differences ($p < .01$) in anxiety (VAS) over time when comparing from baseline to discharge (time points 1 to time point 5). Between groups differences were non significant. The GRM and the NM groups both reported an overall decrease in this measure greater than was found in the ML group. A significant difference was identified in UMACL-TA when comparing from immediately before to immediately after a post operative session (time points 3a to 3b + 3c) within the GRM group. The result of the analyses of postoperative changes when comparing from after the operation to discharge (time points 3a to 5) showed a non-significant difference in effects on anxiety (VAS) in the interaction of group and time. Larger changes were reported in the GRM and NM groups than in the ML group. Even though there was an observable difference between the groups in anxiety VAS scores at discharge and in UMACL-TA immediately before and after a session, the comparison between groups found no significant differences. Thereby hypothesis 1a was not confirmed.

4.5 Results relating to Pain

In the following sections descriptive statistical analyses regarding pain (VAS) are presented first, and are followed by the presentation of the results of the inferential statistical analyses. The analyses of pain (VAS and analgesics as an aspect of pain), were done regarding several measurement time points (similar to those done in anxiety presented in the previous section 4.4) in order to measure the effects on pain (VAS) of a post operative session (comparison 1); of the effects from before to after a session (comparison 2). Further, analyses were done in order to measure the overall effect of the intervention on pain from baseline to discharge (comparison 3), and the effects of the treatment on pain from after the operation to discharge (VAS) (comparison 4).

As a measure related to pain, information on the amount of analgesics taken by the participants were recorded from the EPJ at measurement time points 1- 5, and self-reported by the participants in the follow-up questionnaire (time point 6). The analyses of analgesic dosage were undertaken in relation to three different measurement time points in order to compare the changes in analgesics on days of a session (time point 3) to a day between sessions (time point 4) and from after the operation to discharge (time points 3 to 5), comparison 5. The results of the descriptive analyses of measures of analgesics are presented before the results of the linear mixed-effects models analyses.

4.5.1 VAS (descriptive analyses)

Pain (VAS) was measured at measurement time points 1, 2a and b, 3a, b, c, 4, 5, and 6. Table 4.14 shows the means and standard deviations for the changes in pain measured by participants' self reported experience of pain on a VAS for the three groups. The left column 'Measurement time points' shows the seven time points of measurement for the pain VAS. The column 'Total sample' displays the number of participants, who completed this measure at these seven different times, pre and postoperatively, and the means and standard deviations for the sample in total. The three following columns display the means and standard deviations for each of the three research conditions separately including the number of participants who completed this measure at these seven different time points of measurement. These data are then presented visually in figure 4.5 where the development over time is graphically illustrated.

TABLE 4.14

Means and standard deviations for changes in pain (VAS) in sample and three groups

Measurement time point	Total sample	GRM	ML	NM
Pre operative	*N* M (SD)	n M (SD)		
1 Baseline	*68* 0.76 (1.50)	*25* 0.79 (1.69)	*23* 0.54 (1.00)	*20* 0.99 (1.73)
2 Post session	*63* 0.61 (1.12)	*22* 0.61 (1.24)	*22* 0.68 (1.24)	*19* 0.51 (0.86)
Post operative				
3a Pre 2nd/3rd session	*45* 3.12 (2.71)	*14* 3.44 (3.43)	*17* 2.78 (2.39)	*14* 3.21 (2.40)
3b Post 2nd/3rd session	*44* 2.61 (2.43)	*13* 2.35 (2.43)	*17* 2.62 (2.72)	*14* 2.84 (2.20)
4 day between 3rd and 4th session	*38* 1.96 (2.44)	*10* 2.49 (3.22)	*15* 1.95 (2.47)	*13* 1.56 (1.73)
5 Post treatment/ at discharge	*32* 2.06 (2.16)	*7* 1.20 (1.26)	*11* 2.31 (2.36)	*14* 2.29 (2.37)
6 Follow-up 4-5 weeks post discharge	*39* 1.39 (1.41)	*10* 1.20 (1.32)	*15* 1.68 (1.74)	*14* 1.21 (1.07)

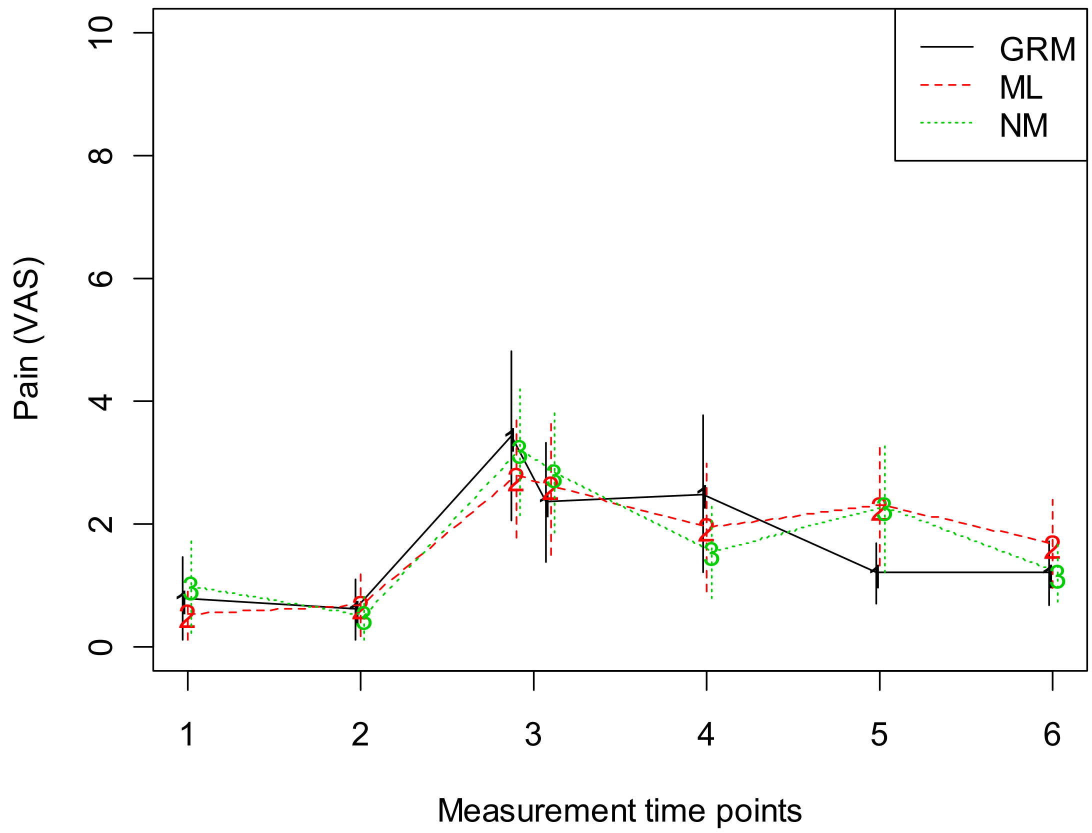


Figure 4.5. Changes in pain (VAS) over time measured at seven time points in three groups

Preoperative measures of pain (VAS) show a low and similar level in participant reported experience of pain in all three groups before the surgery. While patients with heart disease report discomfort and breathing irregularities, pre operatively they do not typically complain about pain from their condition (Petterson et al., 1999). Changes in the preoperative measures show a slight decrease in the GRM and the NM groups, and a small increase in the ML group (time points 1 to 2) in their reported pain. Overall decrease in the reported measures of pain was found when comparing from after the operation (time point 3a) to discharge (time point 5) and follow-up (time point 6) in all groups. Postoperatively the largest decrease in measures of pain was reported in the GRM group when comparing the measures made immediately before a session (time point 3a) to the measures made at discharge. Postoperatively, immediately before a session (time point 3a), the GRM group reported the highest score in pain (VAS) and a greater reduction after the session (time point 3b) when compared to both the ML and NM groups. On the day between sessions three and four (time point 4) the GRM group reported a small increase in pain whereas the ML and NM groups reported a continued decrease when compared with post operative measures (time point 3b). At discharge, having had their fourth session (time point 5), the GRM group reported a greater reduction in pain from the day before to after a session (time points 4 to 5) than did the ML and the NM groups, who reported an increase close to identical levels of pain at discharge. At follow-up (time point 6) the GRM and the NM groups reported the lowest level of pain compared to the ML group. When comparing the VAS measures of pain made at baseline (time point 1) to those made at discharge (time point 5) the GRM group reported a lower increase in pain than did the ML and the NM groups.

4.5.2 Results of analyses undertaken with a linear mixed-effects model on pain (VAS)

The following analyses (comparisons 1 to 4) of changes in pain (VAS) were performed in order to test hypothesis 1b that the GRM group would report greater reduction in pain when compared with the ML and the NM groups. The results of the analyses of changes in pain are presented in the order of measures made by participants' self report by VAS. This is followed by the results of analyses of analgesics.

4.5.2.1 Pain (VAS) Comparison 1

The objective of comparison 1 was to compare the changes in pain (VAS) from immediately before to immediately after the postoperative session (time points 3a to 3b) when data was collected. The results of this comparison are reported in table 4.15.

Table 4.15

Comparison 1: Effects of time of measurement, group and their Interaction in pain (VAS) from immediately before to immediately after a session (time points 3a to 3b)

Source	*df*	*F*
Time: Pre and post $2^{nd}/3^{rd}$ session	1	1.94
Group	2	0.10
Interaction between time and group	2	0.37

Note. At time points 3a/3b: *N*= 45/44. GRM (*n*= 14/13), ML (*n*= 17), NM (*n*= 14).

No significant differences were found when comparing measures before and after the respective session (from time point 3a to time point 3b) between groups. No significant effect was found in the interaction between time and group. This was similar to the small differences in pain (VAS) illustrated visually in figure 4.5.

4.5.2.2 Pain (VAS) Comparison 2

Comparison 2 was performed in order to compare the changes from a day before to a day after a session (time points 4 to 5) in pain (VAS). The session in question here was the third postoperative session, the final of four sessions in total. The effects of time of measurement, group and the interaction between these factors in pain as measured by VAS are reported in table 4.16.

Table 4.16

Comparison 2: Effects of time of measurement, group and their Interaction in pain (VAS) before and after the fourth session (time points 4 to 5)

Source	*df*	*F*
Time: before to after a session	1	3.04^{+}
Group	2	0.20
Interaction between time and group	2	1.09

Note. $^{+}p < .09$. At time points 4/5: N= 38/32. GRM (n= 10/7), ML (n= 15/11), NM (n= 13/14).

Table 4.16 shows non significant differences found in VAS scores ($p < .09$) when comparing measures made before to after the fourth session between groups. The effects of the interaction between time and group also showed no significant effect.

4.5.2.3 Pain (VAS) Comparison 3

The objective of comparison 3 was to compare changes over time from admission to discharge (time points 1 to 5) in VAS pain scores. This comparison was concerned with the changes in pain over time during the participant's hospital stay from beginning to end. Table 4.17 shows the results of comparison 3 in regard to the effects over time from baseline to discharge by group, and the interaction between the measurement time point and group.

Table 4.17

Comparison 3: Effects of time of measurement, group and their Interaction in pain (VAS) from admission to discharge (time points 1 to 5)

Source	*df*	*F*
Time: admission to discharge	1	11.17**
Group	2	0.28
Interaction between time and group	2	0.46

Note. ***p*< .01. At time points 1/5: *N*= 68/32. GRM (*n*= 25/7), ML (*n*= 23/11), NM (*n*= 20/14).

Table 4.17 shows a significant difference in effects over time in VAS pain scores ($p < .01$) when comparing measures made on day of admission to day of discharge (time points 1 to 5). No significant differences were identified in the effects between groups, and the interaction between time and group showed no significant effect.

4.5.2.4 Pain (VAS) Comparison 4

Comparison 4 was performed in order to compare changes over time from after operation to discharge (time points 3a to 5) in pain (VAS). The results of this comparison are reported in table 4.18.

Table 4.18

Comparison 4: Effects of time of measurement, group and their Interaction in pain (VAS) from post operation to discharge (time points 3a to 5)

Source	*df*	*F*
Time: post operation to discharge	1	1.31
Group	2	0.05
Interaction between time and group	2	0.95

Note. ***p*< .01. At time points 3a/5: *N*= 45/32. GRM (*n*= 14/7), ML (*n*= 17/11), NM (*n*= 14).

Table 4.18 shows that no significant differences were found between groups in VAS pain scores when comparing participants' self-reported measures made from after operation to discharge.

4.5.3 Summary of results relating to Pain (VAS scores)

No significant differences were found in pain VAS scores when comparing measures before and after the respective session (from time point 3a to time point 3b) between groups, and when comparing measures made before to after the fourth session (from time point 4 to 5) between groups. The GRM group reported an overall decrease in VAS pain scores in the postoperative period when measured from after their operation (time point 3a) to discharge (time point 5), though differences between groups were non significant. The effects of the interaction between time and group also showed no significant effect. Significant differences ($p < .01$) in effects over time were found when comparing measures made on day of admission to day of discharge (time points 1 to 5) which meant that the participants in the ML and NM groups experienced a significant increase in pain after their surgery. The GRM group reported a lower mean level in pain VAS at the time of discharge (time point 5). However, differences between groups were non significant, and hypothesis 1 b was not confirmed.

4.5.4 Analgesics (descriptive statistics)

Information on the amount of analgesics taken by the participants was obtained from the EPJ at measurement time points 1- 5, and was self-reported by the participants in the follow-up questionnaire (time point 6). The analgesics intake was recorded in the following groups: a) strong opioids (morphine, 'ketogan[59]'); b) mild opioids ('tradolan', 'dolol', 'mandolgin'); and c) paracetamol ('panodil'). The information on analgesics was recorded as an additional measure of pain in order to analyse descriptively the distribution of means and standard deviations of analgesics in the three groups. The means (M) and standard deviations (SD) for the changes in analgesics taken from the EPJ (time points 1 to 5) and the participants' self-report (time point 6) are reported in tables 4.19 to 4.21. The left column display the six measurement time points for analgesics. The column 'Total sample' displays the number of participants (*N*) included in the analyses at these six different times, pre and post operatively, and the means and standard deviations for the sample in total. The columns of figures in each of the tables (4.19 to 4.21) display the means and standard deviations for the three groups respectively including the number

[59] The medication types in inverted commas (ketogan, tradolan, dolol, mandolgin, and panodil) are the Danish brand names.

of participants (n) included in the analyses. The analyses of the three categories of analgesics are presented consistently in this way. The inferential statistical analyses of analgesics were undertaken on all three groups in relation to two different measurement time points comparing the amount of analgesics taken by the participants at time point 4 with time point 5, (comparisons 5a, b, and c). The results of the descriptive analyses of measures of analgesics are presented before the results of the linear mixed-effects models analyses.

Beyond the standard pain management with these analgesics, a few additional types of mild opioids (Doloxene), Acetyl Salicylic Acid (ASA), and Non Steroid Anti Inflammatory (NSAID) medications were taken by five participants. The ASA and NSAID are reported separately in table 4.22 and were not included in any further analyses.

4.5.4.1 Strong opioids (descriptive)

Table 4.19 shows the means and standard deviation for the changes in strong opioids as informed from the EPJ for six different time points of measurement. The left plot in figure 4.6 is a graphical representation of these data.

TABLE 4.19

Means and standard deviations for changes in analgesics: Strong opioids (mg) in sample and three groups

Measurement time point	Total sample	GRM	ML	NM
Pre operative	*N* M (SD)		*n* M (SD)	
1 Baseline	*68* 0.29 (2.43)	*25* 0.00 (0.00)	*23* 0.00 (0.00)	*20* 1.00 (4.47)
2 Post session	*63* 0.00 (0.00)	*22* 0.00 (0.00)	*22* 0.00 (0.00)	*19* 0.00 (0.00)
Post operative				
3 Day of 2nd / 3rd session	*49* 14.08 (20.76)	*15* 16.67 (26.37)	*20* 9.00 (15.78)	*14* 18.57 (20.23)
4 day between 3rd and 4th session	*39* 18.97 (21.98)	*10* 25.00 (25.26)	*16* 17.50 (23.24)	*13* 16.15 (18.50)
5 Post treatment/ at discharge	*59* 6.69 (10.32)	*21* 7.38 (10.91)	*21* 7.14 (11.35)	*17* 5.29 (8.56)
6 Follow-up 4-5 weeks post discharge	*23* 0.00 (0.00)	*6* 0.00 (0.00)	*8* 0.00 (0.00)	*9* 0.00 (0.00)

Preoperative measures of strong opioids (reported from EPJ) show a very low intake of strong opioids. Post operative measures show an increase in all three groups when comparing from the preoperative session (time point 2) to post operative measures made at time point 3. The GRM group reported the largest increase in strong opioids intake post operatively when comparing from post operation (time point 3) to a day between session three and four (time point 4), and a larger reduction in strong opioids intake from the day of no session to discharge (time points 4 to 5) than reported by the ML and NM groups. There is no clear explanation why the GRM group should have had their pain managed primarily with strong opioids rather than mild opioids (at time point 3). This group registered a smaller mild opioids intake than did the other two groups. The GRM group could have been more sensitive to not having a session (time point 4) than the ML and the NM groups. At discharge the strong opioids dosages were reported at similar levels in all three groups. Some conjecture for these results will be addressed in the discussion chapter.

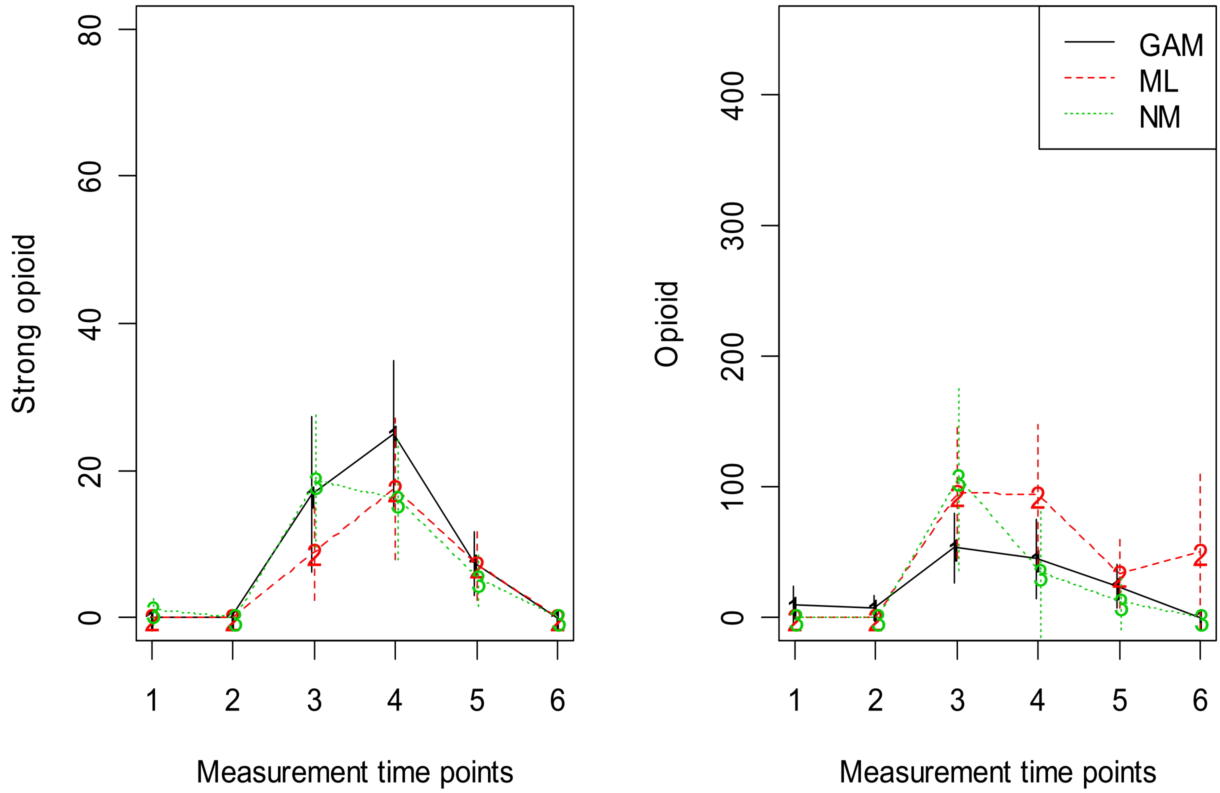


Figure 4.6. Changes in strong opioids dosages (left) and mild opioids (right) over six time points of measurement in three groups
Note: The figure legend in the plot to the right applies to both plots. GAM (*Danish*) = GRM (Eng.), group A

4.5.4.2 Mild opioids (descriptive)

Table 4.20 shows the means and standard deviation for the changes in mild opioids as informed from the EPJ for six different time points of measurement. The right plot in figure 4.6 is a graphical representation of these data.

Table 4.20

Means and standard deviations for changes in analgesics: Mild opioids (mg) in sample and three groups

Measurement time point	Total sample	GRM	ML	NM
Pre operative	N M (SD)		*n* M (SD)	
1 Baseline	*68* 3.68 (21.71)	*25* 10.00 (35.36)	*23* 0.00 (0.00)	*20* 0.00 (0.00)
2 Post session	*63* 2.38 (13.99)	*22* 6.82 (23.38)	*22* 0.00 (0.00)	*19* 0.00 (0.00)
Post operative				
3 Day of 2nd / 3rd session	*49* 85.71 (120.33)	*15* 53.33 (66.73)	*20* 95.00 (120.20)	*14* 107.14 (160.36)
4 day between 3rd and 4th	*39* 61.54 (112.66)	*10* 45.00 (76.19)	*16* 93.75 (130.22)	*13* 34.62 (110.65)
5 Post treatment/ at discharge	*59* 23.73 (51.16)	*21* 23.81 (40.68)	*21* 33.33 (61.91)	*17* 11.76 (48.51)
6 Follow-up 4-5 weeks post discharge	*23* 17.39 (83.41)	*6* 0.00 (0.00)	*8* 50.00 (141.22)	*9* 0.00 (0.00)

Preoperative measures of mild opioids (reported from EPJ) show no intake of mild opioids in the ML and NM groups, and a low, varied level of this medication in the GRM. In postoperative measures the lowest level of mild opioid intake was reported in the GRM group when comparing at time point 3 between groups. The GRM group also reported the smallest increase in mild opioids intake when comparing between and within groups from before to after operation (time points 2 to 3), with a gradual reduction in the use of mild opioids from after the operation to discharge and follow-up respectively (time points to 3 to 5, and 3 to 6). The GRM group reported a lower level of mild opioids intake after the operation (time point 3), on the day of no session (time point 4), and at discharge than did the ML and the NM groups. At follow-up the GRM and the NM groups both reported no use of mild opioids. The reason for the lower intake of mild opioids registered in the GRM group is most likely related to their greater usage of strong opioids as reported in section 4.5.3.1.

4.5.4.3 Paracetamol (descriptive)

Table 4.21 shows the means and standard deviation for the changes in paracetamol as informed from the EPJ for six different time points of measurement. The plot in figure 4.7 is a graphical representation of these data.

Table 4.21

Means and standard deviations for changes in analgesics: Paracetamol (gram) in sample and three groups

Measurement time point	Total sample	GRM	ML	NM
Pre operative	*N* M (SD)		n M (SD)	
1 Baseline	*68* 0.15 (0.58)	*25* 0.12 (0.44)	*23* 0.30 (0.88)	*20* 0.00 (0.00)
2 Post session	*63* 0.13 (0.49)	*22* 0.18 (0.50)	*22* 0.18 (0.66)	*19* 0.00 (0.00)
Post operative				
3 Day of 2nd / 3rd session	*49* 3.08 (1.04)	*15* 3.00 (0.93)	*20* 2.90 (1.02)	*14* 3.43 (1.16)
4 day between 3rd and 4th session	*39* 3.46 (1.00)	*10* 3.50 (0.71)	*16* 3.38 (1.09)	*13* 3.54 (1.13)
5 Post treatment/ at discharge	*59* 1.27 (0.93)	*21* 1.24 (0.94)	*21* 1.33 (0.97)	*17* 1.24 (0.90)
6 Follow-up 4-5 weeks post discharge	*23* 0.89 (1.38)	*6* 0.00 (0.00)	*8* 1.19 (1.51)	*9* 1.22 (1.56)

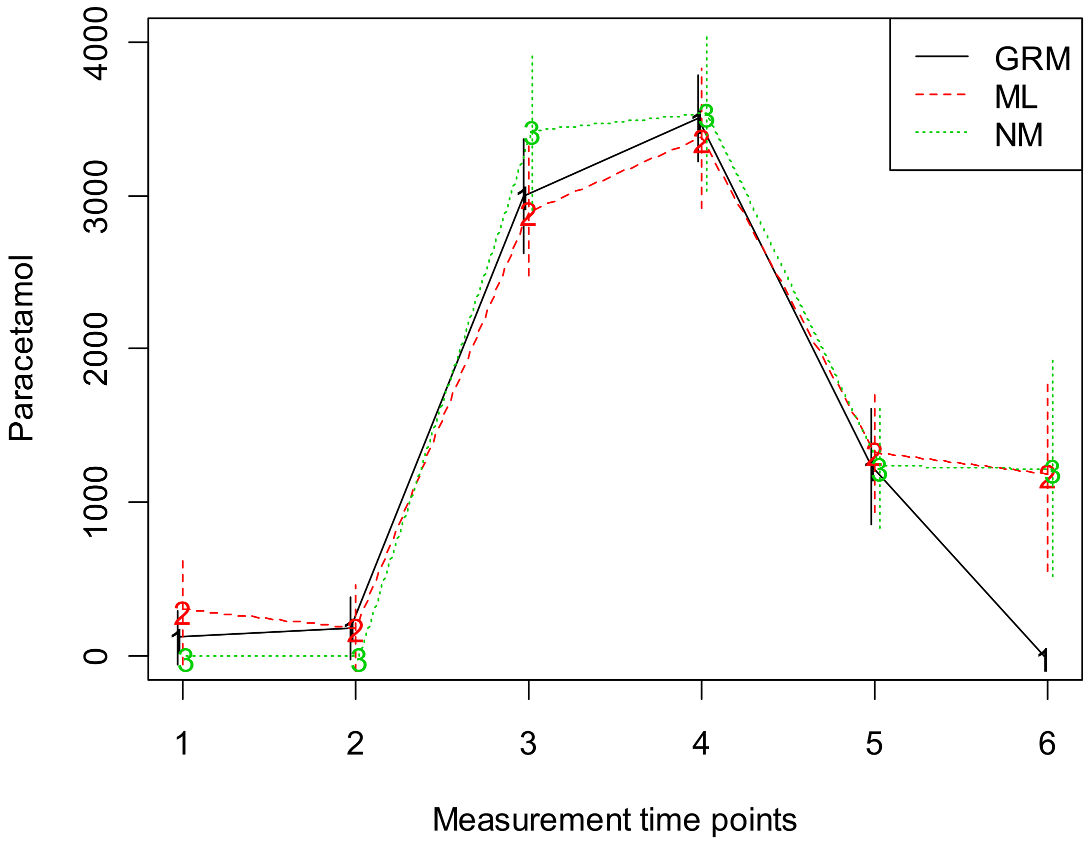


Figure 4.7. Changes in paracetamol dosages (EPJ) over time points 1 to 5, and participants' self-report at time point 6

Preoperative measures of analgesics in the form of paracetamol show a very low level in participants' intake, and postoperative measures show an increase in the amount taken post operatively at measurement time points 3 and 4 in all three groups, with the peak at time point 4. A large reduction was reported in all three groups when comparing from the day of no session (time point 4) to discharge (time point 5). A further reduction to a mean level of zero paracetamol intake was reported in the GRM group only when comparing from discharge to follow-up (time point 5 to 6), whereas the ML and NM groups for this time self-reported the amount of paracetamol that they took at follow-up similar to the level that was recorded from EPJ at discharge.

4.5.4.4 Other analgesics (descriptive)

Table 4.22 displays the reported results for ASA and NSAID (from EPJ) for six different time points of measurement in the GRM and ML groups. None of the participants in the NM group received analgesics beyond the standard treatment as already recorded in the previous analyses.

The right columns in this table depict three categories of analgesics that were not typically prescribed: 1) ASA and codein (product names listed: Kodipar and Cody magnyl), 2) NSAID: Voltaren and Arthrotec; and 3) Mild opioid: Doloxena. The dosage units are indicated for each type of medication. The numbers in the table refer to the number of participants in the GRM and the ML groups who received the different types of medication respectively.

Table 4.22

Other analgesics: Acetyl salicylic acid (ASA) and Non steroid anti inflammatory medication (NSAID) in GRM[1] and *ML*

Type of medication and dosage	ASA and codein		NSAID		Mild opioid
	Kodipar	Cody magnyl	Voltaren	Arthrotec, forte	Doloxena
Measurement time point	1 g	1 g	75 mg	75 mg	2 x 100 mg
Pre operative					
1 Baseline	*1*		1		*1*
2 Post 1st session	*1*		1		*1*
Post operative					
3 Day of post op 2nd/3rd session		*3g x 1*			
4 Day between 3rd and 4th session		*1*		2 dosages x 1	
5 Discharge		*1*		1x1	
6 Follow-up 4 -5 weeks after discharge					

Note. [1] Group A, GRM, in normal typography. *Group B, ML, in italics.*
Empty cells indicate that no participants received any of the above mentioned types of analgesics.

As shown in table 4.22 two participants in the GRM and three in the ML groups received these other types of medication. The reasons for this deviation from the standard prescriptions were not recorded, and while the data on other analgesics are reported here for inclusivity, no conclusion in relation to this study can be drawn.

4.5.5 Results of analyses undertaken with a linear mixed-effects model on analgesics: a) strong opioids, b) mild opioids, and c) paracetamol

The following analyses (comparisons 5a, 5b, and 5c) of changes in analgesics were performed in order to further test whether the GRM group would report less intake of analgesics (postoperatively) than reported in the ML and the NM groups. This comparison was undertaken as sub analyses in relation to the participants self-reported measures of pain regarding hypotheses 1b. The objective of comparisons 5a, b, and c was to compare differences in the use of analgesics: a) strong opioids, b) opioids (mild), and c) paracetamol on day between sessions 3 and 4 (time point 4) and at discharge (time point 5) when participants had had the treatment to which they had been allocated. The results of these comparisons are reported in tables 4.23 - 25.

4.5.5.1 Analgesics: Strong opioids Comparison 5a

Table 4.23

Comparison 5a: Effects of time of measurement, group and their Interaction in Strong opioids from day of no session to discharge (time points 4 to 5)

Source	*df*	*F*
Time: Day of no session to discharge	1	1.84
Group	2	0.69
Interaction between time and group	2	0.31

Note. ** $p < .01$. At time points 4/5: N= 39/59. GRM (n= 10/21), ML (n= 16/21), NM (n= 13/17).

As shown in table 4.23 no significant differences were found in the amount of strong opioids taken by the participants when comparing measures on the day of no session to day of discharge (time points 4 to 5) between groups. No significant effects were found in the interaction between time and group.

4.5.5.2 Analgesics: Mild opioids Comparison 5b

Table 4.24

Comparison 5b: Effects of time of measurement, group and their interaction in Opioids (mild) from day of no session to discharge (time points 4 to 5)

Source	*df*	*F*
Time: Day of no session to discharge	1	0.24
Group	2	2.05
Interaction between time and group	2	1.24

Note. At time points 4/5: *N*= 39/59. GRM (*n*= 10/21), ML (*n*= 16/21), NM (*n*= 13/17).

Table 4.24 shows that no significant differences were found in the amount of mild opioids taken by the participants when comparing measures on the day of no session to day of discharge (time points 4 to 5) between groups. No significant effects were found in the interaction between time and group.

4.5.5.3 Analgesics: Paracetamol Comparison 5c

Table 4.25

Comparison 5c: Effects of time of measurement, group and their Interaction in Paracetamol from day of no session to discharge (time points 4 to 5)

Source	*df*	*F*
Time: Day of no session to discharge	1	5.24**
Group	2	0.73
Interaction between time and group	2	0.67

Note. ***p* < .03. At time points 4/5: *N*= 39/59. GRM (*n*= 10/21), ML (*n*= 16/21), NM (*n*= 13/17).

A significant difference in effects over time were found in the amount of paracetamol taken by the participants (p < .03) when comparing measures made from a day of no session to the day of discharge (time points 4 to 5). No significant differences were identified in the effects between groups, and the interaction between time and group showed no significant effect.

4.5.6 Summary of results relating to Pain

These results show that significant differences were identified in only the effects of time in paracetamol dosages when comparing measures taken from the day of no session to discharge (time points 4 to 5). When comparing the registered intake of strong opioids, mild opioids, and paracetamol in the GRM group versus the other two groups, two time points of measurement stand out:

1) After the operation (time point 3) the GRM group had a higher strong opioid intake than did the ML group, and a lower mild opioid intake than was registered in the two other groups, indicating that the strong opioid reduced the need for mild opioids in the GRM group.
2) On the day of no session (time point 4) the GRM group had a larger strong opioid intake than did either the ML or the NM groups. At the same time point, the mild opioid intake was lower in both the GRM and the NM groups (to similar levels), whereas this intake remained at a higher level in the ML group. At discharge the levels were similar across all types of analgesics registered, and in all three groups, indicating that pain was managed well in all three groups. No clear conclusions can be drawn from these results as these differences in effects may be due to the recovery in general and may not be attributed to the effect of the GRM intervention.

4.6 Results relating to Mood

In the following sections the results of the descriptive statistical analyses are presented first, and they are followed by the presentation of the results of the inferential statistical analyses.

Mood was measured by the Profile Of Mood States consisting of 37 items (POMS-37). The analyses were done utilising four measurement time points in order to measure the effects of the full treatment protocol (comparison 3); and of the post operative treatment (comparison 4) in mood (POMS-TMDS[60]). Similarly analyses were carried out for the POMS factors (sub scales). In the following sections the results of the analyses (comparisons 4 and 5) of the effects on total mood disturbance (TMDS) measured by POMS-37 are presented first. These results are followed by the presentation of the results from the six factors of the POMS (**T:** Tension-Anxiety; **D**: Depression-Dejection; **A:** Anger-Hostility: **V:** Vigor-Activity; **F:** Fatigue-Inertia; and **C:** Confusion-Bewilderment).

4.6.1 POMS-37: TMDS (descriptive statistics)

The TMDS of the POMS-37 are scored within the range -24 to 124, as each item may be scored by 0 (not at all) to 4 (to a very high degree). All factors are scored with 'positive' values. The Vigor-activity, factor V, consists of six items (scored within the range of 0 to 24) and is in the total mood disturbance scale recoded to the range -24 to 0. The higher the scores in POMS-TMDS the more disturbed in mood the participant would feel. Measures of mood were made with the POMS-37 at baseline (time point 1), after a postoperative session when measures were made (time point 3), at discharge (time point 5), and at follow-up (time point 6). The results on analyses of mood are first reported as TMDS followed by the presentation of the six factors of the POMS. All the results relating to measures of mood are presented in tables showing the descriptive statistics and interaction plots for each as graphical illustrations of the interactions of the variable in question.

In all tables showing results of the descriptive statistical analyses the left column 'Measurement time points' shows the four measurement time points for mood (POMS-TMDS). The column 'Total sample' (*N*) displays the number of participants, who have completed this measure at these four different times, pre and post operatively, and the means and standard deviations for the sample in total. The three following columns display the means and standard deviations for each of the three groups including the number of participants (*n*) who completed this

[60] **P**rofile Of **M**ood **S**tates - **T**otal **M**ood **D**isturbance **S**core = **POMS-TMDS**

measure at these four different measurement time points. The results are then illustrated graphically in an interaction plot in figure 4.8.

Table 4.26

Means and standard deviations for changes in POMS-TMDS in total sample and three groups

Measurement time points	Total sample	GRM	ML	NM
Pre operative	N M (SD)		*n* M (SD)	
1 Baseline	*57* 11.42 (19.21)	*22* 10.82 (21.03)	*18* 14.83 (18.25)	*17* 8.59 (18.31)
Post operative				
3 Post $2^{nd}/3^{rd}$ session	*34* 17.62 (17.80)	*10* 21.60 (15.74)	*17* 10.24 (16.48)	*7* 29.86 (17.05)
5 Post treatment/ at discharge	*22* 9.68 (17.40)	*6* 6.83 (21.32)	*6* 11.33 (15.68)	*10* 10.40 (17.60)
6 Follow-up 4-5 weeks after discharge	*30* 6.63 (17.53)	*8* 2.25 (12.00)	*12* 0.08 (13.24)	*10* 18.00 (21.12)

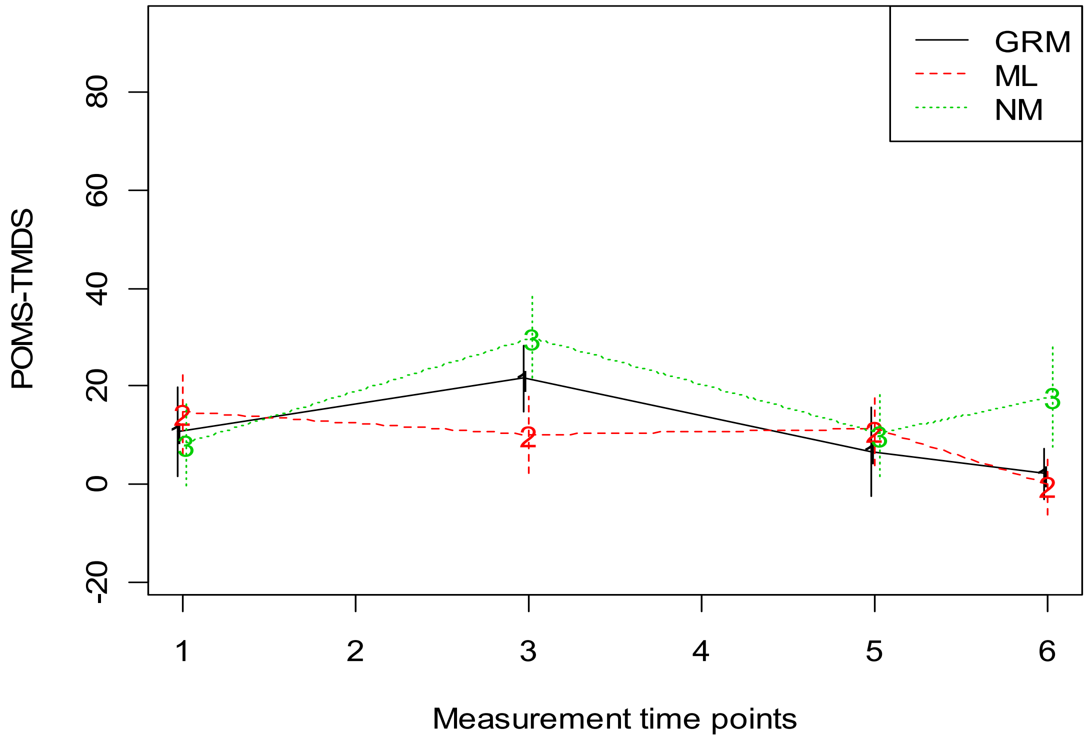


Figure 4.8. Changes in POMS-MDS measured over four time points (time points 1, 3, 5, and 6).

The pattern in measures of mood (POMS-TMDS), displayed in table 4.24 and illustrated in figure 4.8, show a participant reported increase in the total mood disturbance score in the GRM group when comparing from baseline to the postoperative session (time points 1 to 3), and a small decrease in POMS-TMDS when comparing the reported measures from baseline to discharge. This overall decrease in TMDS continued to decrease from discharge to follow-up in the GRM group. The NM group also reported a similar increase in TMDS when comparing from baseline to the postoperative session (time points 1 to 3) and decrease when comparing the reported measures from the postoperative session to discharge. The NM group reported a small increase in TMDS when comparing measures made at discharge to those made at follow-up. The overall TMDS in the NM group increased from the time of admission (baseline) to the time of follow-up. The ML group reported a pattern of very small changes in mood throughout their reported measures. This group reported a very slight decrease in the TMDS when comparing the reported measures from baseline to the day of the postoperative session (time points 1 to 3), and a very small increase when comparing the postoperative measures made at time point 3 to those made at discharge (time point 5). The ML group reported a decrease in TMDS when comparing from discharge to follow-up, and an overall decrease in this measure of mood when comparing the reported measures from baseline to those at follow-up, very similar to those reported in the GRM group. The GRM group reported more improvement in mood overall when comparing measures made from baseline to discharge and follow-up than did the NM group, and an overall improvement very similar to the total TMDS reported in the ML group.

4.6.2 Results of analyses undertaken with a linear mixed-effects model on POMS-TMDS

The following analyses (comparisons 3 and 4) of changes in Total Mood Disturbance Score were performed in order to test hypothesis 1c that the GRM group would report greater improvement in mood self-reported by POMS-37 when compared with the ML and the NM groups. The results of the analyses of changes in mood are presented in the order, beginning with the total mood disturbance score followed by the six factors (sub scales) of the POMS. The results of the analyses in relation to these six factors are presented together.

4.6.2.1 POMS-TMDS Comparison 3

The objective of comparison 3 was to compare changes over time from admission to discharge (time points 1 to 5) in mood (POMS-37: TMDS). This comparison was concerned with the changes in mood over time during the full duration of the participants' hospital stay. Table 4.27 shows the results of comparison 3 in regard to the effects of the time of measurement from baseline to discharge, group, and the interaction between the measurement time point and group.

Table 4.27

Comparison 3: Effects in POMS-37 TMDS in three groups from admission to discharge (time points 1 to 5)

Source	*df*	*F*
Time: admission to discharge	1	0.02
Group	2	0.34
Interaction between time and group	2	0.48

Note. At time points 1/5: *N*= 57/22. GRM (*n*= 22/6), ML (*n*= 18/6), NM (*n*= 17/10).

Non significant differences between groups were found in mood as measured by POMS-37 TMDS or in the interaction between time and group when comparing baseline measures to those made at discharge as reported in table 4.27.

4.6.2.2 POMS-TMDS Comparison 4

Comparison 4 was undertaken to compare changes over time from after operation to discharge (time points 3a to 5) in mood (POMS-37 TMDS). The results of this comparison are reported in table 4.28.

Table 4.28

Comparison 4: Effects in POMS-37 TMDS in three groups from post operation to discharge (time points 3a to 5)

Source	*df*	*F*
Time: Post operation to discharge	1	2.12
Group	2	1.26
Interaction between time and group	2	4.22**

Note. ** $p < .04$. At time points 3a/5: $N = 34/22$. GRM ($n = 10/6$), ML ($n = 17/6$), NM ($n = 7/10$).

The results of comparison 4 identified a significant effect ($p < .04$) of the interaction between time and group on mood (POMS-37 TMDS) when comparing measures taken from after the operation to discharge (time points 3a to 5). As illustrated in figure 4.8 these effects were reported in the GRM and NM groups, whereas in the ML group hardly any change was reported over the whole period of hospitalisation. In relation to hypothesis 1c, the findings show that the GRM group reported a greater improvement in mood from after their operation to discharge when compared to the ML group, but not when compared to the NM group whose results were rather parallel to the GRM group. Therefore hypothesis 1c was not confirmed as the NM group reported an improvement in mood similar to the GRM group. Hypothesis 1c was also not confirmed when comparing measures reported at baseline to those made at discharge where no significant differences were identified between groups.

4.6.2.3 Longitudinal analysis over Time points 1, 3, 5 and 6

In table 4.29 the results of the longitudinal analyses of POMS-37 TMDS and six factors measured at four measurement time points are reported. The effects of time of measurement, group, and the interaction between these two variables on POMS-37 TMDS and six factors respectively are displayed in table 4.29.

Table 4.29

Longitudinal analysis over time point 1, 3, 5, and 6 in POMS-37 TMDS and six factors

POMS		TMDS	T	D	A	V	C	F
Source	*df*				*F*			
Time points 1, 3, 5, 6	1	3.15^{+}	6.25**	2.82	1.15	6.77**	0.72	0.02
Group	2	0.42	1.01	1.03	0.11	0.93	0.87	0.27
Interaction between time and group	2	1.77	1.40	2.30	2.36	1.06	0.86	1.91

Note. $^{**}p < .01$. $^{+}p < .08$. At time points 1/3/5/6: N= 57/34/22/30. GRM (n= 22/10/6/8), ML (n= 18/17/6/12), NM (n= 17/7/10/10).

Table 4.29 shows the effects over time points 1, 3, 5 and 6. The longitudinal analysis identified significant differences in effects of time in the Tension-Anxiety (T) and the Vigor-Activity (V) factors ($p < .01$), whereas no significant differences were found neither between groups, nor in the interaction between time and group.

4.6.3 POMS factors (descriptive analyses)

In the following sections the results of the descriptive analyses of the POMS factors are presented. The six factors of the POMS each consist of a different number of items and therefore a different range of scoring. Table 4.30 displays the number of items in each factor and their scoring range respectively[61].

[61] Administration and interpretation of the POMS-37 in section 3.7.1.4 in chapter 3 of this thesis and appendix 3.12 on the CD-R accompanying this thesis.

Table 4.30

Number of items and scoring ranges in POMS-37 factors

POMS-37		Factors					
	TMDS	T	D	A	V	F	C
Number of items	37	6	8	7	6	5	5
Scoring range	-24 to 124	0 to 24	0 to 32	0 to 28	0 to 24[a]	0 to 20	0 to 20

Note. [a] In the POMS-TMDS the Vigor-Activity factor is recoded to - 24 to 0.

The results of the descriptive analyses of the POMS factors are shown in table 4.31 for the GRM group[62] as an example in order to examine the effects of this intervention over time. The left column of this table displays the time points of measurement, and the six following columns display the means, M, and standard deviations (SD) for each of the factors as self-reported measures by the GRM group at each time point when measures were made. The number (*n*) of participants in the GRM group who have completed these measures are displayed in the tables in the flow chart, figure 4.2. The results of the descriptive analyses of the POMS factors for all three groups are then illustrated graphically in the interaction plot in figure 4.9. In each interaction plot of a factor the y-axes depict the full data scoring range, and the x-axes depict the measurement time points 1, 3, 5, and 6. (No measures of POMS were made at time point 2 and time point 4). Left of the y-axes the interaction plot is vertically labelled with the name of the factor in question.

62 Means and standard deviations in POMS-37 six factors in total sample and three groups, as well as the numbers of participants who have completed these measures at each measurement time point may be seen in appendix 4.1 on the CD-R.

Table 4.31

Means and standard deviations in POMS-37 six factors for GRM group from baseline to follow-up (time points 1 to 6)

Measurement time points (*n*)	T	D	A	V	F	C
Preoperative	M (SD)					
1 Baseline (22)	7.24 (5.08)	4.83 (6.42)	2.64 (4.99)	12.00 (5.04)	5.08 (4.18)	4.76 (4.19)
Postoperative						
3 Post 2nd/3rd session (*10*)	5.83 (4.04)	7.23 (5.34)	2.17 (2.72)	8.42 (3.80)	10.54 (3.60)	5.50 (3.34)
5 Day of discharge (*6*)	3.14 (2.34)	4.14 (3.53)	1.67 (1.97)	10.43 (9.34)	6.83 (3.71)	2.67 (2.42)
6 Follow-up 4-5 weeks after discharge (*8*)	4.49 (3.91)	3.38 (3.73)	1.83 (2.60)	11.50 (6.42)	6.00 (3.53)	3.40 (3.20)

Table 4.31 shows that the GRM group reported a continued decrease in POMS Tension-Anxiety (T) factor from admission to discharge (time points 1 to 5). Though a small increase was reported from discharge to follow-up (time points 5 to 6) a reduction in this factor was reported in this group when comparing measures from admission to follow-up (time points 1 to 6). In the Depression-Dejection (D) factor, this group reported an increase from baseline to after the operation (time points 1 to 3). Following this, there was a continuous decrease from post operation to discharge and follow-up (time points 3 to 5 and also fro 5 to 6). The level of measures reported in the Anger-Hostility (A) factor was low, and changes over time very small, suggesting that anger was not a prevalent mood during the first preoperative phase of the participants' rehabilitation. The Vigor-Activity (V) factor level decreased as reported by this group from baseline to after the operation (time points 1 to 3), indicating that the participants experienced less vigour after their surgery. Following this, a continuous increase in the V factor was reported from post operation to discharge and follow-up (time points 3 to 5 and 5 to 6). A large increase was reported in the Fatigue-Inertia (F) factor from baseline to after the operation (time points 1 to 3) which indicates that a heart valve operation is tiring. Postoperatively a continuous decrease in this factor was reported from after the operation to discharge and to follow-up (time points 3 to 5 and 5 to 6). A

pattern of fluctuation was reported by the GRM group in the Confusion-Bewilderment (C) factor with a small increase from baseline to post operation (time points 1 to 3). This was followed by a decrease from after the operation to discharge (time points 3 to 5), and a small increase from discharge to follow-up (time points 5 to 6). The standard deviations were large in all six factors at baseline (time point 1), after the operation in the D factor (5.34), and in the V factor at discharge (9.34) and follow-up (6.42) (time points 5 and 6). The significance of these changes will be reported in section 4.6.4.

The GRM group reported a greater reduction in the POMS Tension-Anxiety (T) and Confusion-Bewilderment (C) factors when compared from baseline to discharge than did the ML group which may be seen graphically in figure 4.9. The decrease reported was also similar in the GRM and the NM groups when comparing from baseline to discharge and a further decrease was found in the NM group who reported the highest level of scores at follow-up in both these two factors (T and C). The decrease in the T factor reported in the GRM group is similar to the results from the anxiety VAS of self-reported measures when comparing from baseline to discharge where the GRM group reported greater reduction in anxiety than did the ML and the NM groups. In the ML group a pattern of decrease in the T factor was reported when comparing from baseline to postoperative measures (time points 1 to 3). This group reported an increase in both the T and C factors when comparing from after operation to discharge (time points 3 to time point 5). Following this the ML group reported decreases in the T and the C factors when comparing discharge to follow-up (time points 5 and 6).

In Figure 4.9, the Depression-Dejection (D) factor show all three groups reporting a low level, though increases were reported in the GRM and the NM groups when comparing measures made at baseline to those made postoperatively (time points 1 to 3). The GRM group reported a continuous postoperative decrease in this factor when comparing from time point 3 to both discharge (time point 5) and follow-up (time point 6). The NM group also reported a similar decrease in depression from time points 3 to 5, while the ML group reported very small changes overall. All three groups reported very low scores and very small changes in the Anger-Hostility (A) factor throughout their participation from baseline to discharge and to follow-up (time points 1 to 5 and 6). The results of the analyses of the A factor may suggest a floor effect in this measure as the mean scores were reported from .94 to 3 which is within less than 11% of the scoring range. In the Vigor-Activity (V) factor the GRM group reported a decrease when comparing from baseline to postoperative measures made at time point 3 while the ML and the NM groups reported almost no change. The NM and the GRM groups reported a similar increase in this factor when comparing postoperatively from time point 3 to both the time point of discharge (time point 5) and that of follow-up (time point 6).

The ML group reported a pattern of stability in the V factor when comparing from baseline to discharge (time points 1 to 5) and an increase in this measure when compared from discharge to follow-up (time points 5 to 6), at which point they reported a mean level similar to those reported in the GRM and the NM groups. In the Fatigue-Inertia (F) factor the GRM and the NM groups reported a similar increase when comparing from baseline to the time of the postoperative session (time points 1 to 3). The GRM and NM groups reported a similar and greater decrease in the F factor when comparing from after operation to discharge than did the ML group. The NM group reported a slight increase in this factor from discharge to follow-up. The ML group reported very small changes in the F factor overall from baseline to discharge, and a greater decrease compared to the GRM and the NM groups when comparing measures made from discharge to follow-up.

In all factors the mean scores at baseline were, except for a small spread in the V factor, reported within a rather narrow range. When comparing the changes in these factors from baseline measures to the first postoperative measures made (time points 1 to 3) the ML group reported the lowest mean scores in four of six factors: in T, D, F and C factors. At time point 3 the mean score level was practically identical in all three groups in the A and the V factors. The factors that show the most dynamic changes in the means scores over time, particularly the T, V, F and C factors, may be the most relevant to the population in this study. Anger is considered a 'negative' emotion, and participants would comment "What would I be angry about?" or "No, angry, that I don't want to be" as one participant commented when completing this measure at baseline. Depression would be a relevant aspect in later rehabilitation phases (the Danish Heart Society, DHS, 2004) as this mood state is rarely present in the first postoperative phase (Spindler & Pedersen, 2005).

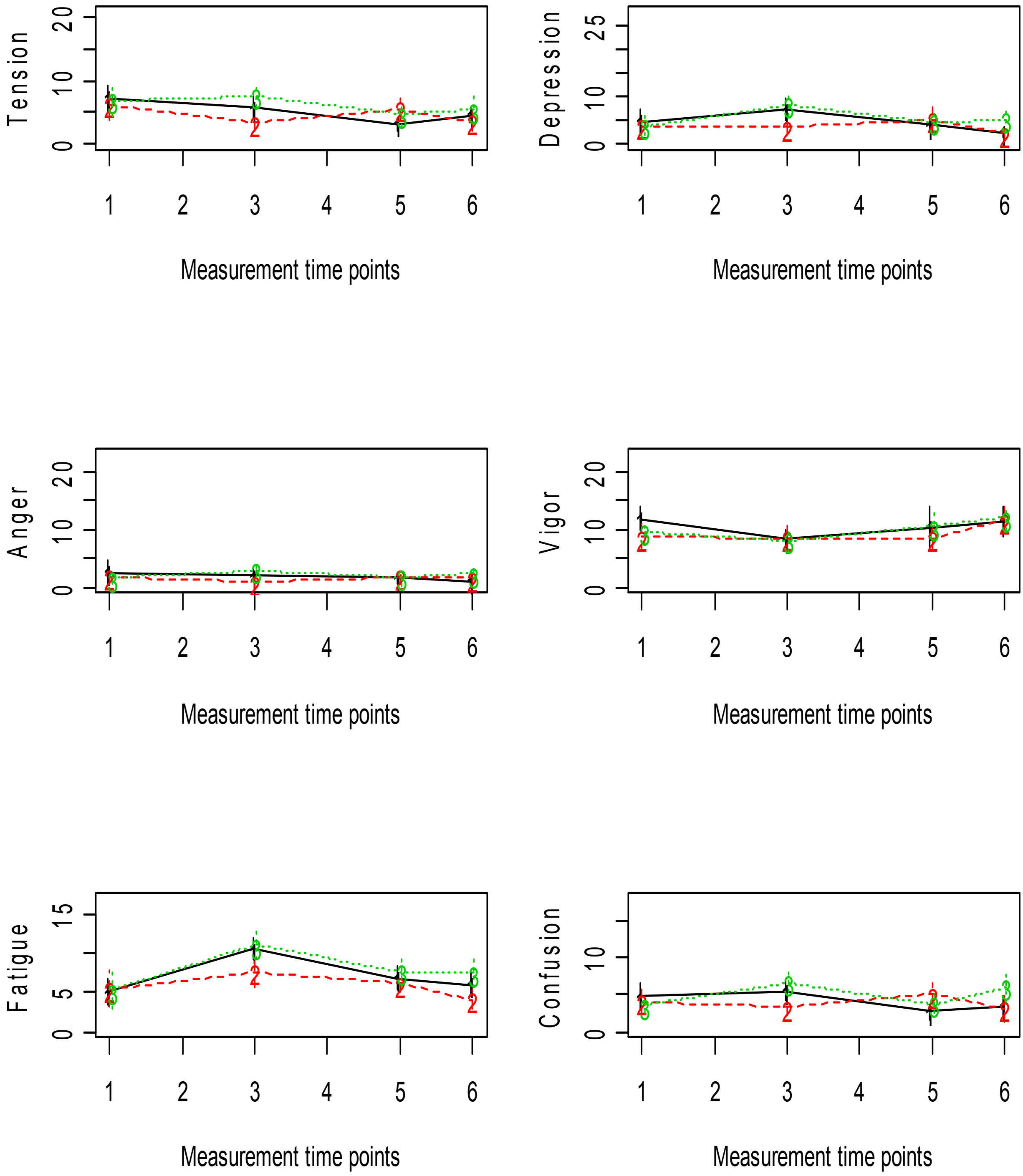


Figure 4.9. Changes in POMS six factors in three groups measured over four time points 1, 3, 5 and 6. *Note:* 1 (black solid line) = GRM group; 2 (red broken line) = ML group; 3 (green dotted line)= NM group

In the following sections the results of the statistical analyses of the POMS factors are presented.

4.6.4 Results of analyses undertaken with a linear mixed-effects model on POMS factors

The following sections present the results of comparisons 3 and 4 of the six factors of POMS-37. These comparisons were done in order to identify possible differences between the factors in the measure of mood. In addition particularly results regarding the Tension-Anxiety (T) factor may add information in relation to the main outcome variable, anxiety. Tables 4.32 – 4.33 show the effects of time of measurement, group and their interaction for each factor in comparisons 3 and 4 respectively. The left column of the tables describe the source: the time points of measurement in question, group as a factor of effect, and the interaction between group and time of measurement. The results of the test of significance are displayed in the right column and probability values are indicated by asterisks (*) and 'crosses' (+) respectively in the case where values in differences were found to approach or be of significance based on a 95% probability.

4.6.4.1 POMS factors Comparison 3

The objective of comparison 3 was to compare changes over time in mood from admission to discharge (time points 1 to 5) in POMS factors. Table 4.32 shows the results of comparison 3 in regard to the effects of the time of measurement from baseline to discharge, group, and the interaction between the measurement time point and group.

Table 4.32

Effects of time of measurement, group, and their interaction in POMS factors from admission to discharge (time points 1 to 5)

Factor		T	D	A	V	F	C
Source	*df*				*F*		
Time: admission to discharge	1	3.72^{+}	0.55	<0.01	< 0.01	5.36**	0.26
Group	2	0.10	0.07	0.27	1.67	< 0.01	0.50
Interaction between time and group	2	1.63	1.10	0.62	0.58	0.21	1.51

Note. + p < .07. ** p< .03. At time points 1/5: N= 57/22. GRM (n= 22/6), ML (n= 18/6), NM (n= 17/10).

Table 4.32 shows the results of comparison 3 in all POMS factors. The result in effects of time in the POMS T factor (tension - anxiety) when comparing from baseline to discharge (time points 1 to 5), suggests that the size of the effect approaches significance ($p < .07$). The effects of time when compared from baseline to discharge was also found to be significant ($p < .03$) in the POMS factor fatigue - inertia (F) only, suggesting that the participants experienced that the whole experience of being in hospital and undergoing a heart valve operation is inevitably tiring. No significant differences were identified in regard to the effect of group or in the effect of the interaction of time and group in any of the six factors.

4.6.4.2 POMS factors Comparison 4

Comparison 4 was done in order to compare effects of time of the overall post operative period from after operation, when measures were made, to discharge (time points 3a to 5) in mood (POMS factors). The results of this comparison are reported in table 4.33.

Table 4.33

Effects of time of measurement, group, and their interaction in POMS factors from post operation to discharge (time points 3 to 5)

Factor		T	D	A	V	F	C
Source	*df*			*F*			
Time: post operation to discharge	1	0.02	0.06	0.01	1.55	4.45*	0.39
Group	2	1.54	1.32	0.89	0.07	1.78	0.83
Interaction between time and group	2	3.80**	2.13	0.60	0.60	1.92	3.90**

Note. $^{**}p < .04$. $^{*}p < .05$. At time points 3/5: N= 34/22. GRM (n= 10/6), ML (n= 17/6), NM (n= 7/10).

Table 4.33 shows the results of comparison 4 regarding the changes over time in the POMS factors when compared from after operation to discharge. The results of this analyses show a significant effect ($p< 0.4$) in the interaction between time and group in the Tension-Anxiety (T) and the Confusion-Bewilderment (C) factor, and a significant effect of time in the Fatigue (F) factor ($p < .05$), confirming that over time patients in the cardiac unit will experience all of these factors both at psychological and physiological levels.

4.6.5 Summary of results relating to Mood

In summary, the GRM group reported a greater improvement in mood (POMS-37 TMDS) from after their operation to discharge when compared to the ML group, but not when compared to the NM group whose results were rather parallel to the GRM group. The NM group actually reported an improvement in mood that was similar to the GRM group. Therefore hypothesis 1c was not confirmed when comparing measures reported at baseline to those made at discharge where no significant differences between groups were identified.

Looking at the results of the individual factors, in the POMS V factor the GRM group reported a greater reduction in vigour from baseline to the postoperative measure at time point 3 than did the ML and the NM groups, after which vigour increased from time point 3 to discharge in the GRM and NM groups, but not in the ML group. There were no significant differences between groups. The GRM and NM groups reported a greater reduction in fatigue (F factor) when comparing from after operation to discharge than did the ML group. Again, no significant differences were found between groups. The results of comparison 3 of the effects of time when compared from baseline (time point 1) to discharge (time point 5) were only found to be significant ($p < .03$) in the POMS factor F. The results of comparison 4 identified a significant mean effect ($p < .04$) of the interaction between time and group in the T and the C factors when comparing from after operation to discharge (time points 3a to 5), and a significant effect of time in the F factor ($p < .05$). The results of the longitudinal analysis of the effects over time point 1, 3, 5 and 6 identified significant differences in the T and the V factors ($p < .01$). Hypothesis 1c was not confirmed when comparing from measures reported at baseline (time point 1) to those made at discharge (time point 5) where no significant differences were identified.

4.7 Results regarding Satisfaction with hospital stay

In the following sections the results of the descriptive statistical analyses of satisfaction with hospital stay (VAS) are presented first, followed by the results of the inferential statistical analyses. The analyses utilised two measurement time points in order to measure participants' self-reported experience of satisfaction with their hospitalisation: after treatment at the time of discharge (time point 5) and at follow-up (time point 6).

4.7.1 VAS (descriptive analyses)

Table 4.34 shows the means, M, and standard deviations (SD) for the reported measures of satisfaction on a VAS (range 0 - 10) for the three groups. The left column 'Measurement time points' shows the two measurement time points for the satisfaction with hospitalization (VAS). The column 'Total sample' displays the number of participants who have completed this measure at these two different times post operatively, and the means (M) and standard deviations (SD) for the sample in total. The three following columns display the means and standard deviations for each of the three research conditions separately including the number of participants (*n*) who completed this measure at these two different measurement time points. These results are then presented in figure 4.10 where the results may be seen graphically.

Table 4.34

Means and Standard Deviations in Satisfaction with stay (VAS)

Research condition	Total sample		GRM		ML		NM	
Measurement time points	*N*	M (SD)			*n*	M (SD)		
5 Discharge	*31*	9.16 (0.99)	*7*	9.19 (.96)	*10*	8.86 (1.35)	*14*	9.37 (.66)
6 Follow-up	*39*	8.60 (2.32)	*10*	7.80 (3.02)	*15*	9.30 (.63)	*14*	8.42 (2.81)

Table 4.34 shows that the GRM group reported a mean score on satisfaction similar to the mean score found for the total sample, and that the differences in the reported measures between groups were small. The highest mean score was reported in the NM group at discharge, whereas the ML group reported their highest mean score at follow-up, at which time the GRM group reported the

lowest level of satisfaction (VAS).

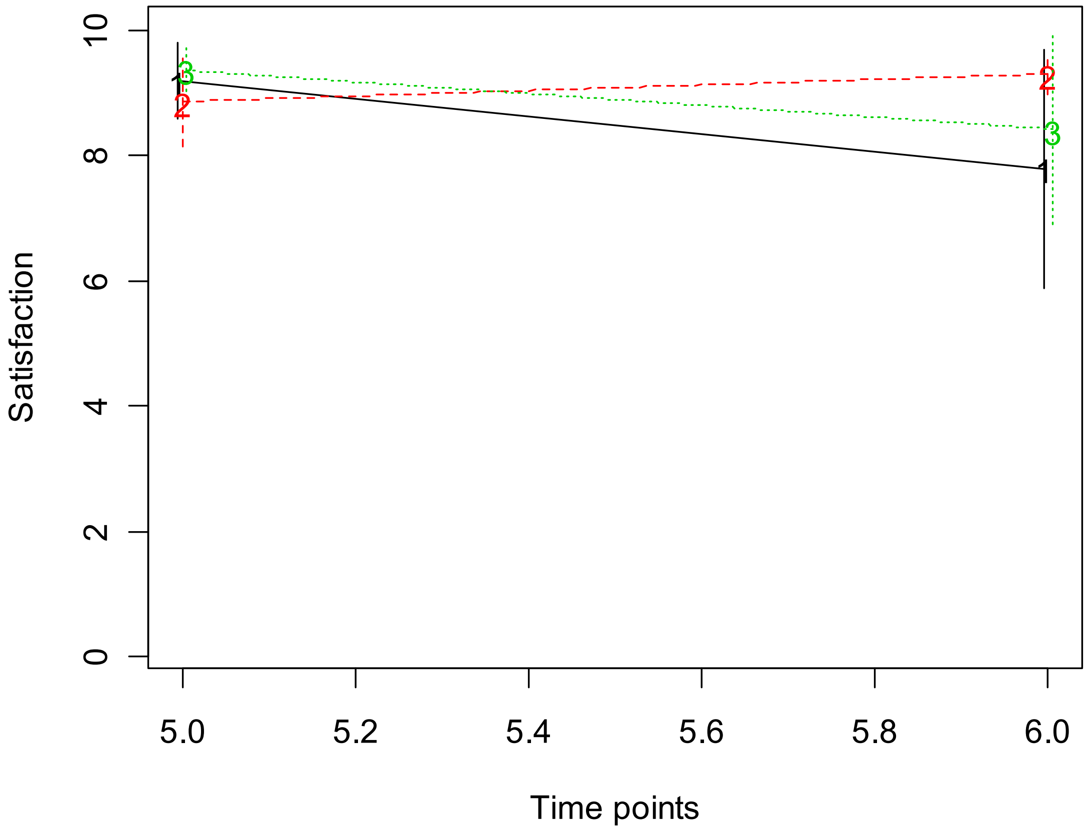


Figure 4.10. Satisfaction with hospital stay in three groups from discharge to follow-up[63]
Note. 1 black solid line = GRM group; 2 red broken line = ML group; and 3 green dotted line = NM group.

In Figure 4.10 the full data range is depicted in the y-axis. The interaction plot illustrates that the distribution is skewed, and presents a ceiling effect which arises when the dependent variable (satisfaction) is equal to the ML and NM groups, and all three are equal to the best possible values (Cohen, 1995). Box plots were used to screen the structure of the data[64]. They showed a rather skewed distribution both at discharge and at follow-up with many values close to 10. At discharge (time point 5) all responses reported values > 6.5 (as illustrated in the histogram in figure 4.11). At follow-up some outliers in the box plot illustrate values close to zero (scores 0 (GRM), 1 and 2 (NM)) in three participants. These participants had all reported values at discharge between 8.5

---

63 The distribution of numbers 5.2, 5.4... to 5.8 is due to the statistical programme and should not be considered here. The 5.0 illustrates time of discharge (time 5) and 6.0 the time of follow up (time 6) when data was collected.

64 Box-plots of Satisfaction with hospitalisation (VAS) are found in appendix 4.2 on the CD-R accompanying this thesis.

and 9.8 within the range 0 to 10. It is possible that they did not understand the measuring instrument (one participant in the GRM group reported '0' in the self-reported measure of satisfaction with stay at follow-up while commenting in the questionnaire that this participant found the staff very helpful and kind); or that they were not as happy about their hospital stay four to five weeks later. One participant reporting a low value at follow-up made a written comment that he was not pleased with treatment at the local hospital to which he had been transferred, and infection reoccurred. This incident may have influenced his response which then may not have represented his actual satisfaction with his stay in Unit T. The fact that the distribution of values is skewed at both times of measurement suggests some caution in interpreting these results regarding satisfaction with hospital stay. In both the GRM and NM groups these lower scores explain some of the decline in these two groups over time between discharge and follow-up. The slight increase in satisfaction with hospital stay in the ML group may be understood as an expression of their overall state of health at the time of follow-up, and that they were recovering well.

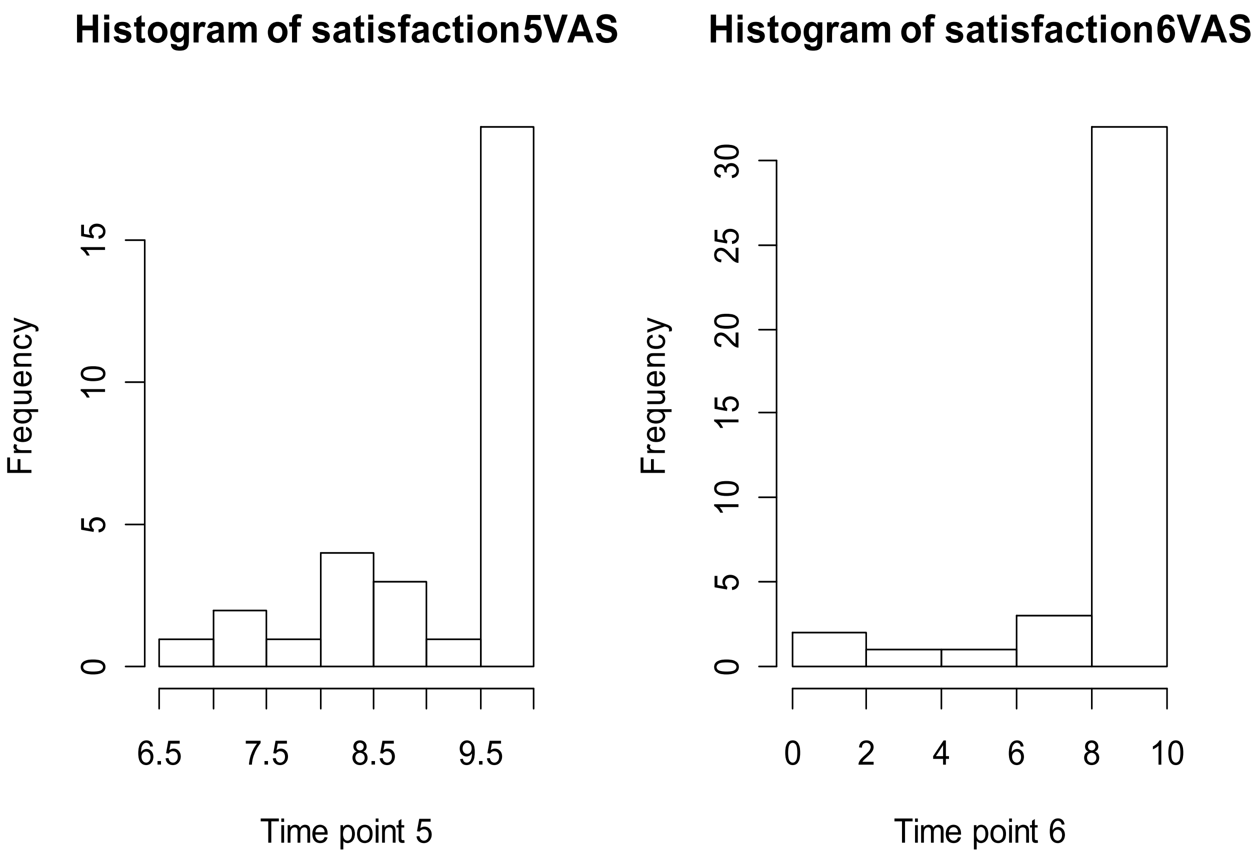


Figure 4.11. Distribution in satisfaction with hospital stay at discharge (time point 5) and at follow-up (time point 6) in total sample
*Note. D*ata scored range at discharge 6.5 to 9.5; at follow-up 0 to 10.

4.7.2 Results of analyses undertaken with a linear-mixed effects model on satisfaction with stay (VAS)

Comparison 6 was made in order to measure differences between groups in hospital satisfaction at discharge and follow-up (time points 5 and 6). The results of this analysis are reported in table 4.35.

Table 4.35

Effects in satisfaction with hospital stay in three groups from discharge to follow-up (time points 5 to 6)

Source	*df*	*F*
Time: discharge to follow-up	1	2.10
Group	2	0.99
Interaction between time and group	2	0.91

Note. At time points 5/6: *N*= 31/39. GRM (*n*= 7/10), ML (*n*= 10/15), NM (*n*= 14).

Table 4.35 shows that hardly any effects were found, and no significant differences were identified between groups in their self-reported satisfaction with hospital stay at discharge and at follow-up. Analysing the effects of the interaction between time and group also showed no significant differences in satisfaction with stay.

4.7.3 Summary of results relating to Satisfaction with hospital stay

The descriptive analyses found ceiling effects in all three groups. No significant differences were identified between groups in their self-reported satisfaction with hospital stay at discharge and at follow-up. Therefore hypothesis 1d was not confirmed. These results indicate that the participants were in general satisfied with their hospital stay, having survived a large and serious operation. This may not be attributed to the effects of the music therapy intervention.

4.8 Results regarding Length of stay

Data for the length of stay for each participant were taken from the participant's EPJ[65] and were reported as the number of days between the date of admission and the date of discharge. The results of descriptive analyses and a one-way analysis of variance (ANOVA) for length of hospital stay are reported in table 4.36 For each group the mean, M, and standard deviation (SD in parentheses) are reported.

Table 4.36

Means and standard deviations in length of hospital stay in three groups

Group	GRM	ML	NM
Source		M (SD)	
Length of hospital stay	8.92 (4.70)	11.65 (8.97)	11.05 (9.36)

Note. *N*= 67. GRM (*n*= 24), ML (*n*= 23), NM (*n*= 20).

The average length of stay in the GRM group was 8.9 days and was found to be two days shorter when compared with the NM group (11.05), and 2.73 days shorter when compared to the mean length of stay in the ML group (11.65). The variation in length of stay was smaller in the GRM group (standard deviation 4.7) than in both the ML and NM groups in which the standard deviation from the mean were close to nine days. Though not a significant result in length of stay, the analysis does show an apparent tendency towards a shorter length of stay in the GRM group compared with either the ML or the NM groups.

4.8.1 Results of analysis undertaken by a one-way analysis of variance, ANOVA: Comparison 7

The objective of comparison 7 was to measure differences between groups in length of stay. The analyses of length of hospitalisation (stay) were done in regard to the days passed from baseline to discharge. The data were analysed by one-way ANOVA. The results of this comparison are reported in table 4.37 in regard to the effects of group and of GRM compared with the ML and the NM groups combined (combined group). The results are then visually depicted in the box plot, figure 4.12.

[65] Electronic Patient Journal

Table 4.37

ANOVAs of Length of hospital stay in three groups and in combined groups

Source	*df*	*F*
Group	2	0.79
Combined group	1	1.53

Note: Pr > F. *N*= 67. GRM (*n*= 24), ML (*n*= 23), NM (*n*= 20).

Table 4.37 shows that no significant differences were found between groups or between the GRM group compared with the ML and the NM groups combined. Therefore hypothesis 1e was not confirmed.

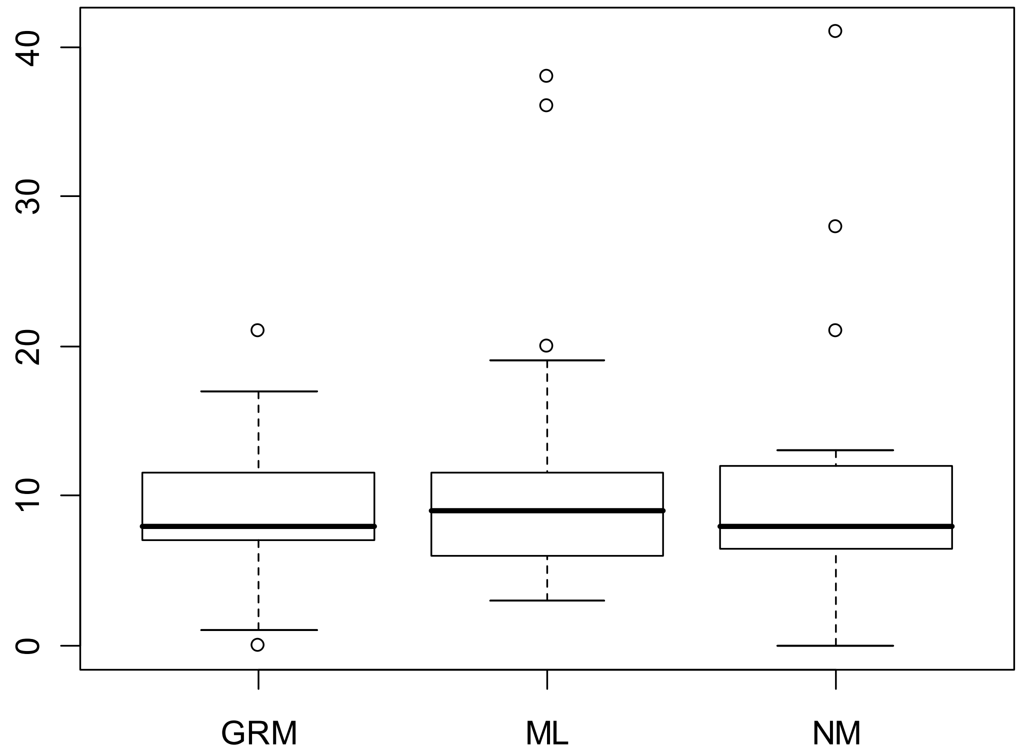


Figure 4.12. Box-plot of differences between groups in mean length of hospital stay

The y-axis in the box plot in figure 4.12 depict length of hospital stay as number of days. The x-axis depicts the three conditions. In screening the data this box plot illustrates that the median in all conditions are within a narrow range of 8 - 9 days. The average length of stay in Unit T is 7 - 10 days. In all three groups there were a few outliers (music therapy: 2, music listening: 3, and control: 3). These were due to infections in the participants' wounds (sternum which was opened in order to perform the heart valve repair/ replacement, and/ or the leg, where a vein had been taken for the bypass in the heart). These infections can prolong the hospitalisation by typically 1- 1½ months.

4.8.2 Summary of results relating to Length of hospital stay

No significant differences between groups were identified in the length of hospital stay, and hypothesis 1e was not confirmed. Outliers in all groups were found, and mean length of stay was similar between groups when data was screened regarding these prolonged lengths of stay in eight participants. Reasons for this finding will be discussed in the following chapter.

4.9 Results regarding Relaxing music

The following sections present the results in relation to the supplementary research questions regarding how the music therapy intervention, guided relaxation with music, helped the participants relax. The participants chose their preferred style of music for their relaxation from the four examples, and the results of those choices are presented first, followed by analyses of the music of the four examples (excerpts from music programmes of the four different styles). Then follows the presentation of the results in relation to the questions regarding how helpful the music was for the participants' relaxation, and which aspects of the music helped them to relax.

4.9.1 Choice of music style

The procedure of choosing music was administered before starting the preoperative session in the GRM and the ML groups. The participants were given a choice of four different music styles. The participants were asked to choose which one they preferred for their rest / relaxation period. The same music programme chosen by the participant was then used in all the sessions that they received. In table 4.38 the distribution of the choice of music that the participants made is displayed. The left column displays the total number of participants (*N*) in these two groups, and the number of participants' (*n*) choice of the music programme in question by group and in total. The four music programmes are listed in the right hand columns. A new age programme (in parentheses) was replaced by the jazz programme immediately following the initial trial period, thus the majority of the participants were given the choice between easy listening, classical, specially composed (MusiCure), and jazz. The new age programme was very similar to the specially composed music, and these two programmes are therefore combined in the analyses. The choice of styles of music is illustrated in figure 4.13 for a graphical representation of the music choice.

Table 4.38

Four styles of music chosen in the GRM and ML groups

Music programme	Easy Listening		Classical		Specially composed		Jazz	
(*N*=44)	GRM [a]	ML [a]	GRM	ML	GRM	ML	GRM	ML
Number of participants by group	12	13	5	8	4	1	0	0
Total number	25		13		5 (1) [b]		0	

Note. [a] *n*= 22. [b] During the initial trial a new age programme was chosen by one participant, 2.3%. This programme was found too similar to the specially composed programme and was therefore replaced by a jazz programme. In the analyses the new age programme has been combined with the specially composed programme.

The majority of the participants in the GRM and the ML groups chose the Easy Listening programme (25 of 44 participants, the equivalent of 56.8%); the classical programme was chosen by 13 (29.5%); the specially composed music by 5 (11.4%) and the jazz by none (0.0%). The reasons for the selection in choice of music style may relate to the fact that the population in this study are, in the main, elderly people. The specially composed programme (MusiCure) was chosen by very few participants though this music has been composed and designed for hospital settings, originally for intensive- and recovery units (www.musicahumana.dk). The elderly population may have difficulty in relating to the jazz programme which is in a contemporary style. This will be discussed further in section 5.3 in the following chapter.

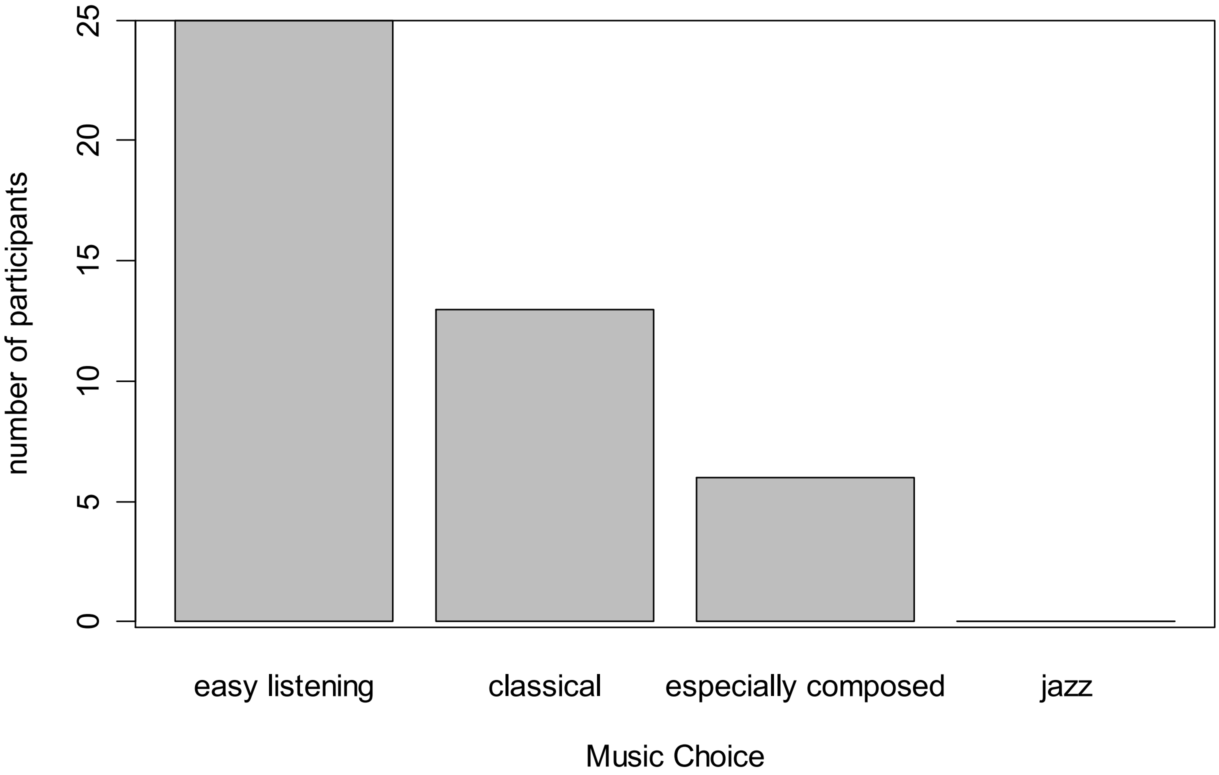


Figure 4.13. Music choice in GRM and ML groups.
Note. The 'specially composed' bar includes 'new age' chosen by one participant in the initial trial.

Following this graphical illustration the results of the musical analyses will be presented.

4.9.2 Results of SMMA of four music examples

As described in the method section (3.5.4) the four music examples, all of a duration of 40 seconds, were played to the participants as part of the procedure forming the basis for their choice of preferred style of music for their relaxation. In order to identify the musical characteristics of the music programmes, and consider why some was chosen more than other, the **S**tructural **M**odel of **M**usical **A**nalyses, SMMA, was used to describe characteristic elements. The results of these analyses are displayed in table 4.39. The left column lists the elements of the SMMA, and the right hand columns show the results for each element in each of the four music styles respectively. The last right hand column shows the results of the comparative analyses of similarities and differences between the four examples referred to as numbers 1 to 4, in the order of appearance.

Table 4.39

Analyses of the four music excerpts using the Structural Model of Music Analysis, SMMA (Grocke, 1999, 2007)

Music style SMMA element	Easy listening	Classical	MusiCure	Jazz	Comparative[1]
1. Style and Form					
1.1 Period of composition	20th century	Baroque	21st century	20th century	2: older
1.2 Form	Fragment – therefore no defined form	Fragment – therefore no defined form	Fragment – therefore no defined form	Fragment – therefore no defined form	All similar
1.3 Structure (predominantly)	Simple	Simple	Complex	Simple	1, 2, 4: simple 3: complex
2. Texture					
2.1 (Predominantly) Thick/thin texture	Thin	Thick	Thick	Thin	1 & 4: thin 2 & 3: thick
2.2 Monophonic, homophonic, polyphonic	homophonic	homophonic	homophonic	homophonic	All similar
3. Time					
3.1 Metre	4/4	4/4	varied	4/4 and 2/4	3: intro different
3.2 Complexity and variability in metre	little variability	stable	0- 0:10 free 4/4 from 0:10 to end	stable	1, 2, 4: stable 3: complex
3.3 Silences, rests, pauses	rest at 0:21- 0:23	none	none	rest at 0:31- 0:32	1 & 4: rests 2 & 3: no rests
4. Rhythmic features					
4.1 Underlying rhythm	consistent rhythm	consistent, eights in mostly descending or ascending whole/half tone steps	flowing harmonies 0:00 - 0:10 Consistent from 0:10 – 0:40. Cello: repeated bass pattern	consistent, walking bass	All consistent, except for 3: intro
4.2 Important rhythmic motifs (notate)	Not prevalent	Not prevalent	Not prevalent	Not prevalent	All similar
4.3 Repetition in rhythmic motifs	Not prevalent	Not prevalent	Not prevalent	Not prevalent	All similar
4.4. Variability in rhythm - predictable/unpredictable	predictable	predictable	unpredictable 0 - 0:10/ predictable 0:10 - 0:40 in cello	predictable	1,2 & 4: similar 3: varied

Table 4.39 continued …

4.5 Syncopation	Not prevalent	Not present	Not prevalent	Syncopated style	2: not present 1 & 3: not prevalent 4: predominant
5. Tempo					
5.1 (Predominantly)	slow-moderate pulse 80 b/m	slow - adagio pulse 60 b/m	moderate pulse 80 b/m	slow pulse 64 b/m	2, 4: slow 1, 3: moderate
5.2 Alterations in tempi: change of meter, use of accelerando and ritardando	ritardando 0:21 - 0:23	stable	stable	stable	1: ritardando 2, 3, 4: stable
6. Tonal features					
6.1 Key structure, diatonic, modal	diatonic; major key	diatonic, major	diatonic/ minor	diatonic	1, 2, 4: major 3: different
6.2 Major/minor alternations	Not present	Not present	Not present	Not present	All similar
6.3 Chromaticism	Stepwise scale ascending to start of repetition 0:19 - 0:22	Not present	Not present	Not present	1: transition to repetition 2, 3, 4: none
6.4 Modulations	To dominant	To dominant	To dominant	Several	1, 2, 3: similar; to dominant 4: Several modulations
7. Melody					
7.1 Main themes in work	stepwise motif, sing able short phrase	long phrase	played by oboe	stepwise progressions in melody	
7.2 Significant melodic fragments	Not prevalent	Not prevalent	Not prevalent	Not prevalent	
7.3 The structure of each melody/theme	eight bars' theme with repetition	0:00 - 0:18 one phrase	long theme from 0:10 ascending to 0:24, then descending to end of ex.	ascending and descending theme	
7.4 Intervals of each melody/theme	small (seconds, thirds)	fourth, descending thirds, octave	small	thirds, fifths, and sixths octave leap at 0:33 at theme repetition	
7.5 Shape of each melody/theme	ascending-descending	peaks at 0:10, 0:22, 0:30 and 0:36	Long phrases within a fifth	Short, symmetrical	

Table 4.39 continued …

7.6 Length of phrases in each melody/theme: symmetrical, short, long	Series of short, symmetrical phrases	Long 2 bars symmetrical	Long	Long overall phrases	
7.7 Predominant pitch range of the melody/theme: high, medium, low register	medium	medium and high	high (oboe) register – change at 0:28 to lower register, cello	medium to low register	All medium (predominantly) 3: widest range span
8. Embellishment, ornamentation and articulation					
8.1 Trills	Not present	Not present	Not present	Not present	Not present
8.2 Marcato, accents, detached bowing	Few accents	Not prevalent	Not prevalent	Few accents	1, 4: accents 2, 3: none
8.3 Pizzicato	Not present	Not present	in cello	Not present	In 3 only
8.4 Legato	legato	legato	Oboe plays legato	legato	all similar
8.5 Use of mute	Not applicable	Not applicable	Not applicable	Not applicable	none
9. Harmony					
9.1 Predominantly consonant or dissonant	Consonant	Consonant	Consonant	Consonant	All consonant
9.2 Consonance/ dissonance alternation within the work	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
9.3 Significant progressions	0:18 - 0:22	Not applicable	Not applicable	transition to theme variation 0:29 - 0:33	2, 4
9.4 Rich	simple	rich	rich	simple	1, 4: simple 2, 3: rich
9.5 Predictable shifts	predictable	predictable	predictable 0:10 - 0:40	predictable	1, 2, 4 similar
9.6 Unpredictable	Not applicable	Not applicable	unpredictable 0:00 - 0:10	Not applicable	3: intro is unpredictable
9.7 Cadence points	Predictable, perfect	Perfect	Perfect	Perfect	Perfect
10. Timbre and quality of instrumentation					
10.1 Vocal - male or female solo, SATB or other combination	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
10.2 Instrumental - Solo	solo guitar – at repetition acc. by piano	Not applicable	Not applicable	solo guitar accompanied by bass	1, 4: solo instr w. accomp.

Table 4.39 continued …

10.3 Instrumental - Orchestral	Not applicable	strings, cembalo	Not applicable	strings, cembalo	2: strings and cembalo
10.4 Small group - e.g. Quartet, combinations of instruments	Not applicable	Not applicable	harp, oboe, cello, synthesizer, birds' voices (recorded)	Not applicable	3: small group of instruments with nature sounds
10.5 Instrument groups used in orchestration (strings, woodwinds, brass, percussion, harp) creating distinctive timbral colour	Not applicable	strings	Not applicable	Not applicable	2: strings
10.6 Interplay between instruments and instrument groups	guitar accompanied by piano	violin playing the melody & cembalo the bass cembalo & strings are ground for violin in dialogue with the viola	cello & synthesizer accompany as a 'ground' for oboe playing melodic theme	bass accompanying (ground) guitar	1, 4: solo w. accompany 2, 3: solo/ dialogue w. grounding group
10.7 Layering effects (adding and reducing instrument parts)	piano adding broken chords at theme repetition	consistent instrumentation	harp & birds' are reduced after intro 0:00 - 0:10	consistent instrumentation	not predominant
10.8 Resonance	distinctive	close	varied	close	2, 4: close 1, 3: different
11. Volume					
11.1 Predominantly loud or soft - alternations between/gradation between	soft stable	soft	soft	soft p-mp	all soft
11.2 Special effects of volume: pianissimo, fortissimo, and sforzando	Not present	crescendo 0:00 – 0:18 and 0:20 – 0:30	Not present	Not present	2 only
12. Intensity					
12.1 Tension/release	tension building to a slight peak from 0:16-0:22 released by returning to theme	tension 0:0 – 0:10/ release 0:11-0:18/ 0:19 diminuendo	Not present	0:00 - 0:06 tension/release and 0:10 - 0:32	1, 2, 4: use of tension/release
12.2 Crescendo, building to peak, and resolution	Not present	crescendo to 0:29, release at 0:34	Not present	Not present	2: small cresc. / resolution at the end of ex.

Table 4.39 continued …

12.3 Tension in harmony, texture etc. and resolution	Not present	Not present (logical harmony)	tension at 0:28	0:26 - 0:27 / released 0:29-0:30	4: tension - resolution found
12.4 Delayed resolution or absent resolution	Not present	Not present	resolution absent	Not present	3: absent resolution 1, 2, 4: Not applicable
12.5 Ambiguity in whether resolved or unresolved	Not applicable	Not present	Ambiguity present	Not present	3: ambiguous 1, 2, 4: NA
13. Mood					
13.1 Predominant mood, as depicted by melody, harmony and predominant instrument	intimacy, optimistic, joy, assurance	serious, solemn, ceremonious	melancholy, exotic, confusion	sweet, loving, intimate, calm, quiet, relaxed, laid back atmosphere	predominant moods are positive 3: some confusion
13.2 Feelings and emotions represented	ease, calm, relaxed	peaceful, calm, relaxed, longing	journeying, confusion	kindness, fondness, care	1, 2, 4: feelings associated with relaxation 3: melancholy and confusion may be associated with tension
14. Symbolic / associational					
14.1 Culturally specific associations	Acoustic guitar, Western cultural style	Western classical style	Associations to new age; tonality and harmony associated with Western culture	Western culture soft jazz style	All Western tonality 3: new age associations
14.2 Metaphoric associations	Invitation to let go, tension / release and to intimacy	Church with many ornaments safe space Coming home	Cello: good enough parents, supporting and holding	Association to lullaby, rocking chair; friendship; close and caring	Being contained and held by something larger / flowing with the music
14.3 Symbolism in motifs (leitmotifs), and their imagery potential - visual, auditory or kinaesthetic	Solo instrument w. accomp. like in the clinical setting (participant w RTM)	Breathing may entrain with the long melodic phrase	Birds' voice annoying Confusion about what to expect	Bass supporting soloist like clinical setting (RTM supports the participant)	Supportive and caring that breathing may become slower
15. Performance					
15.1 The integrity/authenticity of the performers	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Table 4.39 continued …

15.2 Excellence of performance (technique of the performers)	technically well performed	excellent	technically well performed	technically fine	All technically well performed
15.3 Stylistic interpretation - artistic merit	No overt interpretation	Romantic	No overt interpretation	Interpretation through the syncopated melody	
15.4 Articulation of feeling and emotion	or articulation of feeling or emotion (non-intrusive)	Legato underline the sense of intimacy/ closeness	or articulation of feeling or emotion (non-intrusive	Emotion and feeling of care and loving relationship/intimacy or closeness articulated in the close resonance of the two instruments	1, 3: non-intrusive 2, 4: Romantic, emotive
15.5 Authenticity with composer's intent	Not applicable	Not applicable	Not applicable	Not applicable	

Note. 1) Numbers refer to the four styles of music, 1: easy listening; 2: classical; 3: specially composed, MusiCure; and 4: jazz. NA= not applicable

Table 4.39 displays the results for the examples of four styles of music. The short fragments do not show a musical form. The classical composition is baroque, while the three other examples are contemporary. Only the MusiCure example is complex in structure. Easy listening and jazz have thin texture and use rests, and the classical and MusiCure examples have thick texture and no rests. No pauses were found, and all examples are homophonic.

The easy listening (1) and the classical (2) examples are stable in metre (4/4), and the jazz example (4) changes from 4/4 to 2/4 in the second bar of the theme and then continues within the 4/4 metre for the remaining bars. The MusiCure excerpt (3) has an introduction of 10 seconds' duration in free metre followed by a stable 4/4 metre till the end of the example, giving the impression of being a more complex piece of music than the other three examples.

Except for the introduction in the MusiCure example all excerpts have consistent underlying and predictable rhythm. Syncopation is a predominant feature in the jazz example. The tempo is predominantly slow in the classical and jazz examples, and moderate in the easy listening and MusiCure examples. The classical excerpt uses a short ritardando, and the three other examples are stable in tempo. Tonally all examples are diatonic; three examples are in major key (1,2, and 4), and example 3 is in minor key. No excerpts use alternations, and use stepwise movements in melody (easy listening) or in the bass (classical). Modulations to the dominant were commonly found. Stepwise progressions in melody are found in the easy listening and the jazz examples. The melodic structure is gradually ascending and descending in intervals that vary from small (easy listening) to larger (fourths, fifths, and octaves) in the classical, MusiCure and jazz examples. The predominant pitch in easy listening, classical and jazz is medium, and in the

MusiCure example the pitch is high (oboe) to low (cello).

No trills were present, and only few accents were found in the easy listening and jazz examples (none in classical and MusiCure). Pizzicato is found in the MusiCure excerpt in the cello underneath the legato melody played by the oboe, thus creating a rich texture and some tension between the two. The use of mute did not apply to any of these examples. All examples are characterised by consonant harmony and no dissonance alternations were found. In the easy listening and the jazz examples harmonic progressions were used in the transitions. The harmony is simple in these two examples, and rich in the classical and the MusiCure examples. Harmonic shifts are predictable in all four examples except for the introduction (0:00 – 0:10) in the MusiCure example where harmonic shifts are unpredictable. Perfect cadence points were found in all examples. Soft and predominantly unchanging volume was found in all four styles. Small variability in volume within a range from pp to mp happens gradually, and no special effects in this element were found in any of these examples.

Intensity in the form of tension and release was found in easy listening, classical, and jazz, whereas this element differed in the MusiCure example as tension builds towards the end of the excerpt with resolution absent, thus leaving a sense of ambiguity, unresolved tension. In the classical example tension – release happens more times (three) when compared to the three other examples. This may enhance breathing entrainment with the music in the listener. The moods are predominantly positive, though the classical example has a ceremonious and solemn atmosphere to it. An exception to these 'positive' moods are the more melancholic mood found in the MusiCure example.

Culturally all examples are of Western tonality and style, though the MusiCure example resemble a new age style due to the flowing synthesizer harmonies in free metre particularly in the introduction. Metaphorically the four styles may be associated with a sense of containment, support, and being held in a caring atmosphere. The long melodic phrases in the classical example in particular may act as a catalyst for the listener's breathing to flow with the music, and this example may be associated with a sense of being contained by something larger. Technically all examples are well performed. No overt interpretation or articulation of feeling or emotion was found in the easy listening and the MusiCure examples. This particular recording of the classical example was chosen for its romantic style of interpretation which is underlined by the legato playing of the long melodic phrases in the violins against the pattern of the cembalo playing a bass voice in notes of shorter values (eighths), articulating a sense of longing and a sense of coming home at the same time.

4.9.3 Summary of SMMA

The SMMA revealed that the easy listening example was simple in structure and harmony, thin in texture, and had little variability in metre. The rhythm is stable and predictable, the tempo moderate, and melodic movement happens stepwise in small intervals, and the pitch is in a medium range. Harmonically the example is predictable, and tension is released when the theme is repeated. The lack of overt interpretation and articulation of feelings may be perceived as non-intrusive by the participants. The simplicity and predictability in this example may be reasons why the easy listening style of music was chosen by the majority of the participants (25 out of 44).

The classical example was found to be of predominantly simple structure, thick texture, stable in metre, rhythmic features, and tempo; and predictable in rhythm and harmony. Further, the melodic elements are characterised by the long melody phrase, a pattern of tension/release, and a more serious, even divine atmosphere than the other examples. The romantic interpretation and articulation of feelings which may be perceived as an invitation to 'come home', to be safe and cared for, may be reasons for the fact that thirteen (of 44) participants preferred the classical style of music for their relaxation.

The MusiCure programme was chosen by only five participants (of 44) though it is of a composition and style created particularly for hospital settings. The introduction of this example was found to be unpredictable, and to use a shift in metre from free to stable. This example was complex in its structure, thick in texture, and with no rests. Further, the birds' voices could be experienced as disturbing. The unpredictability and the complexity of this example may be reasons that so many participants did not prefer this style of music for their relaxation given that the participants most felt their situation complex and unpredictable as it was before their heart valve operation.

Though the jazz example meets the criteria for music to be relaxing, this style was not chosen by any participants in this study. A simple explanation could well be that this modern jazz style is not commonly used for relaxation purposes, and it may be the least known style of music to the elderly population such as the participants in this study. This piece was composed for a film “Cinema Paradiso” in the late 1980's (1988) and could be too contemporary or avant-garde for the Northern Jutland population. More traditional and older styles of jazz may have a broader appeal to this age group.

4.9.4 Results of the Music Imaging Analyses, MIA

The results of the Music Imaging Analysis, MIA[66], of the excerpts of four styles of music revealed that a flat intensity profile was common to all styles. In addition, a similar structure of the intensity profiles of all programmes in total was found. This supports the relaxing qualities of the music in that no overt changes in intensity were identified.

4.9.5 VAS (descriptive analyses) *How helpful was the music for your relaxation?*

Measures of the participants' self-reported experience of how helpful the music was for their relaxation were made at three time points: pre operatively after the first session (time point 2); on a day between sessions three and four (time point 4), and at follow-up (time point 6) on a VAS within the range from 0 to 10. The measurement time points are displayed in the left column of table 4.40 that displays the means (M) and standard deviations (SD) in the sample (here *N*= GRM + ML), and in the two groups respectively. One participant in the ML group failed to complete this measure (therefore *n* = 21 in this group at time point 2).

TABLE 4.40

Means and standard deviations for changes in benefits of music (VAS) in two groups

Measurement time points	Sample GRM + ML	GRM	ML
Pre operative	*N* M (SD)	*n* M (SD)	
2 Post 1st session	*43* 8.06 (2.21)	*22* 8.79 (1.47)	*21* 7.30 (2.60)
Post operative			
4 Day between 3rd and 4th session	*23* 6.68 (2.58)	*10* 7.62 (2.23)	*13* 5.96 (2.68)
6 Follow-up 4-5 weeks post discharge	*25* 7.19 (2.28)	*10* 7.75 (2.78)	*15* 6.81 (1.89)

66 The Music Imaging Analysis, MIA, intensity profiles are found in appendix 4.3 on the CD-R accompanying this thesis.

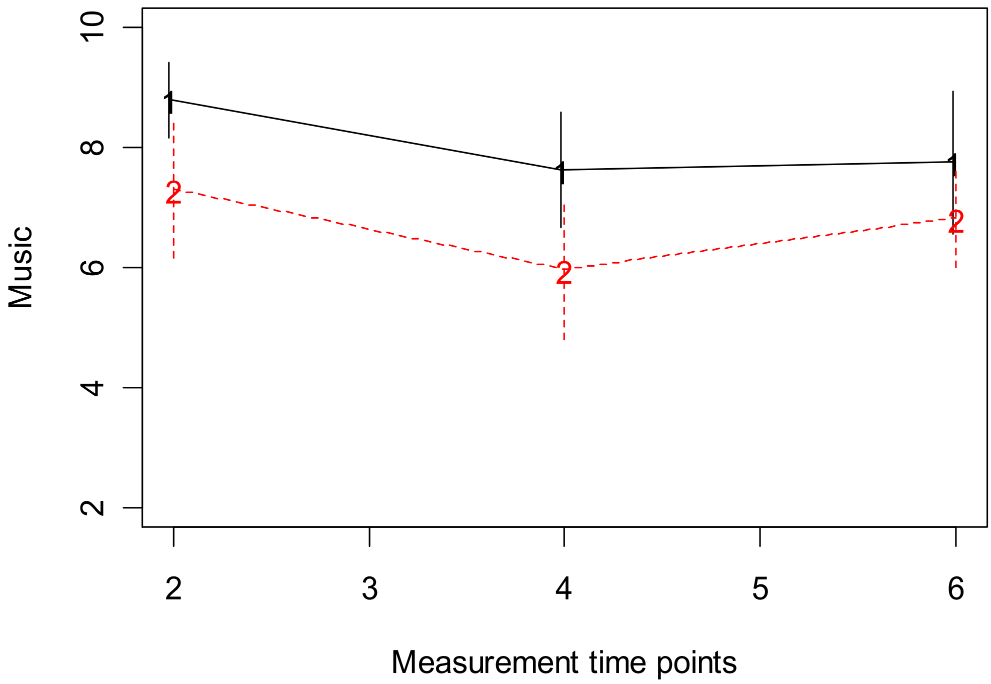


Figure 4.14. Interaction plot of means in benefits of music (VAS range 0 to 10) in GRM (1= black solid line) and ML (2=red broken line) groups.

The descriptive analyses of the benefits of music (VAS) found that the GRM group at all three time points of measurement reported the music to be more helpful for their relaxation when compared with the reported measures in the ML group (illustrated in figure 4.14). The values were reported in the upper range of the VAS (6 to 8.9), thus interpretation of these results should be made with caution. In both groups the decline from preoperative to postoperative measures (time points 2 to 4) may simply be an expression of the fact that the participants had no session when the time point 4 measurements were made. The ML group reported a mean value that had slightly increased when comparing from post operative to follow-up measures (time points 4 to 6).

4.9.6 Results of analyses undertaken with a linear mixed effects model on benefits of music data from the VAS

The results of the statistical analyses by a linear mixed-effects model of changes in the benefits of music as measured by VAS are presented in the following sections.

4.9.6.1 Comparison of benefits of music (VAS) from time point 2 to 4

In order to compare the effects over time, group and the interaction between time and group on the benefits of music as self-reported by the participants in the GRM and the ML groups, comparisons were made from the measurement taken after the preoperative session to a day of no session between the third and the fourth session (time points 2 to 4). The results of this comparison are reported in table 4.41.

Table 4.41

Effects of time of measurement, group and their interaction on benefits of music (VAS) measured from after the first session to day of no session (time points 2 to 4)

Source	*df*	*F*
Time: post 1st session to day of no session	1	5.78^{**a}
Group	1	4.58^{**b}
Interaction between time and group	1	0.81

Note. ^{**a} $p< .03$. ^{**b} $p< .04$. $N= 43/23$. GRM ($n= 22/10$), ML ($n= 21/13$).

Significant effects were found when comparing the measures made after the preoperative session to the day between sessions three and four ($p< .03$), and significant differences were identified in effects between groups. No significant differences were found in the effect of the interaction between time and group.

4.9.6.2 Comparison of benefits of music (VAS) from time point 2 to 6

In order to compare the effects over time, group and the interaction between time and group on the benefits of music as self-reported by the participants in the GRM and ML groups comparisons were made from post the preoperative session to follow-up (time points 2 to 6). The results of this comparison are reported in table 4.42.

Table 4.42

Effects of time of measurement, group and their interaction on benefits of music (VAS) measured from after the first session to follow-up (time points 2 to 6)

Source	*df*	F
Time: post 1st session to follow-up	1	3.47^{+}
Group	1	5.34**
Interaction between time and group	1	0.10

Note. $^{+}p < .08$. $^{**}p < .03$. $N = 43/25$. GRM ($n = 22/10$), ML ($n = 21/15$).

This comparison identified significant differences in effects of treatment on benefits of the music when comparing between groups the measures taken after the pre operative session and at follow-up ($p < .03$). Non significant differences were identified in effects over time, as well as in the effect of the interaction between time and group.

In the following sections the results regarding musical aspects are presented.

4.9.7 Musical aspects: *What made you chose this style of music?*

In order to answer the question "What made you choose this style of music style for your relaxation?" each participant was asked to prioritise the four most important elements of a list of seven. The musical elements (aspects) were: timbre, melody, harmony, tempo, and participants were also asked to prioritise familiarity, instrument, and soloist. These elements are listed on the y-axis in figure 4.15 which illustrates the mean scores of the participants' self-reported prioritising of the musical aspects. The x-axis depict the scores (range 1 to 4). The circles depict the mean scores in the GRM group; the 'pluses' depict the mean scores in the ML group. The three columns numbered 2, 4, and 6 indicate the three time points of measurement pre and post operatively. In both groups the same procedure for choosing music was administered. The participants only completed the question after their first session and therefore had different experiences of their relaxation. At all time points of measurement the GRM group reported high priority in 'melody' and 'tempo', while 'timbre' was given the third highest priority in regard to their choice of music. This group reported low priority in 'familiarity', and lower at all three times when compared to the mean scores reported by the ML group. In both groups 'soloist' is rated of the least importance for the participants' choice of music style.

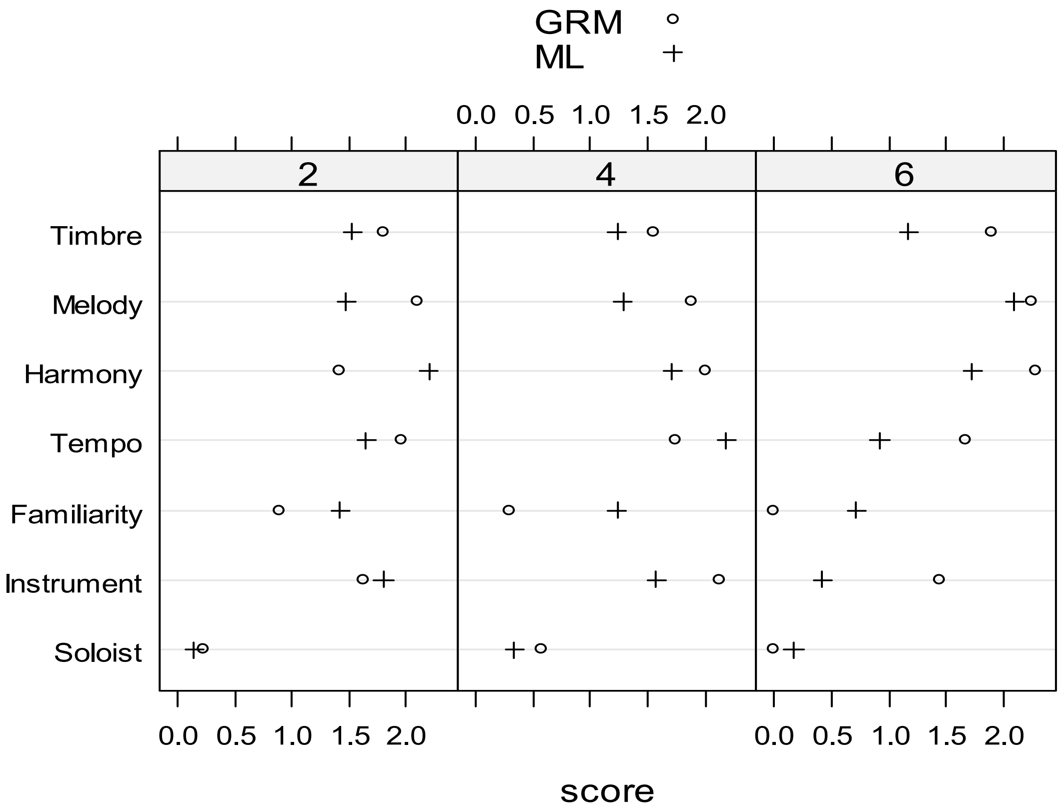


Figure 4.15. Mean scores of prioritised aspects of music informing participants' choice of music style

4.9.8 Musical aspects: *What aspects of the music were helpful for your relaxation?*

In order to answer the question "How helpful was the music for your relaxation?" each participant was asked to prioritise the four most important elements from a list of seven (the same elements as in figure 4.15). These elements are listed on the y-axis in figure 4.16 which illustrates the mean scores of the prioritising of the musical aspects completed by participants' self-report. The x-axis depict the mean scores (range 1 to 4). The three columns numbered 2, 4, and 6 indicate the three time points of measurement pre and post operatively. At all time points of measurement the GRM group reported 'tempo' to be of higher priority in regard to which musical aspects were helpful for their relaxation. This may suggest that the GRM group was more attentive to the music than the ML group, and that the tempo was enforced or underpinned by the guiding which was performed at a slow pace. Familiarity was given lower priority in this group than reported by the ML group. This aspect may have meant less to the GRM group because they experienced a relationship with the music therapist (RTM) whereas the ML group experienced the music listening with a person attending their session without engaging with the participants therapeutically. Similar to what informed the participants' choice of music, 'soloist' was given the lowest priority in both groups when reporting how helpful the music was for their relaxation.

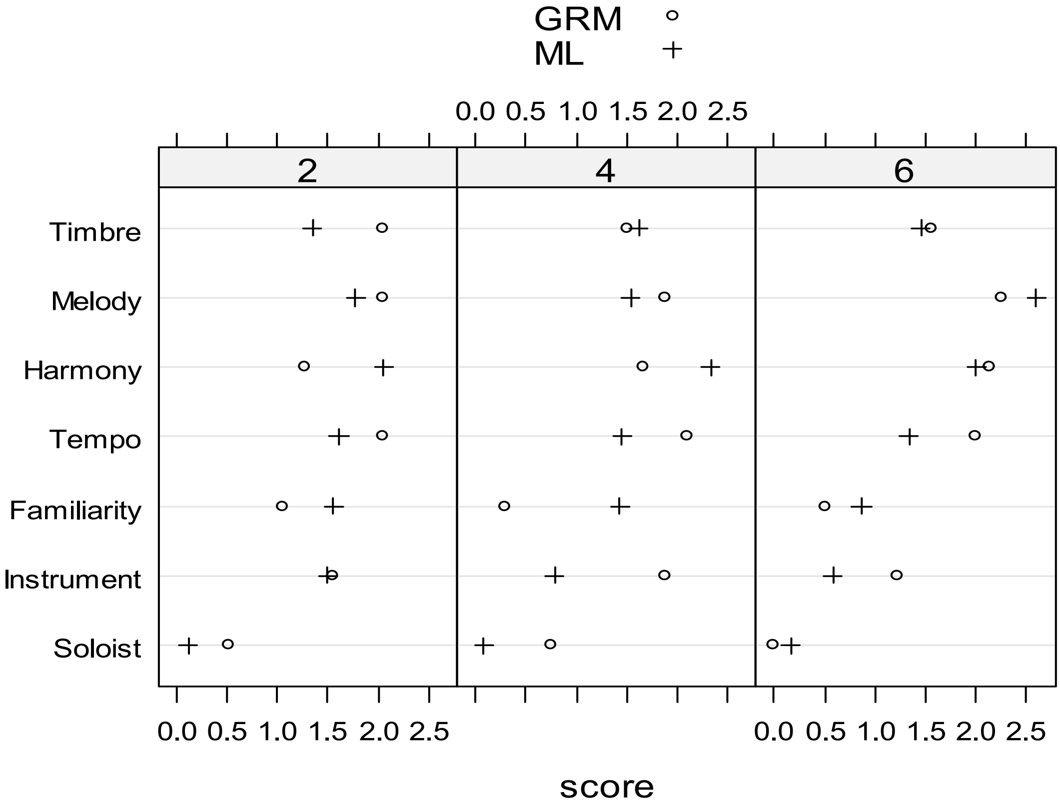


Figure 4.16. Mean scores of prioritised aspects of music helpful for relaxation

4.9.9 Summary of results relating to Music

In summary the easy listening and the classical style of music were preferred by 56.8 % and 29.5 % of the participants respectively in the two music interventions, GRM and ML. The specially composed music, MusiCure, and the jazz style were chosen by 11.4 % and 0 % respectively. The Structural Model of Music Analysis, SMMA, revealed that simplicity, predictability and no overt interpretation or articulation of feelings were characteristic features of the easy listening example and this may explain why the majority of the participants chose this style of music for their relaxation. The Music Imaging Analysis, MIA, found that a flat profile of intensity was common to all excerpts and programmes of the four styles of music.

In relation to the benefits of music self-reported by the participants on a VAS the GRM group reported the music to be more helpful for their relaxation at three time points of measurement than did the ML group. Significant differences were found of the effects of time and between groups when comparing measures reported after the first (pre operative) session (time point 2) to the measure taken between sessions three and four (time point 4). No significant differences were found in the effect of the interaction between time and group by this measure. Significant differences ($p < .03$) were also identified in the effects of treatment (group) on benefits of the music when comparing the measures made after the pre operative session and at follow-up (time points 2 and 6). No significant differences were identified in effects over time and in the effect of the interaction between time and group.

In reporting what made the participants choose their preferred style of music, the GRM group reported high priorities for 'melody' and 'tempo', while 'timbre' was given the third highest priority. This group reported low priority for 'familiarity', and lower at all three times when compared to the mean scores reported by the ML group. In both groups the 'soloist' element was given the lowest priority for the participants' choice of music style. This indicates that the musical elements melody, tempo and timbre are more important to the participants' when choosing their preferred style of music than their familiarity with the music.

When asked what aspects of the music helped the participants to relax, the GRM group reported 'tempo' to be of higher priority at all time points of measurement than was reported by the ML group. This suggests that the GRM group was more attentive to the music than the ML group, and that the tempo was regulated by the guiding. Similarly to what informed the participants' choice of music, the element 'familiarity' was given lower priority by the GRM group than by the ML group indicating that this aspect meant less to the GRM group because they experienced a relationship with the music therapist (RTM).

4.10 Results regarding Guiding

The following sections present the results regarding the GRM group's experience of how helpful they found the guiding for their relaxation, and in relation to the supplementary research question regarding what about the guiding helped the participant to relax. The results are presented in the form of descriptive summaries.

4.10.1 VAS (descriptive analyses) *How helpful was the guiding for your relaxation?*

In order to answer the question "*How helpful was the guiding for your relaxation?"* participants' self-reported measures were made at three time points 2, 4 and 6 by a VAS within the range from 0 to 10. The means and standard deviations in the benefits of the guiding, and the number of participants (*n*) who completed this measure at each measurement time point are reported in table 4.43.

TABLE 4.43

Means and standard deviations for changes in benefits of guiding (VAS) in the GRM group

Measurement time point	GRM	
Pre operative	*n*	M (SD)
2 Post 1st session	*22*	7.91 (2.12)
Post operative		
4 Day between 3rd and 4th session	*10*	7.46 (1.84)
6 Follow-up 4-5 weeks post discharge	*10*	7.46 (2.36)

The measures of participants' experience of how helpful the guiding was for their relaxation (VAS), as displayed in table 4.43, show that they reported their experience of the guiding as helpful for their relaxation at all time points of measurement with a slight decrease reported when comparing preoperative with postoperative measures (time points 2 to 4). The level of the reported mean value was sustained when comparing from postoperative measure to follow-up (time points 4 to 6). The histogram depicted in figure 4.17 of mean scores of the benefits of guiding (VAS) illustrates that the majority of values were distributed from 7 to 10. This histogram illustrates graphically the distribution of the data based on means of all time points of measurements, and at three different time points of measurement respectively. Histograms for each time point of measurement[67] show that the distribution of values at time point two was similar to that of the distribution based on means, whereas the distribution at time point 4, had more evenly spread values from 4 to 10. The numbers of participants who completed this measure at the post operative measurement time points 4 and 6 were much fewer than was the case at the preoperative time point of measurement. This suggests that some caution should be taken in the interpretation of these results. The results overall do suggest that the majority of participants in the GRM group found the guiding very helpful for their relaxation.

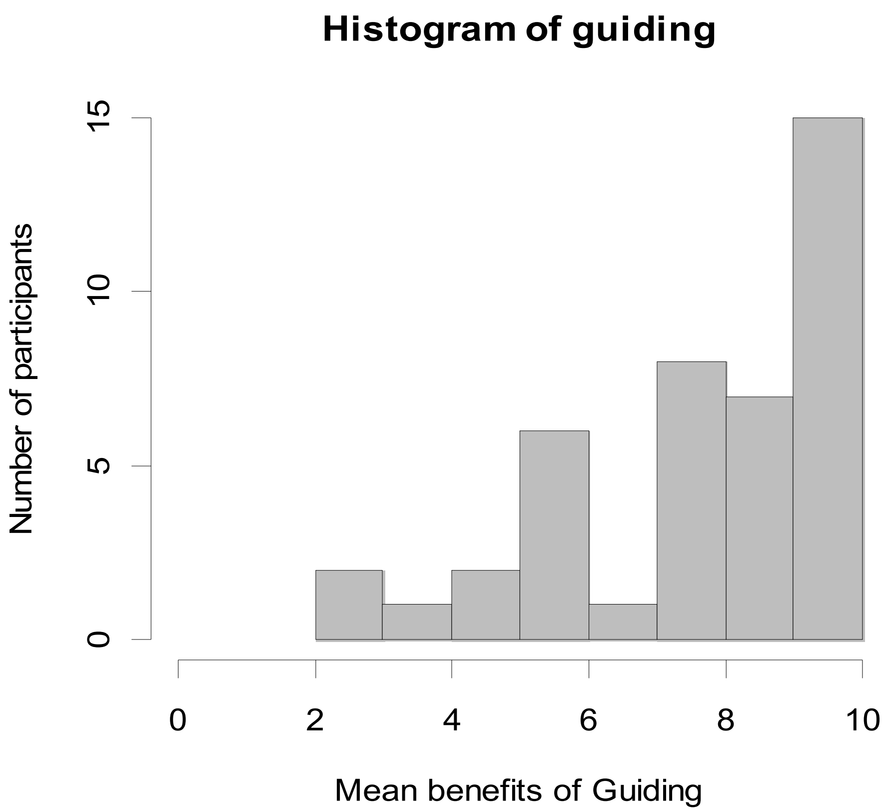


Figure 4.17. Histogram of benefits of guiding (VAS) in GRM group.

[67] Histograms of mean benefits of guiding at time points 2, 4, and 6 are found in appendix 4.4 on the CD-R accompanying this thesis.

4.10.2 Guiding aspects: *Which elements of the guiding were helpful for your relaxation?*

In order to answer the question "Which elements of the guiding were helpful for your relaxation?" each participant in the GRM group was asked to prioritise a list of five elements. These elements are depicted on the y-axis in figure 4.18. The range of scores (2 to 4) are depicted on the x-axis. This measure of the guiding elements was made at three time points: time point 2, 4 and 6 by the participants' self-reporting. The mean scores are marked by circles in the parallel dot plots[68] one for each of the three measurement time points.

The vocal aspects, voice and vocal timbre were reported of highest importance for the relaxation. That the guiding should fit well with the music was reported to be of high importance (3.5) at all three time points of measurement. The least importance was reported to be the tempo aspect of the guiding. Overall the most important aspect of the guiding in relation to the participants' experience of their relaxation was reported to be the vocal timbre. The importance of this aspect increases over time. This suggests that the participants have experienced a development of a relationship with the therapist over time, even on a day of no session this aspect was given the highest priority.

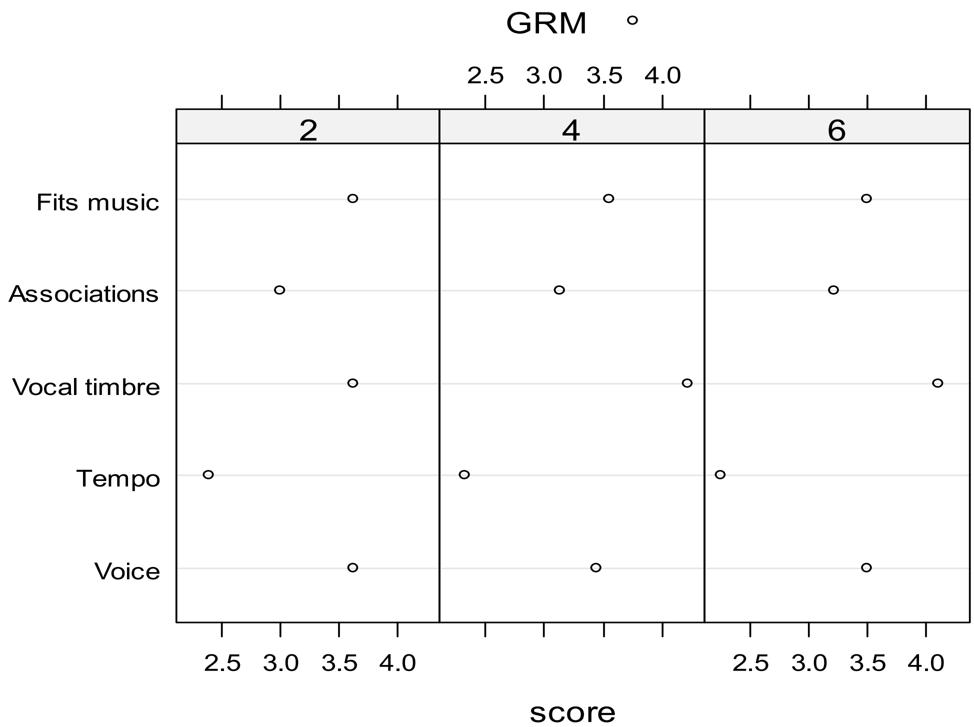


Figure 4.18. Mean scores of prioritised aspects of the guiding helpful for relaxation

[68] The score range on the x-axis is by default in the statistical programme arranged thus depicting this axis for the middle dot plot at the top, and for the first and the third plot at the bottom respectively.

4.10.3 Summary of the results relating to Guiding

The results of the descriptive analyses of the guiding from the VAS were that the majority of participants in the GRM group reported the guiding very helpful for their relaxation, though the distribution of mean scores was skewed towards the maximum value (10 on the VAS). This suggests that some caution should be exercised in the interpretation of these results.

The participants reported voice and vocal timbre to be most important for their relaxation, and the importance of vocal timbre was reported of higher importance on the measurement taken between sessions (time point 4) or after the full treatment at follow-up (time point 6). That the guiding should fit the music was reported to be of high priority for the relaxation to be helpful. This suggests that the participants have developed a relationship with their RTM through listening to her voice, and that they have experienced the music as an integral part of the intervention.

4.11 Results regarding Relaxation

In relation to the analyses of what aspects of the treatment helped the participant to relax the common condition in all three research groups was rest/ relaxation. The following presents the results in relation to the relaxation as self reported on a VAS by the participants.

4.11.1 VAS (descriptive analyses) *How helpful was it for you to relax?*

The benefits of relaxation were measured on a VAS within the range 0 to 10. The participants answered to the question "How beneficial was it for you to rest / relax?" The participants initially completed this question after their first session and therefore had different experiences of rest/ relaxation. The measures were made five times in total: pre operatively after the first session (time point 2); and postoperatively after the postoperative session when measures were made (time point 3); on the day of no session between session three and four (time point 4); at discharge (time point 5); and at follow-up (time point 6). In table 4.44 the means and standard deviations in measures of benefits of rest are displayed in the total sample (*N*) and in the three groups. For each group the number of participants (*n*) is displayed at each measurement time point.

Table 4.44

Means and standard deviations for changes in benefits of rest (VAS) in sample and three groups

Measurement time points	Total sample	Music therapy GRM	Music listening ML	Control NM
Pre operative	N M (SD)	*n* M (SD)		
2 Post 1st session	*63* 7.34 (2.38)	*22* 8.16 (1.88)	*22* 6.85 (2.89)	*19* 6.97 (2.08)
Post operative				
3 Post 2nd/3rd session	*44* 6.38 (2.60)	*13* 6.75 (2.62)	*17* 6.62 (2.35)	*14* 5.73 (2.93)
4 Day between 3rd and 4th session	*38* 7.55 (2.28)	*10* 8.48 (1.81)	*15* 7.01(2.19)	*13* 7.46 (2.64)
5 Post treatment/ at discharge	*31* 7.20 (2.50)	*7* 8.70 (1.78)	*10* 6.65 (2.52)	*14* 6.85 (2.64)
6 Follow-up 4-5 weeks post discharge	*39* 6.95 (2.27)	*10* 7.68 (2.11)	*15* 7.02 (2.05)	*14* 6.36 (2.59)

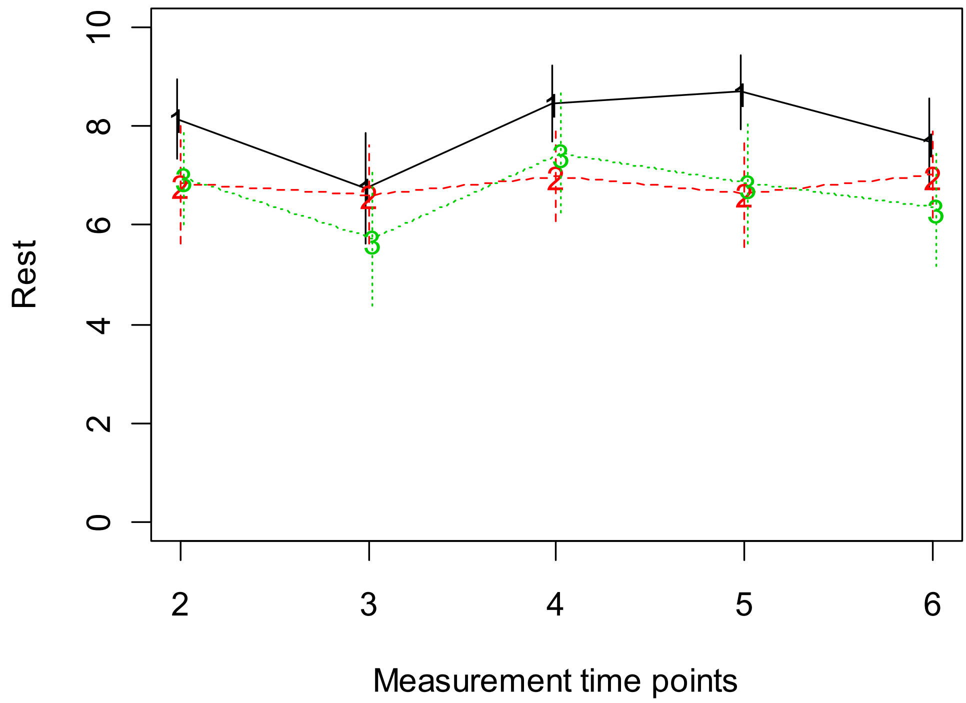


Figure 4.19. Changes in benefits of relaxation (VAS) in sample and three groups measured at five time points
Note. 1 black line = GRM group; 2 red broken line = ML group; and 3 green dotted line = NM group.

The GRM group reported greater values in the self-reported benefits of rest/ relaxation at all time points of measurement compared to the ML and NM groups as illustrated graphically in figure 4.19. Postoperatively the GRM group reported an increase in benefits of rest when comparing from the postoperative session when measures were made (time point 3) to the day between sessions three and four (time point 4), and this increase was sustained until discharge. The ML group reported their benefits of rest/ relaxation very evenly at all five time points of measurement. The fluctuation in the values reported by the NM group is parallel (in lower values) to that of the GRM group when comparing from the preoperative measure to the day of no session (from time point 2 to time points 3 and 4), followed by a continuous decrease in measures until the time of follow-up (time points 4 to 6).

4.11.2 Results of analyses undertaken with a linear mixed-effects model on benefits of relaxation from VAS

The comparison for rest / relaxation was performed in order to compare the changes over time from after the first session to discharge (time points 2 to 5). The influence of group is an important aspect in relation to rest/ relaxation, as rest was the common predictor in the three conditions. Table 4.45 shows the changes in the effects of time of measurement, group, and of the interaction between these factors.

Table 4.45

Effects of time of measurement, group and their interaction in benefits of rest (VAS) measured at five time points

Source	Measurement time points	*df*	F-value
Time: post 1st session to discharge (2 to 5)		1	0.57
Group		2	2.86^{+}
Interaction between time and group		2	0.74

Note. $^{+}$ *p* < .07. *N*= 63/31. GRM (*n*= 22/7), ML (*n*= 22/10), NM (*n*= 19/14).

As shown in table 4.45 there was no effect over time, or in the interaction of time and group.

4.11.3 Summary of the results relating to Relaxation

In summary the results relating to how helpful these periods of rest/ relaxation were to the participants show that the GRM group at all times of measurement reported higher mean values in their self-reported measures on a VAS when compared to the ML and NM groups and when comparing the scores from admission to discharge and to follow-up (time points 1 to 5, and 5 to 6). Nevertheless, the GRM group reported a slight decrease from discharge to follow-up (time points 5 to 6), and a slight increase was reported by the ML group between these time points. The differences between groups were not significant, and the changes over time were also not significant. The higher scores could suggest that the intervention of guided relaxation with music (group A) may be more helpful to the participants during their hospitalisation than the music listening intervention without guiding (group B) or rest/ relaxation without guiding and with no music (group C).

4.12 Results regarding late follow-up

In order to gather further information on the participants' experience of their relaxation in relation to their heart valve surgery a late follow-up with 4 participants in each condition (n=12) was carried out 6 - 18 months after the participants' discharge. These participants had received all four sessions to which they were allocated. The data were collected in the form of a self-reported structured questionnaire consisting of eight questions (Method, section 3.7.3). Except for question number 3, all questions were completed by participants' self-report on Likert type scales of varied values. For the convenience of the reader, the eight questions of the late follow-up are restated here:

1. How did you like the atmosphere while resting?
2a. How did you like that someone was with you while you were resting?
2b. How did you like resting on your own?
3. How relaxed did you feel after the resting periods?
4. Did filling in the questionnaires affect your benefits from the rest?
5. Did the rest periods influence your total experience of your hospital stay?
6. Do you think you could use this kind of rest another time at similar treatment?
7a. Did you like the music you chose for your rest?
7b. Would you have benefited more from the rest if you had listened to music?
8. Would you recommend this type of rest to others?

4.12.1 Descriptive analyses

The descriptive statistical analyses of the late follow-up are reported in table 4.46. The left column displays the numbered questions and their abbreviation for simplicity. In the right hand columns the results in three groups are displayed respectively. The minimum and maximum scores are displayed first, and are followed by the means (M) and standard deviations (SD in parentheses). Values in the reported measures regarding question number 4 differ from the values of the other questions, as the effect of the participants having to complete questionnaires as part of their participation is assumed to express a negative influence, even though the question does not leave room for such value judgement.

Table 4.46

Descriptive analyses of late follow-up

	GRM		ML		NM	
Questions (*scoring range)*			Min.-Max.	M (SD)		
1. atmosphere (*-1 to 2)*	2 - 2	2.00 (0.00)	1 - 2	1.75 (0.50)	0 - 2	1.25 (0.96)
3. relaxed (VAS) (*0 to 10*)	7 - 10	9.00 (1.41)	4 - 8	6.75 (1.89)	5 - 9	7.00 (1.63)
4. questionnaire (*0 to 3*)	0 - 2	1.25 (0.96)	0 - 2	1.25 (0.96)	0 - 2	1.50 (1.00)
5. rest influence (*0 to 3*)	2 - 3	2.75 (0.50)	1 - 3	2.25 (0.96)	0 - 3	1.75 (1.26)
6. use of rest (*0 to 3*)	2 - 3	2.75 (0.50)	1 - 3	2.00 (0.82)	2 - 3	2.75 (0.50)
8. recommendation (*0 to 3*)	3 - 3	3.00 (0.00)	2 - 3	2.75 (0.50)	2 -3	2.75 (0.50)
2.a company (*-1 to 1*)	1 - 1	1.00 (0.00)	-1 - 1	0.00 (0.82)	-1 -1[a]	0.00 (1.41)
7.a liking music (*0 to 3*)	2 - 3	2,75 (0.50)	1 - 3	2.25 (0.96)		
2.b resting alone (*-1 to 1*)					1 - 1[b]	1.00 (0.00)
7.b missing music (*0 to 3*)					1 - 3	2.00 (0.82)

Note. *N*=12. *n*=4 in each group. [a] Two participants in the NM group rested with an RTM present. [b] Two participants rested on their own before the protocol for this condition had to be revised due to increased anxiety reported by participants in the later clinical research period.

In this late follow-up, the GRM group reported higher values in relation to how they liked the atmosphere while they were resting than did the ML and the NM groups and the standard deviation was found to be zero as all four participants reported the highest possible value. In regard to how relaxed the participants felt after their sessions (question 3) the GRM group reported a much higher level of relaxation than was reported by the ML and the NM groups, and the standard deviation was slightly smaller when compared to the other two groups. The influence of having to complete questionnaires (question 4) on their relaxation was reported in similar mean values in the GRM and the ML groups, whereas the NM group reported this to have had a little stronger influence on their relaxation experience. The influence of the relaxation/ rest (question 5) was reported to be larger in the GRM group than in the ML and the NM groups. The nature or the value of this influence was not defined. Interestingly the GRM and the NM groups both reported the use of the relaxation (question 6) to be of higher value to them when compared with the value reported by the ML group, and the GRM group reported higher value in regard to whether they would recommend this type of relaxation (question 8) to others than did the two other conditions. The difference in mean values was small (0.25) as high values were reported in the ML and the NM groups. The GRM group liked their music better than was reported by the ML group (question 7a), and the NM group reported to be missing music to some extent (question 7b). As far as resting with someone present (question 2a) the GRM group reported this factor to be 'really reassuring', whereas it made no difference in the two other groups who experienced an RTM attending their session. This suggests that the guiding has made a difference in regard to establishing a reassuring environment for these participants. The participants who rested on their own in the NM group found it really reassuring which could suggest that the procedure for this group was experienced as safe enough for these individuals (question 2b). The small number of participants in this late follow-up suggests that caution must be taken in the interpretation of these results. Further, ceiling effects were found in the values of the self-reported measures in the GRM group from questions 1, 3, and 8 which underpins this kind of caution.

4.12.2 Summary of results relating to Late follow-up

In response to seven of the eight questions in the late follow-up questionnaire, the GRM group reported higher mean score when compared with the ML and the NM groups. In the three questions regarding atmosphere, recommendation for this kind of treatment, and resting in the company of someone present, there was complete agreement in the GRM group's reported measures. In question (4) regarding the influence of having to complete questionnaires, the standard deviations were similar and lower in the GRM and the ML groups than in the NM group. This suggests that all participants found this aspect of their participation in the study of some influence and presented them with some difficulties. The NM group reported similar scores to the question about how they liked resting on their own, and in how useful they found the rest as was reported in the GRM group. This indicates that the procedure of administering the NM condition was sufficiently safe. Given the small numbers of participants in the late follow-up, and the ceiling effects, caution should be exercised in the interpretation of these results.

4.13 Attrition

The large drop out in the GRM group after session 1 (seven participants) was due to the following reasons:

- participants' withdrew their consent (3)
- the operation could not be carried out because of atherosclerosis[69] (1)
- interruption in the clinical research (data collection) (2)
- and post operative complications causing severe mental confusion (1)

In the ML group five participants dropped out after the first session due to the following reasons:

- participants' withdrew their consent (3)
- the operation could not be completed (1)
- operation was postponed (1)

The large drop out in this group after session 3 (seven) occurred as the participants were discharged (transferred to local hospital) before they had the fourth session.

In the NM group five dropped out after their first session for the following reasons:

- participants' withdrew their consent (2)
- due to a concurrent cancer diagnosis heart valve operation was denied (1)
- interruption in the clinical research (data collection) (1)
- operation was postponed due to infection (1)

[69] Atherosclerosis: Hardening of the arteries.

4.14 Summary

The results of descriptive and inferential statistical analyses in relation to the hypotheses were presented in this chapter in eight sections regarding the outcome variables. The inferential statistical analyses were done by linear mixed-effects models for VAS anxiety and pain, UMACL-TA, POMS-37 and its factors, as well as for VAS satisfaction with stay. Analysis of length of stay was undertaken by a one-way analysis of variance, ANOVA. This was followed by the presentation of the results regarding the supplementary research questions and the predictor variables which were done by descriptive analyses of the participants' choice of music, of VAS benefits of music, guiding and rest/ relaxation, and of which elements of the music and the guiding respectively helped the participants to relax. The results of a late follow-up undertaken by descriptive analyses were then presented, and the chapter was finished with a section on the results in relation to the attrition in this study.

The main findings of this study will be discussed in the following chapter.

CHAPTER 5

DISCUSSION

The current study investigated the effect of Guided Relaxation with Music and Music Listening on selected outcome variables (somatic markers) on patients after their heart valve surgery, and which aspects of the interventions helped the participants to relax. The study was designed to examine these somatic markers in the form of anxiety, pain, and mood during the hospitalisation from admission to discharge, and to investigate the effect on the participants' satisfaction with their hospitalization, and the length of their hospital stay. Both standardised instruments as well as tools developed for the present study were used.

The theoretical background for this study explicated in chapter two found a wide variety of previous studies within diverse clinical areas exploring the effects of music, and the effects of music combined with other interventions within both the fields of Music Medicine and Music Therapy and Medicine. To avoid extensive replication of previously reported material, the results from the present study will be related back to the most pertinent of these previous investigations in order to establish the position of these findings as a link in a specific 'chain' of research.

This chapter will review and discuss the findings from the analyses in relation to the hypotheses and in relation to the supplementary research questions as presented in chapter four and will follow the same progression in order to provide a logical sequence in the current chapter. The interventions, the overall value of the study, its limitations, the general clinical relevance of the findings from this investigation, and the direction for future research will be discussed and conclusions will be drawn. In ending this chapter, the researcher reflects on the research process and her learning experience of becoming a researcher.

5.1 Discussion of main findings regarding Anxiety, Pain, and Mood

In this section, the main research question concerning the effect of guided relaxation with music is discussed in regard to the main outcome variable, anxiety, and to the two other psychophysical outcome variables, pain and mood.

5.1.1 Anxiety as measured by VAS and UMACL-TA

In discussing the results of the effects of GRM and ML it is worth noting that in general, anxiety decreases following a successful heart operation, and that the immediate response is one of relief (Petterson et al., 1999). This should still be expected even when no music or other interventions are applied except for standard care and medical treatment. In the present study a significant decrease was identified in anxiety over time (VAS scores), when comparing measures made on the day of admission to the day of discharge (time points 1 to 5). The expected reduction in anxiety may explain why non significant differences were identified between groups. The GRM group reported a larger decrease in this measure postoperatively when compared to the other groups when measured from after their operation to discharge (time points 3a to 5), though differences between groups were found to be non significant. In the following sections, the main findings will be discussed first in regard to the preoperative phase, and then in relation to the postoperative phase.

At baseline, the anxiety level was higher in the NM group and lower in the ML group than the anxiety level reported by the GRM group. After their preoperative session, the three groups reported a decrease in anxiety (VAS) to equivalent levels which is congruent with the findings reported from previous studies that investigated the effects of music listening applied in the preoperative phase only (Miluk-Kolosa et al., 1996, 2002; Wang et al., 2002; Winter et al., 1994; Yung et al., 2003). This decrease does not necessarily relate to the preoperative session. At the time of day when participants had their preoperative session, they had usually ended the examining and information meetings with the medical staff, and it is possible that the participants, after a long day, felt relieved to have a rest. Independent of which group the participants were allocated to, the preoperative session allowed the participants time to digest some of the day's impressions and experiences. Significant decreases in anxiety was reported by previous studies concerned with the preoperative use of music in which anxiety was measured by the State Trait Anxiety Inventory (STAI), (Wang et al., 2002; Winter et al., 1994; Yung et al., 2003). In only one previous study was anxiety measured by participants' self report on a VAS (Gaberson, 1995). In this study, the VAS was introduced to participants by explaining the horizontal line of the VAS as representing "the amount of worry, anxiety, concern or fear which patients may feel before surgery" (Gaberson, 1995, p. 787). Non significant differences were identified in anxiety between three groups receiving a session of 20 minutes of either listening to a humorous tape, music listening or usual treatment. The music was Steven Bergman: Omni Suite, described as an audiotape of slow, quiet, instrumental music. This result may relate to the fact that participants received only one session. A different explanation could be that the VAS was introduced by suggesting that patients experience anxiety and fear before their surgery, rather than asking participants to report their level of these feelings on the VAS with only an explanation of the range (from no anxiety to worst possible) and without intimating what other patients may or may not experience.

The GRM group reported a greater fluctuation in anxiety as measured by the UMACL-TA than did the other two groups. This fluctuation consisted of a decrease in anxiety from before to after a postoperative session, followed by an increase in anxiety reported by participants on the time point 4 measurement between sessions three and four. This may suggest an effect of the therapeutic relationship as the RTM engaged with the participants during their session, and when measures were made between sessions it is possible that not meeting with their RTM, and/or possibly missing having a session scheduled at that time, might be a cause of the reported increase in anxiety.

In the present study the non-significant decrease that was found in postoperative anxiety between groups is consistent with the reported findings from a previous study undertaken by Barnason et al. (1995) who reported a generalised relaxation response in all three intervention groups (music listening, music video, or scheduled rest), and found no significant differences for anxiety ratings as measured by a numeric rating scale and state anxiety instruments between the three groups. Blankfield et al. (1995) and Nilsson et al. (2003) reported no significant differences in ratings of anxiety between a group receiving a treatment of therapeutic suggestions with background music and a control group receiving standard care in postoperative recovery. The study by Nilsson et al. (2005) also reported a non significant decrease in anxiety in the treatment condition of music listening when compared to a control condition of silence. The findings in the present study are less consistent with the findings reported by MacDonald et al. (2003, study 1) and Mok & Wong (2003), who reported that postoperative anxiety was significantly reduced by a treatment of music listening when compared to standard care (control), and in Tusek et al.'s (1997) study comparing a guided imagery intervention with a control condition. Furthermore, the results regarding decreases in postoperative anxiety in the present study are contradictory to the findings reported by two particular studies which were concerned with similar populations:

a) Voss et al. (2004) who found that sedative music was more effective in decreasing anxiety in patients during their first chair-rest after open-heart surgery than scheduled rest, which is similar to a comparison of the NM and ML groups utilised in the present study, and
b) Tusek et al. (1999) in which the results indicated that guided imagery with background music significantly reduces pre and postoperative anxiety in patients undergoing cardiovascular surgery, which offers a more direct comparison of the GRM intervention and the NM group used in the current study.

The variety of music and relaxation techniques used within these various studies are possible reasons for the incongruence with the two studies mentioned above.

The reduction in preoperative anxiety in all groups may have influenced the participants' experience of postoperative pain, as presurgical worry has been associated with greater postoperative pain, poorer self rating of recovery, and a longer recovery time (Broadbent et al., 2003). Broadbent et al. found that patients who are more worried may pay more attention to their wounds and notice signs of pain and discomfort to a greater degree than their less worried counterparts.

A recent study (Twiss et al., 2006), reported that older participants (*n*=60) undergoing cardiovascular surgery who listened to music during and after surgery, experienced less anxiety than did the control group which received standard care, a finding contradictory to the results of the present study. It was not the intention of the present study to evaluate the possible effect directly in relation to speed and quality of recovery. Therefore based on the findings from the present study it is not possible to draw conclusions with regard to these aspects of recovery. This finding may nevertheless be of importance as a helpful treatment for a high level of anxiety is an indispensable component to facilitate recovery to full psychosocial competence and functioning (Rymaszewska et al., 2003). Furthermore, presenting the participants with a tool for relaxation that may help them experience less anxiety may also offer the patients a sense of control, and assist them in mobilizing both physical and emotional recovery, converting psychic activity into physical recovery (Short, 2003), or in other words, reconnecting to their own resources.

5.1.2 Pain as measured by VAS and analgesics from the electronic patient journal

At baseline, before their operation, the participants reported their pain levels on a Visual Analogue Scale (VAS) as very low and within a range of .54 to .99 (mean .76) and within such a small and sufficiently equal range that it is allows for comparison between groups. A range < 3 on the VAS is the level that describes an acceptable pain level (Nilsson et al., 2003). It was to be expected that an increase in the participants' pain levels would be reported in all the three groups after their operation.

In the postoperative phase, the GRM group reported the greatest decrease in VAS pain scores when measured from after their operation to discharge (time points 3a to 5), though differences between groups were non significant, and therefore did not confirm hypothesis 1b. This may suggest a tendency that GRM might be more effective in reducing postoperative pain than ML or NM. This result is different from to the findings from previous studies evaluating the differential effects of relaxation and music, and a combination of the two (Good & Chin, 1998; Good et al., 1999; 2001), which reported these interventions to be equally effective in reducing sensations of pain in surgical patients after their operations. The results regarding decreases in postoperative pain in the current study may be more consistent with the findings reported from the two particular studies referred to above concerning heart surgery populations:

a) Voss et al. (2004) who found that sedative music was more effective in decreasing pain in open-heart surgery patients (during their first chair rest) than scheduled rest and treatment as usual, which is similar to a comparison of the NM and ML groups used in the present study, and
b) Tusek et al. (1999) who found significant differences between groups in postoperative pain in patients undergoing cardiovascular surgery when comparing a group receiving guided imagery with background music with a control condition. The treatment condition of Tusek el al.'s study allows for a more direct comparison of the GRM intervention and the NM group applied in the current study.

A possible explanation as to why the results from the present study suggest that GRM may be more effective in reducing pain than the other two conditions could relate to the therapeutic relationship, particularly from the perspective that the GRM group reported an increase in their average level of pain on the day between sessions two and three when measures were taken. At this time point the GRM group reported their highest average pain level, which was then followed by the largest decrease from this point of measurement (time point 4) to the time of discharge (time point 5) when they had had another session. This suggests that the participants in the GRM group may have been more affected by not having a session than either the ML or the NM groups, neither of which involved an RTM / music therapist with an active therapeutic treatment role. The fact that the GRM intervention was introduced to the participants before their operation, and that sessions were repeated following their surgery, indicate that repeated periods of GRM as opposed to a single session, may be more effective in reducing pain, as suggested by Broscious (1999).

Music and relaxation have been recommended for moderate post operative pain, and also for postoperative pain management used as a treatment in combination with opioid medication (Good et al., 1999), and a reduction in post operative pain from the combined interventions has been reported by Good et al. (1999; 2001). Dileo & Bradt (2005) found inconsistent results regarding the effects of music medicine or music therapy interventions on patients' pain levels, and in surgical patients who participated in 22 music medicine studies, a small effect of music was found. The authors concluded that it is possible that other interventions which musically engage the patients in pain and anxiety management would demonstrate higher levels of effectiveness. These results imply that although music listening to pre-recorded music may be therapeutically beneficial for medical patients, music therapy interventions involving a trained music therapist, a therapeutic relationship, and a therapeutic process can produce significantly greater effects in clinical outcomes. Although the statement (Dileo & Bradt, 2005) refers to studies in which the participants were actively engaged in music such as instrumental playing or singing, it could apply to the different type of therapist-client engagement found in receptive methods when a trained music therapist is involved. In guided relaxation with music, the participant is engaged in a listening activity involving a relationship both with the music therapist /research team member as well as the music. In seeking a further explanation of the decrease of pain as an effect of the music therapy treatment, it should be considered that music not only functions as a distraction from the discomfort after surgery, but also relieves pain (Good et al., 1999) and it may provide the participant with comfort from a discomforting condition (McCaffrey & Good, 2000).

In regard to the results reporting the intake of analgesics, significant differences over time in paracetamol intake were found only when comparing measures taken from the day between sessions three and four (time point 4) to discharge (time point 5), and no differences between groups were identified. This result is similar to the findings by Nilsson et al. (2003) who reported no significant differences in postoperative morphine requirement between the three groups receiving sessions of either a) music listening, b) music in combination with therapeutic suggestions, or c) blank tape in the immediate postoperative recovery. The result is less consistent with the finding reported by Tusek et al. (1997) who evaluated the effects of Guided Imagery with back ground music (before, during and after surgery) on analgesic requirements controlled by the participants, and reported significant decreases in opioid requirements in the guided imagery group when compared to the control group. The findings reported from these studies are therefore inconsistent, and this may be due to either the variety in music therapy or music listening conditions offered, or possibly due to the varied sample size. The interventions utilised in these studies were also applied differentially in relation to the time of surgery.

There is no clear explanation as to why the GRM group in the present study had their pain managed primarily with strong opioids rather than mild opioids (at time point 3), and a smaller mild opioids intake registered than did the other two groups. The GRM group could have been more sensitive to not having a session (time point 4) than the ML and the NM groups, and therefore this group needed stronger pain treatment. Another possible explanation is of a different nature: When obtaining the information on analgesic intake from the electronic patient journals, medication appeared to depend not only on the needs of the patient but also on the medical staff on duty. Any differences in the prescribed combination of strong and mild opioids may be due to a number of factors, including physicians' practices related to patients' needs.

The findings in relation to analgesics intake in the present study are congruent with the results reported in a recent review (Cepeda et al., 2006) which stated that the decrease in opioid requirements by listening to music is comparatively minor. A recent RCT (Sendelbach et al., 2006) evaluated the effect of music listening versus uninterrupted rest on pain intensity and opioid consumption (as well as anxiety and other physiological outcomes). Participants were 86 patients undergoing either coronary artery bypass or heart valve replacement surgery who received 20 minutes of treatment (*n*= 50) or rest (control, *n*= 36). Sendelbach et al. reported no reduction in opioid usage in the two groups.

A Cochrane review on ”Music for pain relief” evaluated the effects of music on pain and opioid requirements (Cepeda et al., 2006). This systematic review included 51 studies (RCTs), and involved 3663 participants. Only music listening interventions were included, and studies using music with relaxation were excluded, because the effect of music alone could not be isolated in studies where these interventions were combined. The authors stated that listening to music for pain management offers potential advantages of low cost, ease of provision, and safety. Cepeda et al. write

> … that music reduced pain, increased the number of patients who reported at least 50% pain relief, and reduced requirements for morphine-like analgesics. However, as the magnitude of these positive effects is small, the clinical relevance of music for pain relief in clinical practice is unclear. (Cepeda et al., 2006, p. 2)

These review authors stated that the combination of music and other non-pharmacological therapies could have a synergistic effect producing clinically important benefits on pain and analgesics requirements. In conclusion Cepeda et al. recommended was that music should not be considered as a primary method for pain relief, and that listening to music reduces pain intensity levels and opioid requirements, and that the clinical importance is unclear as the magnitude of these benefits is small.

These results reported from the meta analysis by Cepeda et al. underpin the continued need for investigations into how music may support and enhance pain management in clinical practice. These authors included music listening interventions only, and had in fact excluded studies that utilized music listening in combination with other interventions, such as relaxation. It is therefore possible that further research into the effect of music therapy involving a therapeutic relationship such as that used in GRM may reveal greater effectiveness in reducing pain or assisting patients in coping with their pain. In future research a larger sample size may also reveal whether the decrease in postoperative pain as an effect of music therapy is a trend, and may also uncover significant differences between music therapy, music listening, and /or control conditions.

5.1.3 Mood as measured by POMS-37 (Total Mood Disturbance Scores in six factors)

In discussing the results from the POMS-37, implications of the normative samples according to previous research (McNair et al., 1992) will be addressed. The findings showed that the GRM group reported a greater improvement in mood from after their operation to discharge when compared to the ML group, but not when compared to the NM group. Hypothesis 1c was not confirmed as the NM group reported an improvement in mood similar to the GRM group. Hypothesis 1c was also not confirmed when comparing measures reported at baseline to those made at discharge where no significant differences were identified between groups.

In the present study the sample mean score of the TMDS at baseline was 11.42 which appears to be low when compared with a previous study (Chlan, 1995). After the postoperative session (time point 3) this had increased to 17.62, and decreased again at discharge (time point 5) to a total mean score of 9.68 (see table 4.26). For the participants in the GRM and the NM groups this meant that their overall mood improved by the time they left the hospital, whereas the participants in the ML group had a slight increase in their overall mood disturbance at discharge.

One study only (Chlan, 1995) was found within which the POMS was used for measuring mood in the hospital setting. In her pilot study, Chlan utilised the POMS short form (30 items) to evaluate the effects of listening to classical music selections on mood in patients who were mechanically ventilated. The participants were randomly allocated to either the music listening condition or a non-music group (head phones only). Results showed a mean POMS scores for the music listening group at baseline of 16.5, followed by post intervention scores of 9.9 after music listening, indicating that music listening was effective in promoting relaxation and improving mood. Due to their medical condition, the participants (*n*=20) only with difficulty were able to complete the form independently, and the POMS was found to be time consuming for this population as they needed assistance in filling it in.

The participants in the current study appeared not to differentiate their responses very much as 'not at all' (0) was often the selected value. There are more possible explanations for this type of response. The participant may have wanted to please the researcher who was present during the completion of the questionnaires (see also section 5.6.2.3). As an illustration of this, a female participant commented on the item 'angry' while she was completing the POMS-37 for the first time (at baseline), saying that she did not want to be angry, and therefore marked this item with a zero. I understood her comment in that she perceived 'anger' as a negative emotion, with which she did not want to associate. Her difficulty could be understood as being one of not actually feeling and recognising her emotions, but rather she appeared to consider the need to control which emotions were appropriate in the moment. A second explanation could be that some participants (this patient being one such) not only repressed any anxiety and tension that they may have experienced, but also other emotions, trying to stay in control of them selves. Culturally the population of Northern Jutland in general is known to be of an introverted rather than extroverted character and behaviour, and for not expressing their emotions verbally. The medical approach in somatic health care in a Danish hospital setting also does not necessarily encourage patients to communicate their subjective experiences and emotions in relation to their surgery and the following recovery. In this context, being asked about their emotions by way of the POMS-37, could well have been perceived as 'strange' or intrusive by the participants. A third explanation could be that the elderly participants, independent of the culture, are less familiar with differentiating their emotions to the degree that is required in the POMS-37, and it might have felt embarrassing to have to relate to so many items describing emotions in the company of the researcher and an attending relative.

When looking at the scores of the POMS factors, the responses regarding tension-anxiety and confusion-bewilderment are of special interest. For the individual factors in the GRM and the NM groups the mean scores for tension were 7.24 and 6.95 respectively at baseline, indicating a higher degree of tension than that reported as a mean (6.6) in a normative sample (see section 3.7.1.4) which would be expected in patients awaiting such an operation. Then at the postoperative measure and discharge stages this measure fell to 5.83 and 3.14 respectively in the GRM group, demonstrating a lower tension score than found in a normative sample (the latter being more than half the normative populations' value). In the ML group the mean score for tension at baseline was 6.22, a little lower than in a normative sample, and after the operation this group's mean score had reduced to 3.35, and then increased again at discharge to 4.73 which meant that the participants in this group had only a slight improvement in their mood when they were discharged. For fatigue the mean score in the GRM group was 5.08 (5.48 / 5.35 in the ML/ NM groups respectively) at baseline, indicating a lower degree of fatigue than that reported in a normative sample (5.8) which was not expected in patients awaiting such an operation as their heart disease can in itself cause fatigue. At baseline the participants could experience more vigour than fatigue because they were busy with preparation meetings on the day of admission. At the postoperative stage this measure in the GRM group rose to 10.54 (7.59/ 11.00 in the ML/ NM groups) and then fell to 6.83 (6.12/7.67 in the ML/ NM groups) at discharge, nevertheless demonstrating higher fatigue scores at these stages than found in the normative sample. This was expected, as undergoing an operation is very tiring. For confusion the mean score was 4.76 at baseline, indicating a degree of confusion similar to that reported in a normative sample (4.7) which would be expected in patients awaiting such an operation. The mean scores in this factor in the ML and the NM groups were lower (4.05/3.63) Then at the postoperative stage this measure increased to 5.50 which could also be explained when considering the after effects of anaesthesia and surgery. At the discharge stage this measure had decreased to 2.67, demonstrating a lower confusion score than found in the normative sample (almost half the normative populations' value). This may suggest that the guided relaxation with music intervention helped the participants to become relaxed and to demonstrate less general confusion and lack of understanding than the music listening or rest with no music. Such a mood enhancement is likely to be of benefit to the participants in their recovering from their heart valve operation. The fact that the GRM and the NM groups reported greater improvement in the Fatigue-Inertia (F) factor during their postoperative phase than did the ML group, suggests that the GRM and the NM intervention enhanced their relaxation so that they felt more rested and refreshed. In future research a larger sample may uncover whether the difference in the effects of guided relaxation with music on these six factors was a trend or proved significantly different from the effects of music listening or scheduled rest with no music.

Another aspect is of interest here in relation to the tension-anxiety factor of the POMS-37 which showed a gradual enhancement from baseline to discharge in the GRM group. This could have influenced the recovery period in a similar way to that suggested by Broadbent et al. (2003). The finding of mood improvement was congruent with the results from the study by Barnason et al. (1995) in which the music group reported significant increases in mood scores on their third postoperative day, and where the enhanced mood in the group receiving music could clearly be ascribed to the music listening intervention. In relation to these earlier studies, the findings of the present study showed that the ML group reported lower total mood disturbance after their postoperative session when measures on mood were made (time point 3), than was reported in the other two groups. This group also appears to have benefited more from the intervention of ML when compared to the GRM and the NM groups at the time when measures were made after their postoperative session (time point 3). This applies particularly in regard to the tension-anxiety, depression-dejection, fatigue-inertia, and the confusion-bewilderment factors. In contrast, at discharge (time point 5) the ML group in the tension-anxiety, vigor-activity and confusion-bewilderment reported more disturbance than did the other two groups.

The ML group appears to have reported a lower mean level in mood disturbance after their postoperative session (at time point 3) than was reported by the other two groups. This could suggest that the ML was a more beneficial intervention to the postoperative heart surgical patients at this particular moment in their recovery phase than either the NM group of scheduled rest or the music therapy intervention of GRM. From this finding we can speculate that the GRM intervention might be quite demanding when participants are fatigued after the operation. At the same time the data did suggest that the GRM also may have helped participants relax and focus their mind on the body, and have their anxiety levels reduced. The GRM helped reduce both tension-anxiety which made the participants feel more relaxed, and also confusion and bewilderment might have made them feel less confused, and consequently to be more able to focus on their body rather than on the environment. Therefore having to fill in a comprehensive questionnaire could be perceived by this group as more distressing than by the two other groups, because their state of mind was more inwardly focused as a result of the GRM than was the case in the ML and the NM groups. The shift from being in a relaxed state and having one's focus on the body to a state of mental activity requires cognitive activation which will need time and adjustment.

In the event of pain the participant could approach the medical staff for medication. Participants would generally experience pain, anxiety or other discomforts during their treatment, but they may not have thought it severe enough to refer to or ask for (pain) medication. Given the character and nature of these North Jutland participants, they may well have not wanted to 'make a fuss', and assumed that discomfort and pain should be expected. On a few occasions, participants had medication for nausea or pain right before the start of a session. This medication may have influenced the level of pain reported by the participants after their session. Timing of analgesics intake was not registered for the study, but the intake was given with regular intervals in order to keep pain levels to an accepted level for the patients. Participants appeared to experience a certain level of assurance from the medical staff when (pain) medication was provided immediately prior to a clinical trial session.

When participants completed the POMS-37, the similarity between items on each factor within the same questionnaire evoked comments bordering on complaints that they had already responded to an item (such as angry, annoyed, upset, irritated), and why did they have to do it again. Even though the POMS-37 was a reduced version of the original 63 item questionnaire and was a validated instrument to be used for elderly persons and after surgery (Shacham, 1983), it proved challenging to participants in the current study to complete this form. Particularly at the time of the postoperative session when measures were made, the after effects from the anaesthesia and fatigue made the completion of this instrument hard and tiring for the oldest participants. Furthermore, the POMS-37 comprised the last page of the questionnaire, which possibly enhanced the participants' resentment towards completing the POMS-37 when the first postoperative measures were taken (time point 3). Missing data from the POMS-37 more than from the VAS and the UMACL, suggest that caution should be used when interpreting and drawing conclusions from these results.

In the current study, participants were requested to respond to the POMS-37 in relation to their overriding mood state during the past week and the present day. As they stayed in hospital for an average of nine days, there would be some overlaps in the time periods (for example two responses were sought within a period of four days) for which their responses were given which could therefore limit variability in the responses. In relation to this, six studies on college students and psychiatric outpatients were undertaken by McNair et al. (1992). The authors pointed out in their interpretation of the POMS that the factors appeared to be relatively invariant independent of the rating period, whether it related to the immediate present or to a one-week period prior to the completion of the questionnaire. This can reinforce the argument that the scores reported by the participants in this study were sufficiently descriptive of the participants' mood disturbances at the times of measurements independent of the time interval between measures. It is possible that the participants themselves adjusted for the time overlap by responding more according to the present day rather than to the past week, or that their retrospective perception of their mood states influenced their responses.

One factor influencing the effect of music is that music preferred by the patients has been found to have a greater treatment effect in enhancing mood than did music selected by the investigators (Dileo & Bradt, 2005). This will be discussed further in the sections discussing music choice, music preference, and which aspects of the music helped the participants to relax.

5.1.4 Anxiety, pain and mood

The outcome variables anxiety, pain, and mood also interrelate in that pain will typically cause a patient to become anxious (Short, 2003). Previous studies have used music adjunct to the medical treatment procedures for its physiological effects and for its positive effect on the well being and mood of the patients (Bonny, 1983), and reported an experienced shift in participants' awareness toward a more relaxed and calm state (Updike & Charles, 1987). Possible associations between preoperative anxiety and postoperative mood and pain have been discussed by Munafò & Stevenson (2001). In their review of literature concerned with the association of state and trait anxiety with recovery following surgery, Munafò & Stevenson (2001) included 27 studies, and found consistent reports of associations between preoperative measures of anxiety and postoperative mood (and pain). Either elevated or noticeably low levels of preoperative distress may result in greater distress levels after the operation, whereas a generally moderate level of anxiety can, in a way, prepare the patient better for coping with the distress and suffering associated with the recovery following surgery (Janis, 1958). Stress can delay wound healing, and pain has adverse effects on endocrine and immune function (Kiecolt-Glaser et al., 1998). Munafò & Stevenson in their review did not include studies utilising music interventions, and while no direct conclusions can be drawn in regard to the effect of music from their review, it could be considered here that the possible anxiety reducing and mood enhancing effect of guided relaxation with music might be interrelated.

In summary, there is some evidence from the data that as guided relaxation with music may reduce anxiety and promote relaxation, complement pain management, and enhance mood, this treatment could play a part in supporting the rehabilitation process of increasing health and adaptation in patients recovering from heart valve surgery.

5.2 Discussion of the results regarding satisfaction with hospitalization and length of hospital stay

5.2.1 Satisfaction with hospitalization

The results regarding satisfaction with stay, VAS, showed no significant differences between groups at discharge and at follow-up, thus hypothesis 1d was not confirmed. The ceiling effects identified in all three groups may relate to the fact that the participants were relatively happy and relieved and pleased to have survived their heart valve operation (Cullberg, 2007; Petterson et al., 1999). In situations when participants are required to self-report, they may have wanted to do the polite thing and evaluate satisfaction positively (Waldon, 2001). Independent of the intervention in which they participated, it is likely that they were pleased with the treatment provided by the medical staff, as was often expressed by participants during the clinical trial. Two of the three groups included music listening (GRM and ML groups), while the third did not. Therefore it is not possible to suggest any correlation between the level of satisfaction and the participants' music preference or liking to the music as suggested by Thorgaard et al. (2005). This was also not an intention of the current study.

Satisfaction with hospital stay was measured by the Visual Analogue Scale (VAS) at discharge and at follow-up four weeks after discharge. The VAS ranged from 0 to 10 and no space was left with this instrument for the participants to differentiate between their medical treatment and potentially additional treatment effects of what was offered in the research condition to which they were allocated. It was assumed that the general question would generate differences between groups if their level of satisfaction was related to the research condition. It was left to the discrimination of each participant to interpret what satisfaction with hospitalisation meant to them. As ceiling effects were found in all three groups, this indicates that the VAS and the general question regarding satisfaction with hospital stay were not the best instruments for measuring this outcome variable. The professionalism of the medical staff was commented upon by some of the participants as an appreciation and assurance that they were well taken care of during their hospitalisation. If this was a general perception it might be a reason why all three groups, independent of the research condition, reported high levels of mean scores in their satisfaction with the hospitalisation.

Participants living outside the Aalborg area were transferred to their local hospital to continue their medical treatment which could influence the participants' satisfaction with stay. This factor was not controlled for in the design and as such a limitation of the present study. One participant, in the follow-up questionnaire, commented that he was not pleased with the treatment which he had at the local hospital after discharge from Unit T, and this was reflected in his response at the follow-up questionnaire. Therefore his response only in part related to his experience at Aalborg Hospital.

5.2.2 Length of hospital stay

The result of the descriptive analyses found a mean length of hospital stay two days shorter in the GRM group, though no significant differences were identified between groups. Hypothesis 1e was therefore not confirmed. The mean length of hospital stay was similar between groups when data was screened for outliers. This differs from the reported findings of the effects on length of hospital stay of guided imagery with background music when used before and after operations in the studies by Tusek et al. (1997; 1999). The result here is more consistent with the findings reported from studies investigating the effects of music listening used during operations (Blankfield et al., 1995; Nilsson et al., 2001), and with the results from the meta-analyses (Dileo & Bradt, 2005) who found no significant effects for reduced length of hospital stay for surgical patients across three studies.

The reason for a prolonged length of hospital stay in four of the participants (two in the ML group, and two in the NM group) was wound infections (sternum or leg where a vein had been taken for a bypass operation), and it would be of value in future research to investigate whether any differences might be found on the incidence and severity of infections when comparing conditions which might include music, music and guided relaxation, or controlled rest. The findings from Broadbent et al.'s study (2003) reported improved immune response in subjects who received music listening. A future study could explore whether adding guided relaxation to a music listening condition further strengthens the immune response.

Information on length of hospital stay was obtained from the participants' electronic patient journal with help from the research nurse with access to the hospital registry, and was found adequate in terms of providing the necessary information. In the hospital, length of hospital stay is calculated from the day after surgery to discharge, whereas in the current study, this period was calculated from admission to discharge. This means that participants who were admitted on Friday to undergo surgery on the following Monday would experience an additional two days to their length of hospital stay than participants who were admitted for surgery on Tuesdays, Wednesdays or Thursdays. A direct comparison of the actual number of days of length of hospital stay to other studies can therefore be misleading, whereas a comparison of the reduction in this outcome variable is less skewed.

For the patients recovering from heart valve surgery, there remains a question as to whether a shorter length of hospital stay is desirable. The expected length of hospital stay in Unit T is five days after the operation. During the first two postoperative days fatigue is prevalent, and the rehabilitation process generally increases more during the third to the fifth day. Whether patients feel ready for their discharge may be very individual and dependent on their physical and emotional condition, and also whether a solid network for support and assurance exists to reassure the patient that it is safe to move on and go home. The surgical procedure is an influencing factor on the length of hospital stay which is independent of a music therapy intervention. As described in chapter 2 (section 2.1.1) in recent years a 'sternum-preserving' type heart valve surgery has been applied which was the case in a few of the participants in the present study. As this surgical technique is less invasive and preserves the sternum, the risk of wound infections is less, and the expected recovery shorter than after a heart surgery involving an opening of the sternum.

Economically, a reduction in the length of hospital stay could have large implications for hospitals' budgets. The average length of hospital stay for heart valve surgery patients was 13 days in 2005 as reported from the Danish National Board of Health (Sundhedsstyrelsens Takstsystem, 2007[70], p. 66). A reduction in the mean length of hospital stay of two days, suggest economical implications for the hospital. At Unit T, approximately 120 heart valve surgeries are performed per year, and a mean reduction of two days would mean large costs savings.

---

[70] http://www.sst.dk/publ/Publ2007/SESE/Takstsystem/Takstsystem07.pdf

5.3 Discussion of main findings regarding Music

5.3.1 Participants' choice from four styles of researcher-selected music selections

There was no pre-assessment of the participants' music preferences in the present study on which the music selections could be based. The participants were asked to choose one from four pre-selected styles of music. The reasons for the choice of music style that the participants made before their first session in the GRM and the ML groups relate to the fact that the population in the present study are, in the main, elderly people. Easy listening was preferred by 25 out of 43 of participants in these two groups. The specially composed programme (MusiCure) was chosen by very few participants though this music was composed and designed for hospital settings, originally for intensive- and recovery units (www.musicahumana.dk). The elderly population may have difficulty in relating to this style of music also involving a combination with sounds from nature. The reason that the jazz programme was not preferred by any participants for their relaxation, may be that it was in a contemporary style unknown and therefore quite unfamiliar to this population, and the unfamiliarity could mean that they did not find this style of music relaxing.

The choices that participants made were based on listening to excerpts that each lasted 40 seconds. This length of music is assumed to be of sufficient length to get an impression of the music, and to decide whether this is something that the participants would find helpful for their relaxation. In a recent study (Good et al., 2005) the five selected styles of music played to the participants each used an example that lasted 30 seconds.

In previous studies, different choices of music were reported. MacDonald et al. (2003) in their two studies asked participants to select music (audio cassette) from their personal collection to listen to after their operation. The participants selected music based on what they enjoyed listening to at home. These authors found that popular music was the participants' preferred genre, selected by 82.35% in the first study and 70% in the second study. Classical music was chosen by 11.77% and 20%, and jazz by 5.89% and 10% in the two studies respectively. In a study by Chlan (1998) the researcher selected four styles of music, and 56% of the participants (n=27 in the music listening group) selected classical music, 28% preferred country and western, 12% easy listening, and 4% new age music. Jazz and MusiCure were not part of the selections offered to participants in Chlan's study, but the pattern of new age type music as being the least preferred is similar to the pattern in the current study[71]. The pattern in the choices of music that people make from researcher-selected music styles may suggest that the cultural context is reflected in some subjects' selections. For example, the American study (Chlan 1998) included country and western music, which is much more familiar and potentially popular in the USA than in Denmark. Whether cultural and ethnic background are influencing factors in the effect of music listening on anxiety was considered in the Chinese study (Yung et al., 2003) in which participants were given three choices of slow, sedative music (see table 2.2 in this thesis). Ten percent of the participants chose the Chinese instrumental music, 10% chose the Western instrumental music, and 80% chose the songs that were both Western and Chinese. These results indicate that in this study, the vocal aspect was more important than the cultural aspect in terms of reducing anxiety before surgery, and that the patients felt more assured by listening to voice rather than instrumental music, similar to the effect of a lullaby.

A more recent study published after the review of literature for this study was completed (Good et al., 2005) examined the effect of relaxation and music on pain for patients who had intestinal surgery. The participants ((N= 167) were randomly assigned to one of three intervention groups or control. The interventions were: 1) relaxation, 2) music, and 3) relaxation and music in combination. Five types of soothing music (from Good et al., 1999, see table 2.2) were provided from which the participants chose one. A third (32%) of the participants chose classical orchestral music, a quarter (26%) chose piano music, a fifth (20%) chose slow jazz, a little more than a tenth (12%) chose synthesizer music, and close to a tenth (11%) chose harp music. As described in table 2.2, no details of this music was provided in the Good et al. (1999) study. From the choices made both in the current study and previous studies, it is clear that no one particular style of relaxing music will be unanimously identified or predominately chosen by different populations to be their preferred style of music for the purpose of relaxation. Perhaps the most important identifiable (and logical) parameter governing choice could be the degree of familiarity of the individual participant with a style of music. In the current study, there is some evidence that the more popular music is also the more familiar music, and as in the studies by Spintge (1993), when patients approach surgery, they will very likely choose a style of music that will not challenge them, but will relate them to familiar experiences, thoughts, memories and environments. In fact, music that is likely to feel comfortable and safe for them is most likely to be chosen. This aspect should be considered in future clinical applications of the intervention used in this study whether with this population, or with others.

[71] In this context MusiCure is considered more comparable to the new age style than to any of the other styles included in the Chlan (1998) study.

5.3.2 A Structural Model of Music Analysis (SMMA)

The Structural Model of Music Analysis (SMMA) was used in this study to look at musical elements and characteristics of the chosen selections. Initially designed for the analysis of classical music in BMGIM programmes, the applied use of this tool (Grocke, 2007) demonstrates its comprehensiveness and inclusivity in analysing short excerpts of the music in this study.

The SMMA can usefully tease out characteristics in music that help both interpret and understand how preferences are shown. For example, the SMMA revealed that simplicity, predictability and no overt interpretation or articulation of feelings were characteristic features of the easy listening example. This may not be the only explanation as to why the majority of the participants chose this style of music for their relaxation. When participants were to select their preferred style of music, the four music excerpts were played in the same order for all participants according to protocol instructions: 1) easy listening, 2) classical, 3) MusiCure, and 4) jazz. It could be argued that participants would either best remember the first excerpt that they heard, or make a fairly immediate choice on hearing the first piece. Another possible explanation is related to the change in setting and atmosphere as the procedure of choosing music progresses. The participants were first given a brief introduction telling them that in order to choose their preferred style of music they would listen to four short examples of four different styles. This instruction was given in a normal tone of voice. Each sample of music was then introduced in a similar way. When the music began (the easy listening), there was a marked shift in atmosphere to a more relaxing state. Furthermore, the easy listening example consists of a short theme that is repeated, and the repetition, the slow tempo, the simple structure and the thin texture are all elements which could enhance a sense of relaxation. This change from a clinical research setting to actually experiencing an example of a piece of music intending to be relaxing may explain why the easy listening was chosen over the other styles of music, even though they all met the criteria for what characterises relaxing music. Furthermore, the choices which participants made reflect the individual's taste of music.

The SMMA revealed that the four excerpts express different moods. Bach's 'Air' is of a spiritual and solemn mood, corresponding to the category 1 (dignified) in Hevner's mood wheel (Hevner, 1937). The specially composed piece, MusiCure, is of a dreamy mood corresponding to the mood wheel category 3 (dreamy). The easy listening and the jazz excerpts are of a soothing, lyrical mood which corresponds to the category 4 (serene). Low complexity music communicates relaxation and peaceful moods, and a slow tempo can communicate a serene and dreamy mood. Soft volumes can be perceived as peaceful and tender, while small changes are related to pleasantness and a peaceful mood (Hooper, personal communication, 2005.) Perhaps the fact that there were few changes in the musical structure and style in the easy listening example was a reason why this style was preferred by most participants. The repetition of the short theme could also quickly familiarize the listeners with this style, and in this way add to their perception of the music as relaxing. The unpredictable introduction and the dreamy mood in the MusiCure excerpt are the most important likely explanations as to why so few preferred this specially composed style of music.

A Music Imaging Analysis (MIA), found that a flat profile of intensity was common to all excerpts and also to the full programmes of the four styles of music[72]. Considering the preferences found in the participants' choice of music for relaxation, the lack of any significant differences in the intensity profiles of the four excerpts and programmes does not therefore offer an explanation from an intensity perspective as to why the easy listening style was preferred over the other styles. However, these results do add to the description of the selected music, and enable some better understanding as to why they may be suitable for relaxation.

5.3.3 Benefits of music as measured by the VAS

In relation to the benefits of music self-reported by the participants on a VAS, the GRM group reported the music to be more helpful for their relaxation than the ML group at three time points of measurement (time points 2, 4, and 6). In both the GRM and ML groups the mean scores of benefits of music were lower on the day between sessions three and four (time point 4) and at follow-up (time point 6) than after the first session (time point 2). Significant effects were found over time and between groups when comparing measures reported after the first (pre operative) session to the day between sessions three and four (time points 2 to 4). This means that the intervention of guided relaxation in combination with music (GRM) in the present study was experienced as more helpful for relaxation than music listening (ML) alone, and that the benefits of treatment were seen as more helpful when first introduced to the participants than later when the participant thought back about the experience in hospital while filling in the follow-up questionnaire. No previous studies have been found that collect data from the participants in order to evaluate the effect or benefits of the participants' experiences of the music that was used as background for taped therapeutic suggestions or relaxation instructions.

[72] See Appendix 4.3 on the CD-R accompanying this thesis.

5.3.4 Aspects of the music informing the participants' choice of their preferred style of music

The participants filled in the questionnaires concerning how they experienced the benefits of the music once before their operation when they were anxious about the upcoming surgery, and after their operation when they were tired from the surgical experience. Both the GRM and the ML groups gave highest priority to 'melody' and 'tempo' when choosing their preferred style of music, while 'timbre' was given the third highest priority. Surprisingly perhaps, given the comments above, and the actual choices that were made, low priority was given to 'familiarity', and lower priority when compared to the mean scores reported by the ML group.

The most popular style of music chosen in the current study was the easy listening style. In the chosen excerpt, the melody had a shallow contour, a narrow pitch range, and repetition of a melodic phrase. The second most popular music was the classical piece in which the melody has a smoothly developing long phrase. The melody jumps around rather a lot, but is well supported by the harmony which gives the direction of the melody a very logical flow. There are typical repeated sequences of the melody, which also adds to the predictability, and encourages a sense of building familiarity as the tune progresses. The overall characteristics give a sense both of the melody, but more particularly of the long held harmonies in the middle between the walking bass and the melody, creating a sustaining, containing and supportive sound. These are all qualities that meet the needs of the participants for a calm, predictable and structured environment.

The tempo in both the easy listening and the classical excerpts is stable and slow, which are also characteristic of how the participants should be treated. Patients who have just experienced a life threatening disease and a big operation are very tired and become aware that they gently and slowly engage in a period of recovery. Their functional behaviour, such as getting out of bed, walking to the bathroom or to get a meal, will be much slower than average. This means that all activities around the patient need to happen gently and slowly, including music, so that this matches their own tempo in order for them to be able to relax and to feel secure. In short, the tempo has to reflect the recovery process in the participants after their heart operation. These aspects need to be carefully considered for the clinical application of guided relaxation and music, not only in choice of music, but also in the way in which the guided relaxation is administered, and will be commented upon in the section on clinical applications.

The instruments that are used in the easy listening excerpt were guitar and piano/ keyboard, and the overall quality of the sound is smooth, gentle, soft and clear, and no harsh sounds are produced. The guitar and the keyboard are played legato and gently, and the music is pleasing to listen to. The quality almost resembles a 'gentle touch' that would meet the needs of the participants for reassurance that they will be well, and are being cared for in the best way. The quality of the sound in the classical excerpt is warm, the instruments (strings and cembalo) are played in a soft way, and the richness of the timbre adds to the caring and assuring quality of the music, almost as if the music held the listener in a large comforting place of rest.

The least popular pieces, MusiCure and the jazz have melodies of more complex phrasing, and though they are also softly played, these melodies use a wider pitch range that could explain why they were preferred by few and none of the participants respectively. The complexity and unpredictability of the MusiCure excerpt, as well as its changing tempo at the beginning of the piece, do not accurately meet the needs of the participants for small and gradual changes as was the case in the easy listening excerpt.

5.3.5 Aspects of the music helping the participants to relax

In a similar way as discussed in the previous section 5.3.4 regarding aspects of the music informing the participants' choice of their preferred style of music, the GRM group reported 'tempo' to be of higher priority between groups (time points 2, 4, and 6) in relation to what aspects of the music helped them relax. This finding of tempo being important in selecting music for relaxation, was reported in previous studies (Burke, 1997; Good & Chin, 1998; Good et al., 2001; Hevner, 1937; Voss et al., 2004).

'Familiarity' with the music was given lower priority by the GRM group than by the ML group indicating that this aspect meant less to the GRM group possibly because they experienced in the foreground their relationship with the music therapist (RTM), rather than with the music, which would be lying more in the background. The ML group through repeated sessions would hear the same music each time, and therefore become more familiar with this element of their intervention.

5.4 Discussion of the results regarding Guiding procedure and Relaxation/ rest

In the following two sections the main findings in relation to the supplementary questions regarding the guiding procedure and relaxation/ rest are discussed.

5.4.1 Benefits of guiding procedure as measured by the VAS

The responses from the GRM group in relation to the helpfulness of the guiding procedure for their rest/relaxation, showed a skewed distribution of mean scores towards the maximum value (10 on the VAS). These participants reported the guiding procedure to be very helpful for their relaxation. Therefore the treatment met the needs of the participants to such a degree that they found it to be very beneficial for their relaxation. As a clinician and a researcher, I am pleased that this result reflects the benefits of the guiding procedure which the participants obtained from the treatment. This study was unique compared to all other studies in presenting the intervention 'live' rather than through a recorded version. This factor may have been the major reason why the participants found the intervention helpful for their relaxation. The presence of the therapist (RTM) influenced the situation in various ways during a treatment session. The participants receiving the music therapy treatment experienced not only someone sitting next to them while they were resting, but also the caring presence of someone being there for them and relating directly to them through the continuous guiding procedure while listening to music. The required therapeutic skill of the therapist was reflected in the pacing and adapting the guiding procedure to the individual and closely related to their preferred music. This level of attention could easily be seen as a luxury and something that was assuring the participant of special care because, in the hospital setting, the tempo is often high and the level of activity intense. The medical staff are easily interrupted while undertaking procedures with one patient due to the higher priority needs of somebody else, the occurrence of acute situations and shortness of staff at times. It is very difficult in modern health care to be so highly personalised and attentive to the needs of a patient so therefore this could be a good explanation as to why the distribution of the responses were skewed, and why the participants in the GRM group gave such high scores on how helpful they found their music therapy treatment.

Another aspect has to do with the participants' familiarity with the treatment and trust in the RTM. Bonny & Savary (1973, 1990) stated that the more the participants know and trust the guide, the more easily and quickly they will relax. Therefore the high level of benefits of the guiding procedure can be understood as a reflection of the fact that the participants, after three to four sessions, felt more familiar with the treatment and felt that they were able to relax well.

No previous studies that applied interventions of guided imagery with background music (Tusek et al., 1997; 1999) or of therapeutic suggestions with music (Blankfield et al., 1995; Mynchenberg & Duncan 1995; Nilsson, Rawal, Uneståhl, et al., 2001; Nilsson, 2003) have reported how the guiding procedure was performed or the quality of voice that was called for in order for the intervention to fulfil the purpose of the treatment. In one study (Nilsson, Rawal, Enquist et al., 2003) it was reported that the therapeutic suggestions were recorded with a male voice by a person with extensive experience in hypnotherapy.

5.4.2 Aspects of the guiding procedure helping the participants to relax

Voice and timbre were reported to be the most important aspects of the guiding procedure as far as helping the participants relax. It is not surprising that these aspects of the guiding procedure are reported to be of high importance. As stated by Bonny (1978) it is a basic impulse to produce vocal sound, and the association between breathing and the voice remains close and profound (Bonny, 1978, p. 13). The relaxation is affected by the quality and timbre of a voice, and the therapist /RTM should have a well-modulated voice quality which can be soft in an individual session (Grocke and Wigram, 2007). These authors state that a mid-range tone of voice that is kept fairly constant, adds to the effectiveness of instilling trust in the client. Trust was an important element underpinned by the instruction to the participants to let go, and to let the body relax. The expression 'to let go' was deliberately chosen in order to invite relaxation rather than sounding demanding and authoritarian.

High importance was also given to the fact that guiding procedure should fit the music for the relaxation to be helpful for the participants. This suggests that the participants have experienced the music as an integral part of the treatment, and that the relationship between the chosen music and the guiding procedure was important. This combination of the chosen music and the guiding procedure was the intervention that may have helped the participants to relax more than chosen music on its own. The pacing of a guiding procedure is important as it is difficult to relax if the therapist speaks too fast (Grocke and Wigram, 2007).

People who are in a frightening situation that makes them worry and become anxious are going to respond best if they receive a systematic and predictable type of intervention. The structure of the guiding procedure and the sequence of directions in which the participants' minds were guided to work through the body helped to provide a sense of systematisation, and that the guiding procedure was not happening at random, but was planned. The instructions were given as repetitive and very similar statements for each body part. There was a logical sequence to approaching each part of the body, starting at the feet. One part followed the other in the same order of appearance as the body is structured, and the parts of the body that could feel more sensitive and intimate to the participants, such as the pelvis and the bottom, were initially approached as part of a whole body region (the lower part of your body). The guiding procedure also mentioned the chest area as a whole rather than in detailed parts in order to leave it to the participant to choose how closely aware of their heart and sternum wound they wanted to be. The repetition would help the participants anticipate to which part the voice would guide them next, and this would be reinforced in the following sessions.

5.4.3 Benefits of rest/relaxation as measured by the VAS

At all times of measurement from admission to discharge the GRM group reported higher values between groups in their self-reported measures (VAS) of how helpful the relaxation was to them. Though differences were non significant, these results may suggest that the intervention of GRM may have been more helpful to the participants during their hospitalisation than music listening (ML) with an attendant or rest/ relaxation with no music (NM). Previous studies evaluating the effect of music in combination with scheduled rest showed that music interventions were more effective than rest on its own (Voss et al., 2004; Zimmerman et al., 1996).

The therapeutic relationship is what distinguishes the GRM group from the ML group, and therefore this is the most obvious explanation as to why the GRM group reported higher benefits of their relaxation /rest. The implications are that the participants who received the GRM intervention may have felt more relaxed and rested than the participants in the other two groups. This might influence their mood and their whole experience of recovering from their surgery and preparing to leave the hospital.

5.5 Discussion of findings from late follow-up

In the late follow-up the participants (n=12) had all their sessions in the condition to which they were allocated. Of this sample the GRM group reported the highest mean scores in seven of eight questions when compared with the ML and the NM groups. In three of these questions, namely the first regarding the atmosphere during their relaxation, the second as to whether they would recommend this kind of treatment to others, and the third regarding having the company of someone while resting, the standard deviations were zero demonstrating unanimity between subjects.

Given the small numbers of participants in the late follow-up and the ceiling effects, interpretation of these results deserve some caution. No generalisations can be made from the results from the small sample in this late follow-up. However, there was a trend towards more positive responses in the GRM group compared to the ML and the NM groups. Rather than ascribing their positive responses to the treatment, these could be ascribed to their wish to 'do the polite thing' and respond positively to the questionnaire, as suggested by Waldon (2001). In addition the participants' positive responses may be seen as a halo effect due to the fact that the researcher administered the late follow-up procedure, even though the participants filled in this questionnaire at home in their own time without the researcher present. This will require caution in the interpretation of results from the late follow-up, and in future research someone not directly involved in the research should administer this procedure.

Asking the participants to think back on their experiences of hospitalisation and their surgery 6 to 18 months after their discharge, could have elicited bad memories and feelings. Interestingly, all 12 participants would recommend the intervention they received to others in similar conditions, which suggest that patients appreciated that something extra was being given to them beyond the standard treatment whether they received guided relaxation with music, music listening or rest on their own. In fact, they did receive extra care in the sense that all participants (regardless to which group they were allocated) were taken to a separate, quiet room where they were provided with uninterrupted rest.

From a clinical perspective the contact with these participants was perceived as an additional attention, which was appreciated. This was the response I received from the telephone contact that was made to ask for their permission to send another questionnaire. All twelve responded positively to the request. Clinically it is very relevant to explore how patients, who have undergone a heart valve operation, experience their recovery, and how they regain a normal lifestyle. Further investigations of the somatic markers from the experience of living with heart valve disease and its repair or replacement, would be recommended. This exploration could be done through semi structured interviews or through a follow-up of sessions including dialoguing and processing their experiences.

5.6 Clinical method and clinical applicability

The clinical method guided relaxation with music was an outcome of the present study. From this receptive music therapy procedure came also the guidelines for the therapist, which included recommendations for the skills of the therapist. The process of selecting music for this intervention, and a procedure for how clients may choose their preferred style of music for their relaxation were also developed for this investigation. These procedures are discussed in the following sections as well as the clinical applicability of the intervention based on the study outcomes.

5.6.1 Guided Relaxation with Music

Guided Relaxation with Music, GRM, may be more effective in reducing anxiety than music listening with an attendant. The presence of an RTM attending the music listening sessions was included in order to isolate the influence of the therapeutic relationship. No previous outcome studies were found reporting on the use of a 'live' guiding procedure for relaxation, so this approach to music therapy in a post surgical setting is a new contribution to scientific knowledge. It was also evident from the literature search that no studies utilising music listening reported the presence of an attendant during the interventions, indicating that matching the influence of a therapist by the presence of an attendant was not utilised in previous studies. Examples of other receptive techniques for use in the hospital environment are found (Grocke and Wigram, 2007) such as breathing and autogenic induction as preparation for relaxation while listening to music. This relaxation programme was developed for patients undergoing bone marrow transplant and cancer treatment and includes the repetition of a personal affirmation at the end of the relaxation. In this music therapy approach, the participant is asked to follow the therapist's voice, which may add focus in the participants' awareness of the therapist. The instructions include suggestions that the patients feel their body, mind, and spirit, and in this way explicitly demonstrate a holistic approach to relaxation. No outcome studies of the effects of this approach were found in the literature.

The relationship between the therapist and the participant is what distinguishes the difference between the guided relaxation with music approach and the music listening approach in the present study. It is not likely that the words mentioning the participants' body in themselves may promote relaxation, as the GRM group reported a reduction in anxiety greater than did the

ML group. The way the therapist/ RTMs worked with the participants is what may have helped them reduce their anxiety. The relationship was based on the therapist giving the treatment and the participant receiving this treatment. It was very much based on the therapist's ability to inspire trust and assurance in the participant by her attitude, her voice and her way of keeping the right distance to the individual, and on the client being receptive to the guided relaxation and the music.

The guiding procedure appears to be the sole factor in building the relationship between the RTM and the participant. Initially, selecting their preferred style of music for their relaxation, the participants listen to four music excerpts. The music forms a background, almost like a base for the guiding procedure. The RTM is trained to phrase the verbal instructions close to the musical phrases and to let her voice be affected by the dynamics in the music. When the music is played through an audio pillow it is heard clearly by the participant who hears the voice guiding the relaxation from a short distance, but balanced with the volume of the music. In this way the music functions as an integral part of the treatment, and therefore also plays an important part in the development of the therapeutic relationship. The relationship relies very much on the participant and the RTM being together in an experience of the guided relaxation with music as an integral treatment, as no verbal processing is included.

Building a relationship between the therapist/RTM and the participant and adjusting to the individual idiosyncrasies of the participants within that relationship was part of the intervention and what needed to be done. The issue is about getting somebody to trust you to allow for this rather intimate intervention to be undertaken securely, and getting participants to think about and become aware of their body, relies on trust. The therapist /RTM need to have certain personality skills and a caring quality about them in order to be able to support an elderly person into doing this type of body and mind work.

5.6.2 Guidelines for the therapist as a guide

Guidelines for the music therapist/ RTM were specifically developed for the guiding procedure in the GRM intervention, and are as such an outcome of the present study. These guidelines outline the following points for the music therapist to be used when guiding a relaxation with music intervention:

- The *role* of the music therapist is primarily supportive.
- The *attitude* of the music therapist is to relate empathically to the patient.
- The *quality of voice* should sound warm, supportive, and with a rounded soft timbre.
- The *tempo* and *pacing* are calm and attuned to the patient's breathing, and musical phrases.

- In the *script* the word 'now' is recommended to be used regularly in order to support the patient in being present and aware of their body in the here and now.
- The *therapeutic process* evolves in the interaction between the patient, the music, and the music therapist guiding the relaxation and no verbal conversation is encouraged as the intention is to support the patient in relaxing.
- *Comments* from the patient – in the frame of a research setting – can be noted in a log for later processing.

These guidelines were developed in order to maintain consistency in the treatment of participants and they will need adjusting when they are applied in other settings and with different populations.

5.6.2.1 Guidelines for the attendant in Music Listening (group B)

In the music listening group (ML) guidelines for the RTM in the role of an attendant were developed in order to clarify and differentiate this role from the role of the therapist. The guidelines also spoke to the importance of the attendant not therapeutically engaging in conversation with the participant and gave specific instructions in how to address this when necessary.

In summary, these guidelines describe the process of welcoming the participant, explaining the role of the therapist, describing what will happen in the session, and how data will be collected. The value of developing these guidelines for the research is that in working with patients in a critical situation the therapist's approach and attitude provide assurance that someone is taking good care of them, and explaining what is happening while they are resting. These guidelines proved helpful to both the less experienced RTM's in knowing precisely what to do and how to behave, and to the experienced music therapists to control their inclinations towards wanting to act as a therapist in the ML group.

5.6.3 Skills of the therapist

Voice quality is the most important applied skill when conducting a relaxation session (Grocke & Wigram, 2007). During the clinical trials, participants would on occasion comment that my voice had almost a hypnotic quality for them. I think there is some truth in this, in that the voice quality used for the guiding procedure was more airy and soft than a normal speaking voice. The intonation also moved up and down in long phrases within the musical interval of a fifth in order to instil relaxation and to support the participants in letting go of tension in their body. In addition to the guidelines outlined above (section 5.6.2) Grocke and Wigram also write about therapeutic qualities for facilitating a relaxed state in a client, which includes some of the following ideas:

- The tone of voice needs to be mid-range, non-seductive, and should be constant and sustained in order to be effective in inducing trust, and engender a sense of safety.
- The voice must be projected so that the patient can hear the instructions, and yet still kept relatively quiet.
- The dynamics of the voice need to be less variable than that of an average normal speaking voice.
- The speaking pace needs to be slow, and with repetition which will enable the patient to relax more easily.
- The therapist can model the breathing audibly while directing the clients' attention to their breath.

These authors furthermore draw attention to the difference in voice quality when bringing the client to a relaxed state, and when bringing the client out of a relaxed state. When ending the guiding procedure, the tone of voice has greater dynamic variance, the therapist gradually increases the voice volume, and adds more dynamic to the voice quality.

In this intimate setting with mostly elderly clients, I experienced that the RTM's age (ranging from their early twenties to late fifties) influenced the way we each behaved when relating to the participants, and also that the participants perceived and responded differently to the RTMs. The elderly participants sometimes made a comment to the fact that they were not quite sure whether to take the treatment seriously when it was administered by a young RTM, and I had the impression that they needed assurance that they could trust the RTM.

Gender could be another aspect influencing the way participants perceived the treatment and their relationship with therapist/ RTM. The music therapist/RTMs in the present study were all women. When older male participants were given instructions by a young female music therapist/RTM to be aware of his body, particularly of the more intimate parts of his body, he might feel strange, embarrassed, excited or upset about the situation. An 'older' female therapist may resemble a mother figure and be associated with a caring presence and therefore the intimacy might have a more neutral quality to it. I am not sure how the elderly men would respond to a male guiding them in a relaxation procedure. They could relate in a very matter-of-fact way to the situation and feel positive about someone of their own gender being there for them. For some it could feel provoking to have a male therapist mentioning the more intimate parts of their body. A male voice needs to take care, as the female voice, to speak in an inviting and soft quality of voice. Of course these are subjective and speculative thoughts, nevertheless I think the gender of the therapist influences the relationship that involves an intimate setting. In this study no data was collected to explore these influences.

Previous training for some of the RTM's was also an aspect influencing the way they related to participants. Asking a very experienced therapist trained in Guided Imagery and Music (GIM) to administer a research session according to a 'fixed' protocol almost calls for an 'unlearning' process and an acceptance of what appears to be a very simple therapeutic strategy with limited room for flexibility. Working with a 'fixed' therapeutic design is different from a widely used approach such as GIM that is flexible and individualised. Training differences were revealed in that the qualified music therapists or the students in training at the Aalborg programme understood methodological research issues and the reasons for the quantitative design and questioned these in order to better administer the sessions in line with the researcher's intentions.

5.6.4 Selecting music for relaxation

As outlined previously in this thesis (section 2.4.4) very few studies clearly defined the criteria by which the music had been selected for the investigations. A procedure for the selection of relaxing music was developed for the present study. The criteria for this selection were based on potential elements in sedative music as outlined by Wigram (2004). Vocal components were accepted in the music selections with nonverbal expression only in order not to interfere with the vocalized guided relaxation.

During the process of searching for music that would best serve the purpose of relaxation, it was intended to seek for CDs where it was specified on the cover that the music was intended for relaxation. This proved less effective in finding good examples than identifying music that met the criteria defined in Wigram's potential elements in relaxing music (Wigram, 2004). Commercial music selections such as 'No stress' (1999, 2001) subtitled "18 compositions for pure relaxation" contained one and four compositions respectively that met the criteria for potentially sedative music whereas 14 and 17 compositions on these CD's respectively would meet the criteria for potentially stimulating music (Schou, 2007). The process of selecting music and compiling programs for a specific purpose such as relaxation is quite complex and time consuming, and it may be difficult for clinicians in their daily work to make individualised selections for their clients. This type of selection also requires that the music therapist has access to a large musical library, and that the music therapist has knowledge of a large repertoire (Hooper, personal communication, 2005).

In developing criteria in order to determine the selection of sedative music for research Hooper (personal communication, 2005) extensively reviewed the literature regarding the influence of musical factors on emotional expression. From this review, Hooper found characteristics of sedative music including some of the following:

- The musical *form* is simple
- The *tempo* is slow
- The *volume* is soft
- The *melody* uses a narrow pitch range and has a soft timbre
- The *harmony* is consonant and relatively simple

Hooper also said that statements about consistency and predictability were less frequent than the above mentioned characteristics.

In investigating the structural elements of music that most influenced moods, Hevner (1937) found 'tempo' to be of most importance, similar to the finding from the present study where the participants gave highest priority to tempo as discussed in a previous section (5.3.5) in this chapter.

The sequence of the music selections were, to the greatest possible degree, based on the iso principle so, for example, tempo would gradually slow down from the start of the program to the end. From the point of reference of the effect of the music on mood, occasional comments from participants that the excerpt from Bach's 'Air' reminded them of a funeral might suggest it could generate inappropriate connotations for this type of study (and population), while Grieg's cradle song could create associations more in the direction of relaxation. In the course of administering treatment in the guided relaxation with music intervention, I often therefore wondered whether the solemnity and associations of Bach's 'Air' made it the best for the beginning of a session.

5.6.5 Procedure for the clients' choosing their preferred style of music for their relaxation

The procedure of choosing a preferred style of music was developed for this study and is discussed here for its clinical applicability. Providing patients with a choice of music between selected styles that meet the criteria for the purpose of relaxation was previously reported to be of importance for the effectiveness of music in reducing anxiety (Dileo & Bradt, 2005; McCaffrey & Good, 2000;

Standley, 2000). Furthermore, the patient may experience a sense of control by choosing the music for their relaxation (MacDonald, 2003). One study (Good et al., 2005) reported the procedure for the participants' choosing their preferred style of music, the duration of the music excerpts that were played to the clients, and how they selected their preference.

The procedure in the present study was similar for the GRM and the ML groups, and required that:

- The therapists made sure that the volume suited the participants.
- The participants were informed that they would listen to their chosen style of music in all their sessions. This was based on the results from Pelletier's (2004) meta analysis (*n*=22) on the effects of music on decreasing arousal due to stress, which demonstrated that just by learning music subjects increase their ability to relax more when listening to music. The issue here is that increased familiarity with the music is likely to increase the potential for and the speed at which relaxation occurs.

5.6.6 Clinical applicability

The results showing that guided relaxation with music may reduce anxiety in patients who undergo heart valve surgery, suggest that this type of music therapy method may be relevant for this population. The large drop out of subjects did not appear to be a result of this fairly novel music therapy intervention although some patients expressed that due to their age they did not feel it was appropriate for them to participate in the study. Therefore considerations on how to familiarize the participants with this intervention are important. If the participants allocated to a treatment of guided relaxation with music received one to two sessions prior to their admission to hospital for their surgery, they would familiarize themselves with the treatment, be able to benefit from the sessions, and possibly have their anxiety and stress levels decreased. Further research into the importance of the therapeutic relationship and its effect on anxiety are needed.

An issue that occurred during trial sessions was the phenomenon of counter transference. What happened was that a sense of intimacy grew as the guiding procedure progressed, and at first this phenomena caused me to wonder if the guiding procedure and the mentioning of the parts of the participant's body was too intimate or even inappropriate. The most intimate atmosphere actually occurred with one male participant in his early sixties who was emotionally more open (crying, smiling) than was common to the participants. Some adjustment on my part was needed in order to encompass and stay with this level of intimacy. As verbal interaction was not possible, one way of dealing with this issue, was to change my attitude specifically towards an accepting and caring presence and to let this colour the quality of my voice while guiding. To let the situation be exactly what it was without understanding totally what it meant. After a little while things seemed to settle and any sensations of inappropriateness were gone. Such experiences can of course be understood as a sign of my own insecurity being in the role of both a therapist and a researcher in a medical setting with a population that was new to me introducing a novel treatment. Additionally, some people when in a relaxed state, fear a loss of self-control (Bonny & Savary, 1973, 1990). The fact that the relaxed state is induced in a way that is unfamiliar to them, might add to such a fear.

However, another perspective is that this shift in the therapist is a way of differentiating the participants. With some of them the treatment felt suitable, and maybe it felt caring to some of the participants. What makes this caring is that the participants may experience that the music therapist is thinking about how to help them cope with the present and anticipated feelings in their body in the best way, and this is intimate. People coming in for heart surgery for the first time would not be able to know the effects they will feel physically, and therefore won't be able to either anticipate them, or know how to manage them. In addition people may want to protect themselves against these anticipated feelings by not preparing for them. So with people who are a bit 'rough' or appear more insensitive, one can get a sensation here is a person who doesn't really want to deal with this sort of issue, and who might find the guided relaxation invasive or even strange. Psychologically it can feel invasive that somebody is manipulating your mind to think about your body, and this type of person might say that he does not want to lie in bed and have his 'bottom' named in the presence of a stranger (the therapist). Particularly in mentioning the 'bottom' the sensation of the treatment being a bit intrusive would occur, but not in all cases and not as a common trend. This may speak to the qualitative difference between what is accepted from an evidently 'medical' person, such as a nurse or doctor, dressed in a uniform, and an apparently non-medical person, such as a music therapist, not dressed in an identifying uniform, or apparently not coming from a profession that deals with physical health. The music therapists wore name tags so that they were identifiable as research team members in this study. Still, the participants might have seen the RTMs as a therapist other than and different from the medical staff, and that they thought it possible to regard this person from a different profession as someone to whom they could talk and relate regarding matters other than their physical health. I think the statement from the woman who wanted to take me home with her, made a good example of such differentiation of the roles of the health personnel. It could be seen as helpful to the participants to relate to 'ordinarily dressed' people who do not remind them of their physical illness and draw their attention away from the discomfort of the early postoperative recovery.

A theoretical consideration may clarify what type of counter transference is at play in regard to the above description of intimacy. I believe that all counter transferences are useful because they help the therapist improve the treatment. What first comes to mind here, is the term *empathic* counter transference as described by Mary Priestley (1994), by which the therapist becomes aware of her physically experienced resonance to unconscious or preconscious emotions in the client. Though the experience is empathic, it is not exactly the type of counter transference that is happening. The experience depicts my reaction to a participant who is becoming embarrassed, and this type of counter transference could almost be called a sensitivity measure. I am being sensitive to the person I am working with, and becoming aware of the participant's embarrassment, problems, difficulties or anxieties about what I am doing with him (her). Through a small modulation, I distance a little more to the participant and take on a little more clinical attitude; not quite as cosy and friendly. The purpose of making these differentiations is to help the participants feel that what is happening with them is a professional intervention. Furthermore, the importance of assuring the participant that nobody was trying to physically touch them is an important aspect of these modulations. So, though very subtle, this type of counter transference is useful as a sensitivity measure to the way the therapist administers the intervention. It is necessary that the therapist has a certain personality style and maturity in order to be able to do it. Some of the qualities in a guide that are relevant in this context, are mentioned by Bonny & Savary (1973, 1990) and include the concept that the guide (therapist) should be emotionally stable and able to provide trust and confidence for the listener. These authors also draw attention to the fact that the guide should personally have experienced a relaxed state of mind and body, and that the right empathic and caring qualities may be acquired from experience and training.

5.6.7 Contraindications

In scheduling treatment sessions the clients' conditions need to be taken into consideration. In this study, the intervention was offered to patients at a time when they were feeling very tired and perhaps too sick to cope with participating in a research study. Sessions scheduled too soon after the operation can feel overwhelming and cause tension in the patients, as it involves a move from their hospital room to the room where clinical sessions happened. When planning and administering sessions of guided relaxation with music, particularly with elderly people (within a research study), it is important to consider the following contra indications:

- Patients who feel that the treatment is invasive and embarrassing to them when having parts of their body mentioned by the RTM/ music therapist may become tense and may benefit more from a guiding script that contains no specific mentioning of parts of their body that feels intimate to them (such as 'your bottom').

- ♦ Following heart surgery patients may feel discomfort if they lie down too flat on their backs. Due to chest pain, they may need to sit in a more upright position. The patients decide which position is comfortable for them by adjusting the head rest if they are in a hospital bed. It is important that they breathe only as deeply as it is comfortable for them, and are given the choice to have a pillow under their knees (and /or in other places as the patient needs). The benefits of supporting the spine with a pillow under the knees is also noted in relaxation work with physically handicapped clients (Grocke and Wigram, 2007, p. 221).
- ♦ Due to hearing impairments, elderly participants need to feel that they can hear the music well enough otherwise poor reception can raise anxieties. In order to prevent that being a contraindication volume needs adjusting.
- ♦ Inappropriate scheduling of treatment (during visiting hours) raises anxiety levels. It will be important in future studies to include a close relative in the exact scheduling of sessions (within the given frame), or to consider sessions outside visiting hours.
- ♦ Having to fill in questionnaires immediately before and /or after a session can be problematic in research protocols.

Filling in the questionnaires immediately after a session proved challenging to participants. As one participant stated, she would like the treatment but would not have to deal with being part of research. In addition to these precautions Grocke and Wigram (2007, p. 123) point to a consideration of the following aspects that are relevant in relation to the planning of relaxation sessions for adults:

- ♦ Patients who are confused (due to the after effects of anaesthesia) may have difficulty understanding abstract concepts, and may engage better with relaxation scripts that are short or have instructions to follow.
- ♦ Patients who feel vulnerable or feel they are being watched may have difficulty closing their eyes during relaxation experiences, or may need to open their eyes to make sure they are safe.
- ♦ Patients who need physiological support such as oxygen, may experience pain or restriction to deep breathing during relaxation. Therefore the relaxation script should either avoid instructions about deep breathing, or include a comment like 'only breathe as deeply as is comfortable'.

5.6.8 Therapeutic perspectives on clinical application

The guided relaxation with music treatment was intended to help the participants think mindfully and acceptingly about their body. The assumption was that this intervention would address the anxiety that is being produced by the way they feel about their body, and to offer something that is going to help their body to relax and calm down. The guided relaxation with music is designed conceptually almost as a 'mindful massage' or a mindful way of working through their body. Partly this approach is similar to the autogenic training (Schultz & Luthe, 1969) in which a person works through the body by paying attention to the breathing and trying to work with different parts of the body. Therefore a good thing about the guided relaxation with music is that it may actually help people to reduce their anxieties and worries about their body, particularly their heart which is failing them. Not only the malfunction of their heart can cause anxiety, but pain and discomfort from the operation, and the sorts of aches and pain that older bodies might experience.

It is reported that people having heart operations may be in denial about the severity of their situation, its impact on their body, and how to cope with it, and this may be useful during hospitalisation (Lazarus, 1999). They may not want to think about what is happening to their body, especially inside their chest, and their main focus will be on wanting to get out of the hospital as soon as possible and get on with their lives (personal communication with head nurse, Unit T, 2004). This can be understood as a positive and forward looking way of coping with a stressful situation. In order to resume their lives the patients have to make some resolution to the physical trauma that has happened to their body, and come to accept the way it is at a level that is appropriate for the individual. This was a reason why the Bonny Method of GIM was used with patients who experienced coronary artery bypass (Short, 2003). Short stated, that not only is there a physical trauma, but also a trauma of psychological, emotional, social, and spiritual nature, that must be addressed when a patient wakes after a bypass grafting, in order for full healing and return to a positive lifestyle to occur. Guided relaxation with music may help patients after heart surgery to focus and become aware of the needs of their body.

I think that people of the older generation are familiar with this attitude of denial towards something unpleasant. If you don't talk about it or pay attention to it, it will go away which may be coupled with the attitude of 'suffering in silence' and not to complain. It causes intense worry and anxiety in people who have been fairly healthy to suddenly experience that their body, and particularly their heart, fails to function properly, in a way is 'letting them down' or deceiving them. My general impression was in meeting this population that not only had they a great trust in the medical care that they received, some were concerned that they did not add to the work load of the staff. When administering a session during a Sunday, participants would occasionally comment in an appreciative way that we spend a holiday for their sake.

These perceptions are more therapeutic, interpretative and subjective in nature, and based on the author's clinical knowledge and experience. As a comparative example, clients who have suffered severe trauma, such as those who are survivors of torture, may also not want to talk about their experiences at all as talking about them can be experienced as a re-traumatisation of the events. This was reported by Brown (1997) who in working with women traumatised from violence, emphasized that well meaning therapists run the risk of retraumatizing patients if the process of uncovering the trauma is initiated before a trusting relationship is established. Considering the characteristics of a surgical trauma and the short-term treatment used in the current study, it is understandable if some participants felt mentally removed from being attentive to their body. The participants were in control as to exactly where they had their minds while they received the GRM treatment, and to what degree they followed the instructions for relaxation. They could let their mind wander between the voice guiding them, the music, their body, or other sounds in the room or from the outside. However, the instructions of the guiding procedure were directed at the participants, and suggestive of their need to be aware of their body. At times a participant would make small movements of the part of his/her body that was in focus, and in this way the therapist had an indication that the participant was following the guiding procedure closely. It is possible during the guided relaxation that participants could be aware of pain or discomfort in the part of their body that was in focus. It was assumed helpful for the participants to be more aware of their body and learn how to manage the different sensations arising from either their illness, or from the treatment that they were receiving.

5.7 Limitations of the study

In this section the limitations will be discussed first in relation to the research method and the interventions used. This is followed by a discussion of the generalizability of the findings from the study, confounding variables, and attrition and the reasons why patients reclined to participate.

5.7.1 Guided Relaxation with Music and Music Listening

There was no report or observations made that participants did not comply with the guided relaxation with music, yet it was not systematically reported if participants fell asleep during the treatment. It was considered beneficial to the participant to rest, and sleep was unavoidable for some participants particularly on the first day after their surgery due to fatigue and after effects of the anaesthesia and the surgery. The guided relaxation with music contained no demand or control that the participant understood the verbal guiding procedure. The researcher noticed that some participants would gently move the part of the body to which their attention was guided, but there was no specific measure of whether the participant actually followed the guiding procedure or just relaxed while listening to the music and the voice guiding them. No specific adaptation was made if a participant experienced pain or other discomforts, and the guiding procedure left no room for the participant to express specific needs in relation to the intervention. The guiding procedure allowed for small adaptations, but no differentiation was possible whether an individual needed to hear more music and less verbal instruction, or was in need of the music more in the background and the verbal instructions in the foreground. Such further adaptations could be included in order to meet the individual needs of the patients.

Many of the issues that emerge when developing a manualised procedure can be compared in a metaphorical way with methodological issues when developing a mixed methods approach using fixed and flexible designs. In the present study a ‘fixed clinical design’ was used in order to collect concrete, quantitative data to evaluate the effectiveness of this approach and of a music listening approach. A ‘flexible clinical design’ however, would have allowed for delivering and monitoring the intervention more individually, but would not have made it possible to compare the effectiveness of the treatment either within or between groups. The experiences of counter transference as discussed above (section 5.6.) informed the research regarding the limitations and restrictions of the fixed clinical design. The individual needs of the participants varied and were, based on my perceptions and observations, very much dependent on their differing personalities and personal backgrounds of which the demographics collected provided only limited information.

From a clinical perspective the potential flexibility of the intervention would rely on the therapist being aware, sensitive and flexible to the client's reactions at a particular time.

The fixed procedure allowed for no conversation that might influence the process, except for a brief introductory greeting and an ending comment. Adding verbal dialogue regarding the person's experience to the treatment of guided relaxation with music adds the opportunity for the therapeutic process to become conscious to both music therapist and client.

The music styles were limited to four, and additional styles of music could be added when offering patients a selection of styles to choose from for their relaxation. In previous studies undertaken in surgical settings, music styles different from the music used in the present study were included, such as compositions by Steven Halpern (Barnason et al., 1995; Heitz et al., 1992; Zimmerman et al., 1996), and new age music (Nilsson et al., 2003a; Nilsson et al., 2003b; Nilsson et al., 2005; Voss et al., 2004).

The guiding procedure only includes the mentioning of the chest area as a whole, and includes no mention of pain sensation or suggestions of imagery. In stead, the participants are allowed some time to bring their awareness to this particular area of their body and add their own quality of awareness to it. This was intended to provide acceptance and reassurance, allowing for the participants experience to be exactly as it was. In this way the participants may have felt in a quite relaxed state, and having to distinguish 37 items (POMS-37) describing a variety of mood states could be perceived as challenging and possibly disturbing to their present state of being. Conversely in the ML group the participants could listen to the music as they chose to, and let their mind focus on relaxation, on their body or to just let their mind wander as they pleased.

The audio pillows that were used in this study allowed for only a limited range of volume. This was sufficient to be heard by the participants, and audible to the RTM while guiding the participant only at a close distance. The room in which the clinical sessions were monitored had a noisy ventilation system which was constantly working. New equipment (Maysound) has since been developed (www.maysound.dk) and is currently being tested in hospital settings in Sweden. The results from this investigation will show whether this type of equipment may function better with the elderly population in a hospital setting.

In the music listening intervention, unlike what has been reported in the literature, an RTM attended the sessions without therapeutically engaging in conversation with the participants. Some may have perceived this as assuring, others as confusing why someone was with them while not talking to them. While this was explained to the participants in the ML group, participants may have felt the need for further clarification of the role of the attendant. It may be possible to leave it to the participants' own choosing whether to have someone present or to rest alone while they listen to music.

5.7.2 Research method

It was a limitation of the current study, that no assessments of the patients' state or trait anxiety were made prior to their inclusion, and therefore patients' anxiety was not controlled by assessment prior to inclusion in any of the groups.

A methodological limitation of the study is related to the number of times that the participants' were asked to self report their level of anxiety. This was particularly so in relation to the postoperative session (time points 3a, 3b, and 3c) when participants were required to report their anxiety on the VAS before and after their session, and on the UMACL-TA before their session and after their session on two time parameters. This second measure (UMACL-TA) required the participants to report retrospectively on their experience during the session, and on the same instrument on how they rated their experience after the session. The results showed similar values in their responses regarding their experience during and after this postoperative session which suggests that the participants did not appear to distinguish between these experiences. Occasionally participants commented that they had already responded to this question when they were again asked to fill in the UMACL-TA. There could also be some influence on the participants' perception of the experience because this instrument was copied twice on the same page allowing the participant to see the responses that they had just written. This may represent a limitation in how appropriately differentiated (or not) the scores may have been.

It is a limitation of the present study that only half of the participants had all of the four sessions to which they were allocated. The trend that participants drop out of a study, sooner rather than later, was reported by Carpenter et al. (2002).

Demographics such as the participant's musical background in the form of knowledge or training was not obtained in the study, and analysis of such data was considered to be outside the realistic boundaries of this enquiry. In addition, the literature search found no music medicine or music therapy in medicine studies supporting differences in the receptivity of hospitalised patients based on their musical background. The results from Pelletier's (2004) meta analysis (n=22) on the effects of music on decreasing arousal due to stress demonstrated that just by learning music subjects increase their ability to relax more when listening to music. The findings from the present study do not add to the understanding and knowledge of whether the musical background would, in a similar way, influence the cardiac surgical patients' relaxation.

This study was concerned with recovery in Unit T, therefore information relating to treatment undertaken during surgery or in the ICU was not collected. Medical nursing studies concerned with the peri operative phase report according to criteria set by the American Society of Anaesthesiologists, giving ASA - risk scores, duration of surgery, duration of ECC time, duration of ICU care, anxiolytic treatment, β-block treatment and other haemodynamic drugs, and sum of analgesic use during surgery (Nilsson et al., 2001; Nilsson et al., 2003; Nilsson et al., 2005) as these factors may influence the patients experiences of recovery. It is a limitation of this study that this information was not recorded and the influence on the results remains unknown. Their possible influence on the participants' rest and sleep is not known, and incidents of nightmares are not systematically recorded in Unit T. Medication to control the pulse, heart rate and the blood pressure is part of standard treatment in Unit T and information on these types of medication was not collected for this study. In future research this information may be included in order to gain knowledge on the influence of these uncontrolled variables.

5.7.2.1 Questionnaires

Questionnaires were partly validated instruments (VAS, UMACL-TA, POMS-37), and partly developed specifically for the present study (questionnaires regarding the supplementary research questions). All measures, except for analgesics intake and length of hospital stay, were self reported by the participants.

The VAS appeared easily manageable for the participants, whereas the UMACL-TA proved to be complicated and incomprehensible to participants, especially in the first postoperative days. The positive and negative items relating to tense arousal are mixed in the order in which they are presented, and some explanation was typically necessary even though the participant had filled in this questionnaire on two previous occasions before the postoperative measure (at baseline and after the preoperative session). It was necessary to allow for a verbal response from the participants as the questions were read out loud (by the RTM) to the participant while he/she was looking at the questionnaire and verbally expressing his / her answer. This was very tiring for the participants in the early postoperative phase, and became one of the reasons for withdrawal from the study in the early stages of the clinical trials.

Fewer missing data were reported for measures taken by VAS and the UWIST-TA than for the Profile of Mood States (POMS-37) and questionnaires regarding the supplementary questions. This suggests that VAS is an easy instrument to understand and to complete for the population in the present study, whereas the POMS was found to be more comprehensive and challenging by the participants.

The questions regarding the supplementary research questions concerning the music aspects and the guiding procedure (vocal) aspects of the treatment were found to be complicated, or hard to make sense of for the elderly participants. The number of questions may have to be reduced, and the musicological terms replaced with musical words more common to non-musicians, though a risk here would be to lose specificity and accuracy in evaluating what aspects of the music and the guiding procedure helped the participants to relax.

The structured late follow-up questionnaire[73] was developed for this study by the researcher. In this questionnaire, two questions were concerned with how the participants experienced the atmosphere while they were resting (1) and how they liked the company of someone present while they were resting (question 2a). The responses to these two questions were given on Likert type scales containing the expressions 'really enjoyed it' (1) and 'really reassuring' (2a) as measures. In regard to question one, three other levels are suggested ('enjoyed it to some degree', 'did not notice', 'did not like it at all'), and for question 2a, another two levels of responses were possible ('it made no difference', 'would prefer resting alone'). The word 'really' is suggestive of a positive level of assurance, and there is quite a gap between the expression 'really reassuring' to the following option of a response that it made no difference. The expression 'very reassuring' may well be enough to distinguish this level from the other levels as a positive experience. This type of overemphasising a positive experience suggests further caution in the interpretation of the results of the late follow-up.

5.7.2.2 Administration of questionnaires (bias)

The fact that the researcher and the RTM's undertook a double role of administering the clinical trials as well as the questionnaires is up to criticism and as such is a flaw in the design. It is possible that the participants may have responded in a certain way through a feeling of needing to be polite (Waldon, 2001), and when they completed the questionnaires this may have influenced how they responded, rather than responding according to how they felt at the time. Especially during recruitment and the following completion of the first questionnaire, wives would comment or try to respond to the questionnaires on behalf of their husbands. The researcher redirected in a gentle way by reminding both the participant and the attending relative that in order to achieve authentic responses, the participant was being invited to respond according to his/her own experience. While the attending relatives' comments may have their own value, the problem that occurred was where those comments became the answer to a question before the participants had

[73] See Appendix 3.14 on the CD-R accompanying this thesis.

had a chance to formulate their own thoughts. Therefore the attending relatives' comments could replace the response that was requested, and resulted in loss of control for the participant. While the dynamic of the relationship between the participant and the attending relative was not considered in this study, nevertheless it is quite understandable that some attending relatives would be naturally protective, and also eager to help or supply information. In addition they may well have been wanting to contribute in order to feel useful and part of the process, as well as having to deal with their own anxieties.

It could be seen as a limitation that, the researcher/ RTM's administered the questionnaires immediately after the sessions, and that the participant therefore wanted to please and respond positively to the questionnaire in the presence of their therapist. In order to avoid bias in the form of 'positive' feedback where the participant wanted to please the RTM, in retrospect the questionnaires could have been administered by staff other than the music therapy research team.

5.7.2.3 Method of obtaining information on pain and analgesics intake

The Visual Analogue Scale proved to be an instrument that was easily managed by the participants in the current study. However, though this is a simple instrument it is not necessarily the most informative when measuring pain. It was tacitly assumed that the participants would primarily experience postoperative pain in their chest due to the sternum wound. The VAS does not provide any information of the nature or location of the participants' pain experience, which could be provided by using a tool such as the McGill Pain Questionnaire (Zimmerman et al., 1996; MacDonald et al., 1999; 2003; Kane et al., 2004). It is possible that more knowledge of these aspects could enhance the quality of the guiding of the participants' awareness through their body.

Information on the participants' analgesia intake was obtained from the Electronic Patient Journal (EPJ) by the assistance of a research nurse. Obtaining this information on occasions showed inconsistent reporting, discrepancies between the analgesics that were prescribed to patients and the actual intake of analgesia, as well as inexplicable changes in prescriptions. Despite these conditions, information was obtained for all participants. The procedure was time consuming, and it may well be more effective to ask medical staff to administer the reporting of the participants analgesics intake on a daily basis rather than on a monthly basis.

5.7.3 Generalisability of findings

A convenience sample was used in the current study, and given the relatively small sample size the statistical power was greatly reduced, and the results here may not be generalised to the whole population in other surgical hospital units in Denmark. The reason for this is that the sample was drawn from a particular cultural area of Denmark where people have certain personality characteristics, and surgical patients may respond differently when drawn from other regions of Denmark, such as Copenhagen, or in another cultural context such as the USA. The population in the present study is representative of the population of persons in need of heart surgery, as the majority had heart valve surgery as a single procedure, and a smaller number underwent heart valve surgery with a concurrent coronary artery bypass operation. The heart valve surgery is the more demanding part of the surgery (Smidt, 2005). There are further cardiac surgical procedures such as double, triple, quadruple bypass that influence the activity of the heart and repairing of the heart, heart transplants, and also mini invasive type surgical procedures that could influence the outcomes of guided relaxation with music and of music listening. No differentiation was made in the analyses between single and double procedures, and in future studies in order to generalise the results more widely, it would be important to know more about how useful this type of intervention would be with a wider variety of surgical patients who are admitted for heart operations.

As the results support the findings of previous studies involving similar interventions with surgical patients regarding anxiety and pain (Tusek, et al., 1999), and regarding mood (Barnason et al., 1995) the intervention may be applied with some potential success to different clinical populations with similar psychological and physiological symptoms, such as anxiety and pain.

In the present study the number of participants who stayed in the analyses varied within and between groups from baseline to follow-up (time points 1 to 6)[74]. The minimum numbers for statistical tests and procedures that are used are as a 'rule of thumb' (Mertens, 1998) proposed to be approximately fifteen participants per variable. At baseline (time point 1) after the preoperative session (time point 2) and before (time point 3a) and after the postoperative session when measures were made (time point 3b and 3c), this minimum number was met. The results in relation to these times of measurements are therefore stronger than the results for the following times of measurements when further participants were lost. On the day between sessions three and four (time point 4), 10 participants in the GRM group, 16 in the ML group, and 13 in the NM group

[74] See flow diagram in figure 4.2 in this thesis.

remained in the analyses. At discharge (time point 5) these numbers had reduced to seven, 11, and 14 in the three groups respectively, and at follow-up (time point six) these numbers had increased to 10, 15, and 14 respectively. The longitudinal statistical analyses that were performed on the data in the form of the linear mixed effects model take into account the influence of missing data, and allow the results to present some evidence regarding the effect of the treatment.

An aspect which impairs the generalisability of the findings was the limited number of women who agreed to participate and were included in the study (*n*= 11). This number was fewer than expected, and did not proportionally match the planned number of women in the sample. Therefore no sub-group analysis was performed for gender differences on the outcomes. This study did not contribute to the understanding of gender differences between male and female responsiveness to the guided relaxation with music and music listening compared to the no music group. Women said no to participate more often than did men, and they tended to appear more anxious when approached for recruitment for this study. An extensive literature review (Davidson et al., 2003) on perceptions and experiences of heart disease in older women demonstrated gender differences. These authors reported that women make up only a small percentage of participants in the 120 studies that they included in their review, and women present with significantly higher drop-out rates than men. It is beyond the scope of this discussion to elaborate further on this topic here. Suffice is to mention that four themes emerged that women are at a higher risk of psychosocial distress, have a greater need for instrumental and social support, have an altered perception of risk, and demonstrate the need for specific rehabilitation programs that are tailored to their needs (Davidson et al., 2003).

The researcher occasionally observed a wife of a participant left on her own while the participant had a session of rest, and the patient's experience was commented on by the wife in a way that showed interest and curiosity. Future research could investigate whether guided relaxation with music may be beneficial for the patient's close family and relatives who often have to spend many hours in the hospital during the patient's treatment. Based on the effect of this intervention on anxiety, and the positive experiences of quite sick people in this study, there may be evidence that guided relaxation with music may be helpful in the rehabilitation programme administered by the hospital in the second and third phases of recovery. The intervention offers a generalised treatment approach for relaxation and the reduction of anxiety, and therefore there is a potential to extend its application, following appropriate investigation and evaluation in other settings for populations coping with stress and anxiety related problems. Little is known about the effectiveness and value of music therapy used at the 'pre-disease' stage as a preventative tool, where it can promote good health and reduce anxiety which will impact on the development of pathological problems.

This study did not provide evidence that guided relaxation with music or music listening significantly affects the length of hospital stay. The results that were found did not inform us about differences between groups regarding the patients' satisfaction with their hospitalisation sufficiently strongly that these results may be generalised to other populations or to other hospital settings.

The present study was carried out in a hospital unit in Denmark with no tradition for music therapy treatment complementary to the medical treatment. We cannot know in what way or to what degree the results have been influenced by this fact, and which effects might be found in a different hospital unit if this study was replicated.

5.7.4 Confounding variables

In the process of recruiting participants, different factors have proven to influence this recruitment process. The process of recruiting participants relies very much on the production of surgeries in the hospital. At times, the operation rate may be slow due to illness among staff, shortness of staff, holidays or budget limitations. Operations may be cancelled or postponed due to an infection, a new diagnosis found, or a full schedule in the operating room when acute surgeries have to be performed. Another important factor is that patients do give their signed consent to take part in the study. It was more the rule than the exception that a relative (wife / husband or adult son / daughter) would sit in during the recruitment interview. It became evident that agreement with the participant's relative regarding the scheduling of sessions was of great importance and influence on the likelihood of the participant staying in the study after his/ her surgery. Incidents where these issues arose were not systematically recorded during the clinical trials phase of the research, and they are solely based on occasional notes that the researcher kept during the process of administering the recruiting interviews.

Participants' previous experience with music or music training was not controlled, nor was the participants' experience of or previous use of music for relaxation /relaxation with no music. In Unit T (operating theatre) music was played if staff preferred so and the music was then selected by the staff. Music played during surgery without the participant's awareness could have influenced the patient at a physiological level in reducing their experience of pain. The participants may have perceived that music was approved of as part of their overall treatment and make the patient positive towards such on invasive procedures. Whether music was played during surgery was a factor that was not controlled for and could have influenced the findings of this study.

Information on the amount of time participants may have listened to music on their own during their hospitalisation was not collected, and may have influenced their responses. However there are so many potentially uncontrollable variables in a hospital environment that may have influenced outcomes, and this was not designed as a laboratory type experiment.

In a cardiac surgical unit, cardiac arrest can happen and present the medical staff with situations calling for appropriate and immediate action. In such a setting, music therapy can seem a luxury and a superfluous approach to health care. Benner, Hooper-Kyriakidis, and Stannard (1999) stated that clinicians (physicians) often do not have the luxury of time for reflection and philosophical thought: they must react to life-and-death situations. During the clinical trials, incidents of cardiac arrests and death occurred - not to participants in the present study, but in the unit where trial sessions were administered. These life-and-death situations added intensity to the atmosphere as well as influencing the staffing procedures in the unit and the medical staff who were already under pressure. As a researcher coming from another discipline, I was certainly aware of responses to life-or-death situations to be a priority which may have resulted in the cancellation or postponing of trial sessions. Music therapy has been recognised as a professional discipline complementary to current medical practice, in much the same way as other paramedical professions such as psychology, physiotherapy, or speech and language therapy, and as such has specific and unique contributions to make to patient treatment and patient care. Therefore in the context of a heart surgical unit, as in any multidisciplinary health care team, this study set out to identify the relevance and value of a music therapy intervention within the whole care approach.

Various factors could have influenced the data and were not controlled in this study, such as participants in different conditions discussing their experience of sessions; nurses commenting or discussing the study with participants; nursing staff informing the participants on study details when not called for; or commenting on the rest and the expected effect of the music listening in cases of participants being in the NM group.

5.7.5 Reasons for not wanting to participate and attrition

When approaching eligible patients for recruitment, various reasons may be given for not wanting to participate in a research study. In the present study, the following reasons for not wanting to participate were given:

- Some patients expressed that it was enough for them to handle the situation as it was. They did not feel that they could handle participation in research on top of that.
- Patients admitted on a Friday (for surgery on the following Monday) wanted to stay at

home with their family for the week-end as long as possible, as they wanted to return to the hospital no sooner than absolutely necessary. This way they could not receive the preoperative session which needed to be scheduled the day before surgery.

- Some patients expressed their need to be with family and close relatives as much as possible during the hospitalisation.

The interventions in this study were scheduled during visiting hours. The hospital involved was a regional hospital administering these types of operations for patients in a geographically large area resulting in long distances between the patients' / their relatives' homes and the hospital. Therefore both patients and relatives were naturally anxious about losing the permitted quality time with loved ones.

A woman, who chose not to participate in this study, was very specific in her reasoning: "Could you come home with me when this is all over and done with (in the hospital). Then I will know how to make use of you." I find her statement interesting and of much relevance for different reasons:

a) As a patient preparing herself for heart surgery she had already enough to relate to and cope with during her hospitalisation.
b) As a patient in a Danish general hospital she is expecting somatic treatment, and a study offering specific rest periods on top of the standard treatment may be difficult to relate to.
c) It may be simpler and clearer to only have to relate to the hospital staff in a way that is known and in accordance with traditions in the Danish health care system, and only include other types of treatment after the hospitalisation when staying at home.
d) This patient points to the importance of the patient's influence on their own treatment and the importance of the relationship between the patient and the therapist. It is my interpretation that this woman senses that she can gain something from what the research study/ I am offering to her.
e) By taking the therapist home, the patient may feel no obligation of having to relate to a research study.

No examples of reflections of what can cause patients not to want to participate in a research study were found in the literature. This female patient was explicit in expressing her individual needs for making use of the treatment in her own home, which was unique to this particular patient as nobody else expressed such ideas. However the interpretation of her statement very much relies on the understanding and interpretation of similar statements made from other patients who thanked no to participate. Particularly the female and the younger patients of both genders were more inclined to express clearly why they wanted not to deal with research.

These reasons I find totally understandable and I have respect for the patients' choices and priorities. At the same time this challenges the speed of recruiting participants and provides some frustration as a PhD study has a time limit. In this study the data collection period had to be stretched in order to meet the aimed number of participants.

There were found to be differences between the groups, particularly in terms of withdrawal from the study and the differentiated number of sessions participants received. These differences were due to a number of factors such as post operative complications in the form of infections, confusion, and withdrawal of consent to participate which was greater in the GRM group than in the other two groups. This may have occurred by chance, relate to the treatment or to other circumstances of the clinical research. As reported from the late follow-up, the completing of questionnaires, influenced the participants' experience of the intervention in all groups, and it was assumed that this influence was considered negative. When deciding to stop their participation, a reason often expressed, was that it was too demanding to have to fill in questionnaires as the patients felt exhausted and fatigued after their operation (as reported by the POMS factor F). This procedure had proved stressful and therefore contraindicative to the treatment of relaxation. Postponing this questionnaire until the following session reassured participants and re-motivated them to stay in the study.

Asking the participants to complete questionnaires on the day after their surgery soon after their transfer from the intensive care unit, proved to be challenging, especially for the elderly participants, causing drop outs. The written and oral information provided the patient with information of possible challenges in terms of filling in questionnaires – particularly in the first postoperative session – in order to prepare them that they did not need to worry about the fact that they may not feel up to writing themselves. The largest drop out from the study (17 of 63 participants) happened at the first post operative session (second session of four). At this point trying to collect data the research required participants to answer questions that they found it very difficult to give. This happened at the time when participants were likely to have felt most vulnerable, feeble, and distracted (on the day they are transferred from the ICU to Unit T). On occasion (not systematically reported), participants expressed that they felt too tired to be moved from their room, and that they could not cope with the questionnaires in relation to this particular session and therefore wanted to withdraw from the study. Carpenter et al. (2002) stated that there is a drop out trend with time, which means that patients tend to drop out sooner rather than later from a study.

On the day of admission, the patients meet a large number of specialists who prepare and inform them about their upcoming surgery. This in itself can be overwhelming to many elderly patients and was seen as confusing and stressful in itself, which was commented on by patients when we approached them for a recruiting interview. This has not been found to be reported from the previous literature. However, in discussions in the doctoral students' group the issue has been recognised in similar settings. Other possible reasons for attrition from participation are that:

1) Participants were having a critical experience when we were introducing music therapy to them which was something new. This alone could cause anxiety. In future research treatment familiarity might be taken into consideration. Participants could be offered two to three sessions two weeks prior to their hospitalisation after they were randomised to the study similar to study designs used in the investigations undertaken by Tusek et al. (1997) and Tusek et al. (1999). A further advantage to adding to the participant's familiarity with the treatment could be that experiencing a music therapy treatment would be less stressful for the patients, and that more patients would choose to participate in a study when asked for their consent to participate well in advance to the hospitalisation.
2) The elderly patients may have felt rather suspicious of this unconventional psychological type of treatment and therefore decided not to participate or to stop their participation. Two eligible patients directly expressed a concern relating to their age. This statement may relate as much to their age as to their way of saying they did not want to deal with anything other than the medical treatment for which they were admitted, that they were anxious about their operation, possibly feeling out of control and that they had enough to cope with as it was. Familiarising the participant with the treatment could demystify the nature of the intervention.
3) The patients' age needs to be considered, as both hearing and cognitive functions are affected by age. Some elderly patients may have felt anxious about having to write and complete questionnaires. This may be due to some insecurities about what information they were requested to provide, or even the questionnaire data collection may have seemed to be some sort of 'test' for them. One participant, while waiting for his discharge, was asked to complete the questionnaire related to this time point to which he agreed. During the completion of the POMS-37, he suddenly stopped at the word 'angry' and refused to continue. He was very upset and in a clear and direct way expressed that this procedure made no sense to him. He had left school at a very early age, and had experienced enough serious challenges in life. The questionnaire was, of course, put aside and he was thanked

for his participation. It is possible that anxiety regarding the discharge was also a factor eliciting anger at this moment in time in this participant.

This incident spoke to me of the need to be very sensitive to both quality and quantity of the questionnaires which participants are required to complete, balancing the need for sufficient information for the research and the amount of work involved for the participants. Further, that it is important to consider the level of functioning that is required in order for the participant to understand and complete these questionnaires. The POMS (McNair et al., 1992) was tested to be used with people having what equals at least 7th grade education. This instrument was developed in an American context, and though it has been validated in Danish, the cultural context in which the POMS-37 is applied must be considered. Verbal rating may in some cases be replaced by visual or numeric rating instruments, and replication of questions should be avoided by simplifying the questionnaire.

5.8 Conclusion and directions for future research

Further research is clearly necessary to be able to offer any concrete and reliable conclusions as to the effect of individual 35-minute sessions of Guided Relaxation with Music in reducing post operative anxiety in patients who have had heart valve surgery. The intervention may also promote relaxation, and complement pain management. Guided relaxation with music may also be more effective in enhancing mood, particularly by reducing tension and confusion, after the operation than music listening, but no more than scheduled rest with no music. This study offers some preliminary evidence that this music therapy intervention could play a part in supporting the rehabilitation process of regaining health in patients recovering from heart valve surgery. Given that there were some valuable results in all groups at different times and on different parameters, patients recovering from cardiac surgery may well benefit from individualised relaxation, and if this is explored in future studies, personal preference for treatment type should be considered.

No differences were found between Guided Relaxation with Music, Music Listening, and scheduled rest with No Music on the participants' experience of satisfaction with hospitalisation when offered in addition to standard care, and all three groups reported high levels of satisfaction. The GRM group experienced a non significant shorter length of hospital stays than did the other two groups.

Participants experienced the treatment of guided relaxation in combination with music in the present study as more helpful for their relaxation (VAS scores) than music listening alone.

Both the GRM and the ML groups gave highest priority to 'melody' and 'tempo' when choosing their preferred style of music, while 'timbre' was given the third highest priority. The GRM group gave lower priority to 'familiarity' than did the ML group which could infer that the GRM group have experienced familiarity with their therapist as more important to them than being familiar with the music. The GRM intervention met the needs of the participants to such a degree that they found it to be very beneficial for their relaxation. Voice and voice timbre were given highest priority as for the aspects of the guiding procedure helping them relax. A mid-range tone of voice that is kept fairly constant, adds to the effectiveness of instilling trust in the client (Grocke and Wigram, 2007) and trust was an important element underpinned by the instruction to the participants to let go, and to let their body relax.

Directions for future research

The slow recruitment of participants affected the study to such a degree that the period of data collection for the present study was extended by a further six months, and lasted 1½ years. Several questions may be posed in this regard:

- ♦ Would recruitment be improved by providing the patient with more comprehensive information, and better counselling, so that they may feel secure about agreeing to participate in a study, and sustain their participation?
- ♦ Would recruitment be improved if the age range of participants recruited for studies such as this one were limited to less than 80 years? Or should all be included if they want to and meet all other inclusion criteria?
- ♦ Would recruitment be improved, and attrition lessened if sessions were planned so that they did not conflict with visiting hours?
- ♦ Would data collection be improved (and pressure on participants reduced) by reducing the number of questions in questionnaires, and keeping data collection to a minimum? The ways in which questions are asked could also be more adapted.

Increasing the size of the sample can be achieved by including more than one hospital unit in future studies although care needs to be taken that the standard methods of treatment and surgery are comparable. Also, the inclusion criteria might be widened to other types of heart surgery which would affect the level of comparison as cardiovascular diseases causing a need for a coronary artery bypass are more closely linked to lifestyle and strongly influenced by smoking, rich food, lack of exercise than heart valve diseases specifically.

The instrument measuring mood (POMS-37) proved comprehensive and therefore somewhat demanding on the elderly participants, particularly during the sessions immediately after they had had their operation. Paradoxically, the demands for self-reported data can increase anxiety, and stress – the reduction of which was the objective of this study. Nevertheless, anxiety and tension are already measures of mood and the most relevant for the postoperative heart patients. By reducing the number of dependent variables and the battery of questionnaires the strain on the participant would be less.

When using music for reducing anxiety and pain, individual music preferences need to be considered. In the present study the participants could choose from four styles of relaxing music, of which the easy listening was the style most often chosen. Different styles of music should be included in future studies, especially where the choices should reflect the cultural context of the setting and the cultural background of the participants,

Familiarisation with treatment could help in reducing the attrition, and improving recruitment. In future studies in this field, potential participants could be offered one or two more sessions before their surgery in order to both introduce them to, and then familiarize them with the treatment.

The music therapy treatment involves a guiding process in order to facilitate relaxation to music, and patients may either choose or need this type of intervention at a time when they need care provided. However, there might also be times when they can enjoy the purely relaxing effects of listening to calm, sedative music. Future research could look at the way in which patients access these two different modalities, and what lead them to choose one or the other.

The more flexibility that can be incorporated into the treatment procedure, the more appropriate it can be in meeting the clinical needs of the patients. In future studies flexibility in the protocol should be considered, even though this would cause a lack of control in the study, and limit the possible comparisons between research conditions.

Depression is rarely present in the first postoperative phase (Spindler & Pedersen, 2005) and was not an issue in the present study. However incidents of postoperative depression should be considered, and incorporated in the thinking of future research studies. As discussed earlier[75] Rymaszewska et al. (2003) reported that high preoperative state and trait anxiety and depression scores appear to be predictors of postoperative psychological outcome, and that effective treatment of disorders such as high level of anxiety and depression is indispensable for the patients' recovery to full psychosocial competence. Another study (McCrone et al., 2001) evaluated the influence of age and gender on psychosocial recovery. The sample (n=31) were patients over age 60 who had Coronary Artery Bypass Graft surgery who were assessed pre and postoperatively at 2 to 3 days, 2, 4, 8, and 12 weeks. The results showed that women had significantly higher trait and state anxiety, and higher non significant incidence of depression at all times of assessment. The younger participants in McCrone et al.'s study were more depressed in the early phases at their postoperative rehabilitation, and these investigators concluded that women and 'younger' patients having CABG are at a higher risk for psychological distress, therefore interventions should be targeted these patients particular needs.

The findings from the present study could lead to further investigations into the effectiveness of this treatment with differing populations suffering problems of anxiety and pain arising from various different causes.

Verbal processing of the guided relaxation with music intervention was not included in the procedure, neither was any imagery that a participant might have experienced. In this study the focus was on the bodily experience of relaxation, and as in thinking of the somatic markers that a surgical event creates in a person, widening of the treatment procedure to include a verbal

[75] See sections 2.2.1.1. and 5.1.1 in this thesis.

processing of the total experience might be considered. Future research needs to evaluate the effects of more personalised and expanded procedures of Guided Relaxation. Krout (2007) writes:

> Being able to design a personalized music listening and relaxation routine that can be used when, where, and how the consumer desires can empower and allow them to actively take part in their own wellness initiatives. (Krout, 2007).

Further enquiry may discover whether individual sessions of Guided Relaxation with Music support patients in feeling themselves in their body, turning their awareness inward and possibly connect them to their own resources, and /or strengthen the patients' engagement with their own situation to give them a sense of control and influence on their physical and psychological wellbeing. This study is the first of its kind in the field of cardiac surgery, and the results suggest a fruitful ongoing area of enquiry into a therapeutic intervention that is non-invasive, relatively inexpensive within this area of high-tech medicine, and is attractive, non-demanding and pleasant for patients.

5.9 Researcher's reflection on the process and learning experience

Before starting this research, I had little experience with and knowledge about heart disease, and mostly at a personal level due to my nephew's inborn heart failure. Meeting the eligible patients for recruiting interviews was my first professional encounter with the population of adult persons with heart valve diseases. Some were fragile, fatigued, short of breath and in a poor condition due to their heart disease, while some appeared rather well. Meeting the participants again after their big heart surgery made quite an impression in me. It was obvious that the operation had been a major event. Knowing the severity of the situation that these patients were facing, I was amazed at the many who expressed their wish to contribute by participating in this research study.

From personal experiences during this PhD study, I have encountered Danish (private and public) hospitals a number of times. In preparation for general anaesthesia medical staff recommended that I think of something pleasant while waiting for the anaesthesia to have its effect. The reason behind this instruction was that it was expected that the mood I was in when 'going to sleep' would set the mood for when I woke up after the anaesthesia. This influence appeared to be commonly known to the staff.

Benson (1975/2000) stated that the days were long gone when patients were addressed by their diagnosis rather than by their name. This may be true in the USA, but can still happen in Denmark. In 2004 while I was waiting to be examined by a physician, a woman's voice called in the hallway, that 'we have an ankle in room xx'. It made me wonder how the medical staff perceived the rest of my being, and it felt very strange to me to be identified by a small part of my body, though the pain from the fracture in some ways could justify the rather skewed body image. This incident underlined to me the importance of a holistic approach and frame of mind in the clinical work of the trials and in understanding the findings from these.

During the time of this research a process has unfolded in thought provoking ways parallel to the topic in question and has elicited a number of somatic markers in the researcher. Being a middle aged woman, physical problems that are related to age occur, and a large surgery was suddenly called for. The stress of a very long data collection period with unpredictable conditions, administering, training and organising research staff, dealing with the inner perfectionist and performance anxiety all lead to a long period of an extremely high blood pressure. This was not easily controlled by medication at first and increased anxieties in me as well as actually creating a 'faulty signal' in the left side of my heart, near the aorta. In this situation, denial was useful that a heart valve disease had nothing to do with me. A professional attitude while writing the thesis was helpful, though anxiety lured in the back of my mind. Watching a live and healthy aorta valve through an ultrasound scan was impressive, moving and a gift. This visit to a cardiologist made me understand that the key to keeping the heart valve healthy is to control and maintain a normal blood pressure. However, I think my level of empathy with the populations I work with does not need to include somatic empathy to this degree. Still, these experiences have shown me the need for a balanced life style including exercise, rest and relaxation in order to maintain a low blood pressure, low cholesterol, and an overall state of sound health.

A very enlightening experience occurred during the challenges of statistical analyses. The consultancy included basic teaching in statistics, introduction to R, and understanding how to make sense of all the data. It was novel to me to be invited to comment on the first interaction plot on changes in anxiety over time as a therapist, and how I understood these changes. This awakened excitement for me, that my therapeutic experience was being called upon to comment on a statistical result, and that numbers could be viewed intuitively before embarking on description and analyses. Allowing the therapist to 'have a say' in research, seemed to enhance the growth of the researcher. This development has been helped immensely by the way my supervisor has balanced his challenge to, and support of my thinking about research and the clinical trials. Reading research also proved to make more sense as my statistical knowledge increased.

The current study included developing a new music therapy treatment with a new population and a clinical setting in which music therapy had not previously been introduced. It was important for me as a music therapist and researcher to be able to engage within a setting of high-powered technological medical treatment. This in itself proved to be a stressful environment and called for clarity in the communication between all involved. I hope that this study in its own way contributes to the development of music therapy in medical settings.

I enjoyed the clinical sessions very much. I see advantages in working with a clear protocol when doing quantitative research. I have been surprised to experience a phenomenon as counter transference happen, and how adaptations were possible within the clear manualised procedure. What appears to be inflexible and simple actually creates a frame for a music therapy process to happen and a therapeutic relationship to develop. In the coming years of practice, I am looking forward to developing and trialling guided relaxation with music with other populations, and to document its effects in various settings.

Summary

Introduction

The intention with the study was to focus on the postoperative phase of the first rehabilitation upon heart surgery. The literature search revealed studies reporting that participants who had pre operative sessions of music for relaxation experienced a reduction in their anxiety level both pre and post their operation than did participants in the control (Standley, 2000; Tusek et al., 1997; 1999; Winter et al., 1994). Standley (2000) stated that music listening as an intervention to reduce anxiety is most effective when begun prior to the surgical intervention. Similarly, Wang et al. (2002) found that patients who listened to music before surgery reported lower levels of state anxiety than a control group, though no significant differences between groups were found in the physiological outcomes measured.

In their meta analysis of 179 studies of music therapy in medicine, Dileo & Bradt (2005), two studies of music and relaxation were included which were concerned with investigating the effect of music and relaxation in pregnant adolescences (Liebman & MacLaren, 1991), and the effect on pre operative anxiety (Robb et al., 1995). This meta analysis concluded that music therapy treatments (59 studies) were significantly more effective than treatment with music medicine (120 studies). A few studies concerned with surgical patients evaluated the effects of taped music with 'therapeutic suggestions' (Blankfield et al., 1995; Nilsson, 2003), and of music as background for guided imagery (Tusek et al., 1997; 1999).

The conceptual framework for this study is a holistic concept of body, mind and spirit (Justice & Kasayka, 1999; Bonny & Savary, 1973, 1990). Inherent in a holistic concept are the assumptions, that all phenomena affect the functioning of body and mind, and a connection between physical illness and the mind is recognized. A somatic markers model (Short 1991; 2003) illustrates how a somatic incident may affect a person physically, spiritually, socially, psychologically or emotionally. These somatic markers may communicate important clinical information and contribute to the assessment and diagnostic procedures (Short, 1991) and contribute to a more holistic perspective on the uncovering and expanding of a person's experience of a given somatic incident such as such as heart valve disease and heart surgery. Further, a biomedical perspective on how music affects a person's body and mind was included in order to complement the understanding of the mutual influence of anxiety and relaxation (Taylor, 1997).

Research questions and hypotheses

The main research question, "*What is the effect of Guided Relaxation with Music and Music*

Listening on anxiety, pain, mood, satisfaction with hospitalization, and length of stay?" generated the hypothesis (1) that heart valve surgery patients, receiving personalised sessions of Guided Relaxation with Music (GRM) when compared with those receiving sessions of relaxing Music Listening (ML), and those receiving sessions of scheduled rest with No Music (NM), would report:

a) Greater reduction in anxiety
b) Greater reduction in pain
c) Greater improvement in mood
d) Greater satisfaction with their hospitalisation
e) Shorter length of hospital stays

A supplementary research question was formulated to determine what aspects of the music therapy treatment, guided relaxation with music, have an effect on the patient's experience of relaxation:

a) What aspects of the *music* helped the patient to relax?
b) What aspects of the *guiding* helped the patient to relax?

Methodology

Design

The objective of the study was to trial a receptive method of music therapy in the form of a guided relaxation in combination with listening to sedative music (GRM) in 35-minute sessions. This intervention and a music listening intervention were compared with no guiding (ML), and with a control group of rest with no music (NM). Participants were allocated to one preoperative and three postoperative sessions. These four sessions were additional to the care and treatment that the patients received according to the standard routines pre and post surgery in the heart – lung surgical Unit T as organised and administered by the medical staff. A fixed design (Robson, 2002) in the form of a randomised controlled trial (RCT), between and within groups design was used. The study was carried out at the heart- lung surgical unit, Cardiovascular Centre, Aalborg Hospital, Århus University Hospital. The research conditions (by group) were defined as follows:

1) Group A (GRM): a music therapy treatment, consisting of a receptive music therapy method <u>Guided Relaxation with Music</u> (*Music therapy and medicine*) in which the participants received personalised individual sessions of guided relaxation with music with a trained music therapy research team member[76] (RTM) in the role of guiding a body

[76] The trained music therapy research team members (RTMs) were: a GIM therapist, a trained music therapist, and

relaxation based on the patient's preferred style of music for relaxation. The music was selected by the participant when offered four different styles of music.

2) Group B (ML): Music Listening to relaxing music (*Music medicine*) in which the participants received individual sessions of music listening to CD's of relaxing music based on the patient's preferred style of music for relaxation. The music listening was intended as an intervention of music medicine, not as a music therapy treatment. The music was selected by the participant when offered four different styles of music. An RTM attended the session without engaging therapeutically with the participant.

3) Group C (NM): a No Music control group consisting of scheduled rest without musical or verbal intervention. The participants received individual sessions of scheduled rest with no music, and rested on their own[77] while the RTM stayed in another room in the unit. The participants were advised how to call for help if they needed it[78].

Sample

The sample were 68 participants (*N* = 68) in the age range 40 - 80 years who were patients admitted to the heart-lung surgical Unit T at Aalborg Hospital for a planned heart valve operation as a single procedure, or in combination with a coronary artery bypass (a double procedure). One hundred and twenty patients were eligible for inclusion. Thirty one chose not to participate, 12 could not be included in the study, five had their operation cancelled or postponed, and four had their participation cancelled due to an interruption in the clinical trials. The participants were proportionally matched by gender and age, and were randomly assigned to one of three research conditions by block allocation. The numbers of participants randomised to one of three groups were:

GRM (n=25), ML (n=23) and NM (n=20).

Five participants did not receive any the allocated treatment, due to health condition, operations were postponed, or participants failed to show for their preoperative session. Following this, 63 participants received all or parts of the allocated treatment (GRM: *22*, ML: *22*; NM: *19*).

---

two music therapists in training, as well as the researcher, trained for administering the interventions in this study and in collecting data.

77 During the course of the first year of data collection the participants rested alone. Due to an increase of anxiety and discomfort in two cases, for the second year until the conclusion of the data collection the RTM stayed in the room in the NM group in a role similar to that of the RTM in the ML group.

78 By means of telemetry, the nursing staff teams monitored the patient from their workstation, and were able to respond to any electronic alarm made by the participant during this period.

Allocation was concealed to participants in the sense that they were told what their session consisted of, but they were not informed to which conditions the group was compared or whether it was a GRM, ML or a NM group. Staff was not formally informed in which condition their patients were included. Following the initial trial, reasons for attrition (such as participants withdrawing their consent; medical reasons) were systematically recorded in researcher's log during the clinical trial.

Manualised music therapy procedure

The music therapy treatment used in this study was a non-invasive receptive music therapy method of music listening in combination with a guided relaxation which consisted of a 30 minute long verbally guided bodily relaxation. This was accompanied by a 35-minute program of relaxing music (one of four programs available for the choice of the patient), a music therapy method developed for this study. The guided relaxation was introduced by a brief *preparation* followed by an expanded *induction* which focused on relaxation of the body in parts and as a whole. The relaxation (Benson, 1975/2000; Bonny, 1978) was intended to meet the cardiac patients' need for rest and anxiety reduction, and guided the participant's awareness starting from their feet systematically through their body parts with the intention to lead the participant into a relaxed state of body and mind. This particular relaxation method was not progressive in terms of tension-release as the tensioning of muscles would be contra indicated for the heart patient and their condition. Instead, the guiding focused on the participants' awareness of their body (body and mind) and contained no suggestions of imagery, or of particular physical or emotional perceptions as suggested by Nilsson (2003). The procedure allowed for some individual adaptation of the guiding to the participant, insofar as small variations in tempo, quality of voice, pacing and timing were helpful. At the end of the session, the participant was encouraged to seek assistance from the staff if needed.

Criteria for the music selections were based on characteristics of sedative music such as few dynamic changes, predictability, a tempo of 60 to 80 beats per minute, stable rhythm, regular and continuous melody, and in general few contrasts (Spintge, 1993) and on the model of potential elements in sedative music (Wigram, 2004). The music was selected being relaxing and calming, and to offer the patients four selections from which they could choose their preferred style of music. The musical parameters tempo (60 – 80 beats per minute), rhythm, melody and harmony have been described as the most important for music to have a relaxing effect (Nilsson, 2003). Nilsson (2003) reported that no consensus regarding the type of music that has the best analgesic effect was found. The music selections were compiled for the present study and consisted of four programs of 35 minutes of relaxing music in the styles of easy listening, light classical, specially composed music (MusiCure), and jazz.

Independent and dependent variables

The independent variables in this study were the following:

1) The RTMs guiding relaxation
2) A CD of relaxing music (one of four styles) played from an audio pillow

The dependent variables chosen for this study were:

- Anxiety, pain, mood
- Satisfaction with hospital stay, and length of hospital stay.

Anxiety was defined as the primary outcome variable.

Data collection

Data collection was done by means of a battery consisting of six questionnaires which contained the instruments for data collection undertaken through participants' self report. Anxiety was measured by Visual Analogue Scale (VAS), and the Tense Arousal scale from the UWIST-Mood Adjective Checklist, UMACL-TA (Matthews et al., 1991). Pain was measured by VAS, mood by POMS-37 (McNair et al., 1971/ 1992; Sacham, 1983), and satisfaction with their hospitalisation by VAS. Data on analgesics and on the length of hospital stay were obtained from the Electronic Patient Journal, (EPJ) .

A late follow-up 6 to 12 months after the participant's discharge was carried out in the form of a structured questionnaire of eight questions regarding the participants' experience during their participation in the study. Twelve participants who had received all the sessions in the group to which they had been allocated, completed this questionnaire from which the data were treated by descriptive analyses.

Statistical procedures

All participants were analysed in the group to which they were originally randomly allocated. Participants who did not receive all of the allocated treatment were included in the analyses based on the Intention To Treat principle, ITT, (Altman et al. 2001). Descriptive statistics analysed data for central tendencies and to provide an overview of the material. Data regarding single and double procedure were treated together.

In case of missing observations in the data, as was the case in this study, it is recommended to apply more sophisticated statistical analyses to the data (Twisk, 2003, p. 201) such as linear mixed-effects models, LME. This type of statistical analysis is analogous to repeated measures ANOVA and was applied as recommended when the number of repeated measurements varies between subjects. One-way Analysis Of Variance, ANOVA, was applied to the data on length of hospital stay. The data in relation to the supplementary research question and those from a late follow-up were treated by way of descriptive analyses.

Results and discussion

Significant differences ($p < .01$) in anxiety (VAS) were identified in effects over time when comparing measures made on day of admission to day of discharge. Between groups differences were non significant. The GRM group and the NM groups both reported an overall decrease in this measure greater than was found in the ML group. Even though there was an observable difference between groups in anxiety VAS scores at discharge and in UMACL-TA immediately before to after a session, the comparison between groups found no significant differences. Thereby hypothesis 1a was not confirmed.

The analyses in regard to pain identified significant differences ($p < .01$) in effects over time when comparing from baseline to discharge (time points 1 to 5), indicating that participants reported an increase in pain after their surgery. Differences between groups were non significant. The GRM group reported an overall decrease in VAS pain scores in the postoperative period when measured from after their operation to discharge, though differences between groups were also non significant. Differences in effects over time when comparing measures made from before to after a session were also non significant. Therefore hypothesis 1b was not confirmed. The analyses regarding the analgesics identified significant differences ($p < .03$) in the effects over time in paracetamol intake when comparing measures taken from the day of no session to discharge. After the operation the GRM group had a higher mean strong opiod intake than did the ML group, and a lower mild opioid intake than was registered in the other two groups, indicating that the strong opioid reduced the need for mild opioid in the GRM group. The differences in effects may be due to general recovery and might not be attributable to the GRM intervention.

The GRM group reported greater improvement in mood as self-reported by POMS-37 when comparing from after their operation to discharge when compared to the ML group, but not when compared to the NM group. The NM group actually reported an improvement in mood that was similar to the GRM group. When comparing measures reported at baseline to those made at discharge no significant differences between groups were found. Therefore hypothesis 1c was not confirmed

Looking at the results of the individual factors, in the POMS V factor the GRM group reported a greater reduction in vigour from baseline to the postoperative measure (after a session) than did the ML and the NM groups, after which vigour increased to discharge in the GRM and NM groups, but not in the ML group. There were no significant differences between groups. The GRM and NM groups reported a greater reduction in fatigue (F factor) when comparing from after operation to discharge than did the ML group. Again, no significant differences were found between groups. The effects over time when comparing from baseline to discharge was only found to be significant ($p < .03$) in the POMS factor F. A significant mean effect ($p < .04$) of the interaction between time and group in the T and the C factors was identified when comparing from after operation to discharge, and a significant effect over time was found in the F factor ($p < .05$). The results of the longitudinal analysis of the effects over time identified significant differences in the T and the V factors ($p < .01$). Hypothesis 1c was not confirmed when comparing from measures reported at baseline to those made at discharge.

The results regarding satisfaction with stay (VAS) identified high mean scores (ceiling effects) in all three groups. No significant differences were found between groups at discharge and at follow-up, therefore hypothesis 1d was not confirmed. In regard to the effects on length of stay, (EPJ) a shorter mean length of stay was registered in the GRM group than in the other two groups. The results of the ANOVA identified no significant differences between groups, and hypothesis 1e was therefore not confirmed.

Results in relation to the supplementary research questions showed that the majority of the participants (56.8%) in the GRM and the ML groups preferred the easy listening program for their relaxation. The classical style was preferred by 29,5%, the specially composed, MusiCure, by 11,4%, and the jazz by none. The Structural Model of Music Analysis, SMMA, revealed that simplicity, predictability and no overt interpretation or articulation of feelings were characteristic features of the easy listening example. The Music Imaging Analysis, MIA, found that a flat profile of intensity was common to all excerpts and programmes of the four styles of music.

Though differences were non significant, the GRM group reported the music to be more helpful for their relaxation at three time points of measurement than did the ML group. Significant differences ($p < .03$) were identified in the effects of time and between groups when comparing measures reported after the first (pre operative) session to day between sessions three and four and in effects of group, when comparing measures made after the pre operative session and at follow-up.

In reporting what made the participants choose their preferred style of music, the GRM group reported high priorities for 'melody' and 'tempo', while 'timbre' was given the third highest priority. This group reported low priority for 'familiarity', and lower at all three times when compared to the mean scores reported by the ML group. In both groups the 'soloist' element was given the lowest priority for the participants' choice of music style, indicating that the musical elements melody, tempo and timbre are more important to the participants' when choosing their preferred style of music than their familiarity with the music.

When asked what aspects of the music helped the participants to relax, the GRM group reported 'tempo' to be of higher priority at all time points of measurement than was reported by the ML group. Similarly to what informed the participants' choice of music, the element 'familiarity' was given lower priority by the GRM group than by the ML group indicating that this aspect meant less to the GRM group because they experienced a relationship with the music therapist (RTM).

The GRM group reported the guiding to be very helpful for their relaxation, though the distribution of mean scores was skewed towards the maximum value (10 on the VAS). This suggests that some caution should be exercised in the interpretation of these results. ‘Voice’ and ‘timbre’ were reported to be the most important aspects of the guiding for their relaxation, and the importance of vocal timbre was reported of higher importance on the measurement taken between sessions (time point 4) or after the full treatment at follow-up (time point 6). The relaxation is affected by the quality and timbre of a voice, and the therapist /RTM should have a well-modulated voice quality which can be soft in an individual session (Grocke & Wigram, 2007).
That the guiding should fit the music was reported to be of high priority for the relaxation to be helpful. This suggests that the participants have developed a relationship with their RTM through listening to her voice, and that they have experienced the music as an integral part of the intervention.

At all times of measurement from admission to discharge the GRM group reported higher mean values in their self-reported measures (VAS) of how helpful the relaxation was to them when compared to the ML and NM groups and when comparing the scores from admission to discharge and to follow-up. The higher scores could suggest that the intervention of guided relaxation with music (group A) may be more helpful to the participants during their hospitalisation than the music listening intervention without guiding (group B) or rest/ relaxation without guiding and with no music (group C).

In response to seven of the eight questions in the late follow-up questionnaire, the GRM group reported higher mean score when compared with the ML and the NM groups. In the three questions regarding atmosphere, recommendation for this kind of treatment, and resting in the company of someone present, there was complete agreement in the GRM group's reported measures. In the question (4) regarding the influence of having to complete questionnaires, the standard deviations were similar and lower in the GRM and the ML groups than in the NM group. This suggests that all participants found this aspect of their participation in the study of some influence and presented them with some difficulties. The NM group reported similar scores to the question about how they liked resting on their own, and in how useful they found the rest as was reported in the GRM group. Given the small numbers of participants in the late follow-up, and the ceiling effects, caution should be exercised in the interpretation of these results.

Discussion and directions for future research

The sample was relatively small reducing the statistical power. However, the results tend to support findings from previous studies that have involved interventions with post-operative patients. This study builds on previous studies reporting decreases in postoperative anxiety and pain. Two particular studies were concerned with similar populations. Voss et al. (2004) found that sedative music was more effective in decreasing anxiety and pain in patients during their first chair-rest after open-heart surgery than scheduled rest, and Tusek et al. (1999) in which the results indicated that guided imagery with background music significantly reduces pre and postoperative anxiety in patients undergoing cardiovascular surgery. Interventions with music and relaxation were effective in reducing postoperative pain for patients who had intestinal surgery (Good et al., 1999; 2005).

This study offers some preliminary evidence that this music therapy intervention, GRM, could play a part in supporting the rehabilitation process of regaining health in patients recovering from heart valve surgery. Given that there were some valuable results in all groups at different times and on different parameters, patients recovering from cardiac surgery may well benefit from individualised relaxation, and if this is explored in future studies, personal preference for treatment type should be considered.

People who are in a frightening situation that makes them worry and become anxious are going to respond best if they receive a systematic and predictable type of intervention. The structure of the guiding procedure and the sequence of directions in which the participants' minds were guided to work through their body helped to provide a sense of systematisation, and that the guiding procedure was not happening at random, but was planned.

When using music for reducing anxiety and pain, individual music preferences need to be considered. In the present study the participants could choose from four styles of relaxing music, of which the easy listening was the style most often chosen. Different styles of music should be included in future studies, especially where the choices should reflect the cultural context of the setting and the cultural background of the participants.

The music therapy treatment involves a guiding process in order to facilitate relaxation to music, and patients may either choose or need this type of intervention at a time when they need care provided. However, there might also be times when they can enjoy the purely relaxing effects of listening to calm, sedative music. Future research could look at the way in which patients access these two different modalities, and what lead them to choose one or the other.

Further enquiry may discover whether individual sessions of Guided Relaxation with Music support patients in feeling themselves in their body, turning their awareness inward and possibly connect them to their own resources, and /or strengthen the patients' engagement with their own situation to give them a sense of control and influence on their physical and psychological wellbeing. This study is the first of its kind in the field of cardiac surgery, and the results suggest a fruitful ongoing area of enquiry into a therapeutic intervention that is non-invasive, relatively inexpensive within this area of high-tech medicine, and is attractive, non-demanding and pleasant for patients.

Resumé

Indledning

Undersøgelsens formål var at fokusere på den første postoperative fase af rehabiliteringen efter hjerteoperation. Via litteraturgennemgangen blev der fundet flere undersøgelser, som viste, at deltagere som fik før-operative musiksessioner med henblik på afspænding, oplevede en større reduktion af deres angst[79] både før og efter deres operation end deltagere i kontrolgruppen (Standley, 2000; Tusek et al., 1997; 1999; Winter et al., 1994). Standley (2000) fastslog, at musiklytning som intervention til at reducere angst er mest effektiv, hvis den påbegyndes før det operative indgreb. Tilsvarende fandt Wang et al. (2002), at patienter som lyttede til musik før operation rapporterede mindre angst end en kontrolgruppe, selvom der ikke blev fundet signifikante forskelle mellem grupperne i de fysiologiske variable, som blev målt.

I en metaanalyse af 179 undersøgelser af musikterapi i medicin (Dileo & Bradt, 2005), indgik to undersøgelser af musik og afspænding, som undersøgte effekten af musik og afspænding på angst, dels hos gravide teenagere (Liebman & MacLaren, 1991), og dels på præoperativ angst (Robb et al., 1995). Denne metaanalyse konkluderede, at behandling med musikterapi (59 undersøgelser) var signifikant mere effektiv end behandling med musikmedicin (120 undersøgelser). Betegnelsen 'terapeutiske anvisninger' anvendes i nogle få undersøgelser (Blankfield et al., 1995; Nilsson, 2003) til at beskrive bestemte afspændingsmetoder, som bruger verbale instruktioner med forslag til billeddannelse, selv-suggestion eller guidede billeddannelser (Tusek et al., 1997; 1999).

Denne undersøgelses paradigme er en holistisk opfattelse af krop, sind og sjæl (Bonny & Savary, 1973, 1990; Justice & Kasayka, 1999; Short, 2003). En sådan holistisk opfattelse indbefatter den antagelse, at alle fænomener påvirker krop og sind og anerkender en forbindelse mellem fysisk sygdom og sindet. Short (1991; 2003) har udarbejdet en model over 'somatiske markører', som viser, hvordan en somatisk hændelse kan påvirke en person fysisk, åndeligt, socialt, psykisk eller følelsesmæssigt. Disse somatiske markører kan formidle vigtig klinisk information og bidrage til klinisk vurdering og diagnosticering (Short, 1991) og bidrage til et mere holistisk perspektiv på afdækningen af en persons oplevelse af en given somatisk hændelse så som hjerte(klap)sygdom og hjerteoperation. Endvidere bidrager et biomedicinsk perspektiv på hvordan

[79] Det engelske ord 'anxiety' er bevidst oversat med angst, som opleves både somatisk, fysiologisk og psykologisk (Hansen, Thomsen & Varming, 1997). I protokollen og alt materiale til deltagerne i undersøgelsen er ordet oversat med 'ængstelse' for at understrege de mange nuancer af spænding og bekymring, som patienter kan opleve i forbindelse med en stor hjerteoperation.

musik påvirker en persons krop og sind (Taylor, 1997) til forståelsen af den gensidige påvirkning mellem angst og afspænding.

Forskningsspørgsmål og hypoteser

Ud fra hovedspørgsmålet "*Hvilken effekt har Guidet MusikAfspænding og MusikLytning på angst, smerte, stemningsleje, tilfredshed med indlæggelsen, og på indlæggelsestid hos patienter efter en hjerteklapoperation?*" opstilledes den hypotese (1), at hjerteklappatienter, som får individuelle sessioner med Guidet MusikAfspænding (GMA) sammenlignet med patienter, som får sessioner med afslappende MusikLytning (ML), og med patienter som modtager/får sessioner med skemalagt hvile uden musik (NM), ville rapportere:

a) mindre angst
b) mindre smerte
c) større forbedring af stemningsleje
d) større tilfredshed med indlæggelsen
e) kortere indlæggelsestid

Følgende supplerende forskningsspørgsmål blev formuleret: *Hvilke aspekter af behandlingen guidet musikafspænding påvirker patientens opfattelse af afspænding*? Patienterne svarede ved selvrapportering deres oplevelse af:

a) Hvilke elementer i *musikken* hjalp patienten til at slappe af?
b) Hvilke elementer i *guidningen* hjalp patienten til at slappe af?

Metode

Design

Målet med undersøgelsen var at afprøve en receptiv tilgang til musikterapi i form af guidet afspænding kombineret med lytning til beroligende musik i sessioner af 35 minutters varighed. Denne intervention blev sammenlignet med musiklytning uden guidning (ML), og med en kontrolgruppe, som fik hvile uden musik (NM). Deltagerne fik en session før og tre sessioner efter deres operation. Udover disse fire sessioner fik deltagerne pleje og behandling i henhold til den gældende standardbehandlingsplan for præ- og postoperativ pleje på hjerte-lunge-kirurgisk afdeling T, som varetages af det medicinske personale. Der blev anvendt et 'fixed design' (Robson, 2002) i form af en randomiseret kontrolleret klinisk undersøgelse (RCT), 'between and within groups' design. Undersøgelsen blev gennemført på hjerte-lunge-kirurgisk afdeling, Kardiovaskulært Center[80], Aalborg Sygehus Syd, Århus Universitetshospital. De tre forsøgsgrupper blev defineret således:

1) Gruppe A (GMA): musikterapi-behandling, bestående af en receptiv musikterapi-metode Guidet MusikAfspænding (*Musikterapi i medicin*) hvor patienterne modtog individuelle sessioner med guidet musikafspænding udført af et trænet medlem af musikterapiteamet[81] (RTM) i rollen som guide af en kropslig afspænding på baggrund af patientens foretrukne musik til afspænding. Deltageren valgte musikken ud fra terapeutens præsentation af fire forskellige musikstilarter.

2) Gruppe B (ML): MusikLytning til afslappende musik (*musikmedicin*), hvor deltagerne modtog individuelle sessioner, hvor de lyttede til musik på CD'er med afslappende musik baseret på patientens foretrukne musikstil til afspænding. Musiklytning var tænkt som en musikmedicin intervention, ikke som musikterapi-behandling. Musikken blev valgt af deltageren ud fra terapeutens (RTM) præsentation af fire forskellige musikstilarter. En RTM var til stede under sessionen uden at forholde sig terapeutisk til deltageren.

3) Betingelse C (NM): en kontrolgruppe uden musik, bestående af skemalagt hvile uden musikalsk eller verbal intervention. Deltagerne modtog individuelle sessioner med skemalagt hvile uden musik, idet de hvilede alene[82] mens RTM opholdt sig i et andet rum på afdelingen. Deltagerne fik at vide hvordan de kunne tilkalde hjælp, hvis de havde behov for det[83].

Deltagere

Deltagerne var 68 patienter (n = 68) i alderen 40 - 80 år, som var indlagt på hjerte-lunge-afdelingen, afdeling T på Aalborg Hospital til en hjerteklapoperation (enkeltprocedure) eller kombineret med en bypass i kranspulsårerne (dobbeltprocedure). Et hundrede og tyve patienter var potentielle deltagere i undersøgelsen. Tooghalvtreds af disse deltog ikke i undersøgelsen, heraf

80 Nu kaldet 'Specialkirurgisk center'

81 Musikterapi-forskningsteam (RTMs) bestod af: en uddannet GIM terapeut (GIM: the Bonny Method of Guided Imagery and Music), en uddannet musikterapeut, og to musikterapistuderende (bachelor), foruden forskeren selv, oplært til at forestå såvel kliniske sessioner som administrere indsamling af data.

82 Det første år af dataindsamlingen hvilede deltagerne alene. På grund af forøget ængstelse og ubehag i to tilfælde blev dette ændret således, at RTM i det andet år frem til afslutningen af dataindsamlingen opholdt sig i rummet hos kontrolgruppen i en rolle svarende til den tilstedeværende i ML-gruppen.

83 Ved hjælp af telemetri, overvågede sygeplejerskerne patienten fra kontor, hvorfra de kunne reagere på enhver elektronisk alarm fra deltageren også mens sessioner stod på.

enogtredive fordi de takkede nej, tolv opfyldte ikke inklusionskriterierne, fem fik aflyst eller udsat operationen, og fire måtte udgå på grund af pause i det kliniske forsøg. Deltagerne blev proportionelt matchet i forhold til køn og alder og tilfældigt fordelt i en af tre forsøgsbetingelser ved gruppevis allokering. Deltagerne blev randomiseret til en af de tre grupper:

GMA (n=25), ML (n=23) og NM (n=20).

Fem deltagere modtog ingen af de sessioner, som de var allokeret til på grund af helbredstilstand, operation blev udsat eller deltagere mødte ikke til deres session før operationen. De resterende 63 deltagere modtog helt eller delvis den behandling, de var allokeret til (GMA: *22,* ML: *22*; NM: *19*). Deltagerne var blindet i den forstand, at de fik fortalt hvad deres session bestod af, men de blev ikke informeret om, hvorvidt de var i en behandlings-, sammenlignings- eller kontrolgruppe, eller hvilke forsøgsbetingelser deres egen gruppe blev sammenlignet med. Personalet blev ikke formelt informeret om, hvilken forsøgsbetingelse deres patienter var med i, og personalets indflydelse på resultaterne beror på tilfældigheder. Efter den indledende undersøgelse blev årsagerne til at patienter stoppede deres deltagelse (deltagere som trak deres tilsagn tilbage eller medicinske årsager) systematisk registreret i forskerens egen logbog.

Manual-defineret musikterapi fremgangsmåde

Den musikterapeutiske behandling, som indgik i denne undersøgelse, er en non-invasiv receptiv musikterapi procedure bestående af musiklytning kombineret med guidet afspænding som bestod af en 30 minutters verbal guidet kropslig afspænding. Denne var ledsaget af et 35 minutters udvalg af afspændende musik (et ud af fire programmer som patienten kunne vælge af). Den guidede afspænding blev introduceret med en kort *forberedelse* efterfulgt af en udvidet *induktion,* som systematisk inviterer deltageren til at fokusere på afspænding af kroppen del for del og som helhed. Hensigten med afspændingen (Benson, 1975/2000; Bonny, 1978) var at tilgodese hjertepatienters behov for hvile og angstreduktion. Deltagerens opmærksomhed blev systematisk guidet fra fødderne og op gennem kroppen med det formål at bringe deltagerens krop og sind i en afspændt tilstand. Denne særlige afspændingsmetode er ikke progressiv i betydningen spænding - afspænding, da spænding af musklerne er kontraindikerende for hjertepatienter og deres tilstand. I stedet fokuserer guidningen udelukkende på, at deltageren er opmærksom på sin krop og indeholder hverken forslag til billeddannelse, eller på særlige fysiske eller emotionelle sansninger som foreslået af Nilsson (2003). Proceduren tillod en vis tilpasning af guidningen i forhold til den enkelte deltager, og små variationer i tempo, stemmeføring, og timing, når disse var formålstjenlige. Ved afslutningen af hver session opfordres deltageren til ved behov at søge hjælp fra personalet.

Kriterierne for musik-programmerne er baseret på karakteristika for beroligende musik, såsom få dynamiske ændringer, forudsigelighed, tempo på 60 - 80 slag pr. minut, jævn/stabil rytme, regelmæssig og vedvarende melodi, og generelt med få kontraster (Spintge, 1993), og på modellen over potentielle elementer i beroligende musik (Wigram, 2004). Musikken er udvalgt til at være afslappende og beroligende og for at tilbyde musikprogrammer i fire stilarter, blandt hvilke deltagerne kunne vælge deres foretrukne til afspænding. Rytme, melodi og harmoni er yderligere blevet beskrevet som vigtige musikalske elementer for at musik har en afslappende effekt (Nilsson, 2003). Der ikke i litteraturen konsensus om, hvilken type musik der har den mest beroligende effekt (Nilsson, 2003). Musik-udvalg var sammensat til nærværende undersøgelse og bestod af fire programmer af 35 minutter med afslappende musik, henholdsvis easy listening, let klassisk, specialkomponeret musik (MusiCure) og jazz.

Uafhængige og afhængige variable

De uafhængige variable i denne undersøgelse var følgende:

1) RTM som guidede afspændingen
2) En CD med afspændende/ beroligende musik (en af fire stilarter) afspillet på en disc-man gennem en audiopude med indbygget forstærker og stereo højttalere

De afhængige variable valgt til denne undersøgelse var:

- ♦ Angst, smerte, stemningsleje
- ♦ Tilfredshed med indlæggelsen, samt indlæggelsestid.

Angst blev defineret som den primære uafhængige variable.

Dataindsamling

Dataindsamling blev udført ved hjælp af et sæt på seks spørgeskemaer, som indeholdt de anvendte måle-metoder til data indsamling ved hjælp af deltagernes selvrapportering. Angst blev målt på en Visuel Analog Skala (VAS), og ved hjælp af 'Tense-Arousal' underskala fra UWIST-Mood Adjective Checklist, UMACL-TA (Matthews et al., 1991). Smerte blev målt på en VAS, stemningsleje ved hjælp af POMS—37 (McNair et al., 1971/ 1992; Sacham, 1983), og tilfredshed med indlæggelsen på en VAS. Information om deltagernes indtag af smertestilende medicin og indlæggelsestid blev indhentet fra Elektronisk Patient Journal.

Herudover blev der udført en sen opfølgning seks til 12 måneder efter deltagerens udskrivelse. Denne bestod af et struktureret spørgeskema med otte spørgsmål vedrørende deltagernes oplevelse i løbet af deres deltagelse i undersøgelsen. Tolv deltagere, som havde fået alle fire sessioner i den gruppe de var tildelt, udfyldte dette spørgeskema hvorfra data blev behandlet ved hjælp af deskriptiv statistisk analyse.

Statistiske procedurer

Alle deltagere blev analyseret i den gruppe, som de oprindeligt blev randomiseret til. Deltagere, som ikke modtog hele den tildelte behandling (fire sessioner), blev medtaget i analyserne ud fra princippet 'Intention To Treat', ITT, (Altman et al., 2001). Data blev analyseret ved hjælp af deskriptiv statistik for centrale tendenser og for at danne overblik over materialet. Data vedrørende enkelt- og dobbeltprocedure operationer blev behandlet samlet.

I tilfælde af manglende observationer, som det var tilfældet i denne undersøgelse, anbefales anvendelsen af mere sofistikerede statistiske analyser af data (Twisk, 2003, p. 201) som 'linear mixed-effects models, LME. Denne form for statistisk analyse svarer til 'repeated measures' ANOVA, og blev anvendt som anbefalet, når antallet af gentagne observationer/ målinger varierer mellem deltagerne. 'One-way Analysis Of Variance', ANOVA, blev anvendt til at analysere data vedrørende indlæggelsestid. Data i relation til de supplerende forskningsspørgsmål og spørgsmålene fra den sene opfølgning (late follow-up) blev behandlet ved hjælp af deskriptiv statistisk analyse.

Resultater og diskussion

LME analyser fandt signifikante forskelle ($p < .01$) over tid i angst (VAS) ved sammenligning mellem målinger foretaget på indlæggelsesdagen og udskrivelsesdagen. Forskelle mellem grupperne var ikke signifikante. GMA og NM-grupperne rapporterede begge en samlet set større reduktion i denne variable end rapporteret i ML-gruppen. Selvom der var observerbare forskelle mellem grupperne i angst (VAS) resultaterne ved udskrivelsen og i UMACL-TA fra umiddelbart før til efter en postoperativ session, viste sammenlignende analyser ikke-signifikante forskelle mellem grupperne. Derfor kunne hypotese 1a ikke bekræftes.

Analyserne i forhold til smerte identificerede signifikante forskelle ($p < .01$) i effekt over tid ved sammenligning fra baseline til udskrivelse, hvilket betyder, at deltagerne rapporterede stærkere smerter efter operationen. Der var dog ikke signifikante forskelle mellem grupperne. GMA-gruppen rapporterede en samlet reduktion i smerte (VAS) postoperativt målt fra efter deres operation til udskrivelse, selvom forskelle mellem grupperne også her var ikke-signifikante. Forskelle over tid ved sammenligning fra før til efter en session var ligeledes ikke-signifikante. Derfor kunne hypotese 1b ikke bekræftes. Analyserne vedrørende analgetika viste signifikante forskelle ($p < .03$) over tid i paracetamolindtagelse ved sammenlignende analyse mellem målinger foretaget på dagen mellem tredje og fjerde session og målinger foretaget ved udskrivelsen. Efter operation havde GMA-gruppen et højere gennemsnitligt indtag af stærke opioider end ML-gruppen, og lavere indtag af svage opioider end registreret i de to andre grupper. Disse forskelle kan skyldes den generelle bedring og kan ikke nødvendigvis tilskrives GMA interventionen.

GMA-gruppen rapporterede mere bedring i stemningsleje (rapporteret med POMS-37) ved sammenligning fra efter operation til udskrivelse og sammenlignet med ML-gruppen, men ikke ved sammenligning med NM-gruppen. Faktisk rapporterede NM-gruppen forbedret stemningsleje tilsvarende GMA-gruppen. Sammenlignende analyse af målinger fra baseline til målinger foretaget ved udskrivelsen viste ikke-signifikante forskelle mellem grupperne. Disse resultater kunne derfor ikke bekræfte hypotese 1c.

Resultaterne i de enkelte underskalaer af POMS-37 viste, at GMA-gruppen rapporterede mindre 'vigør' (V-skala) fra baseline til efter operationen end ML og NM-grupperne, hvorefter 'vigør' øgedes indtil udskrivelsen i GMA og NM-grupperne, men ikke i ML-gruppen. Der blev ikke fundet signifikante forskelle mellem grupperne. GMA og NM-grupperne rapporterede større reduktion i 'fatigue' (F- skala) ved sammenligning fra efter operation til udskrivelse end ML-gruppen. Igen blev der ikke fundet signifikante forskelle mellem grupperne. Effekt over tid, fra baseline til udskrivelse, viste kun signifikant forskel ($p < .03$) i POMS F-skalaen. Sammenlignende analyse fra efter operation til udskrivelse viste en signifikant effekt ($p < .04$) af interaktion mellem tid og gruppe i 'Tension' (T) og 'Confusion' (C) skalaerne, og viste signifikant effekt over tid i F skalaen ($p < .05$). Resultaterne af 'længdesnits' analysen af effekt over tid fandt signifikante forskelle i T og V skalaerne ($p < .01$). Hypotese 1c blev ikke bekræftet ved sammenligning mellem målinger foretaget ved baseline med målinger ved udskrivelsen.

Resultaterne vedrørende tilfredshed med indlæggelsen, VAS, fandt 'ceiling effects' i alle tre grupper. Der var dog ikke signifikante forskelle mellem grupperne ved udskrivelse og ved opfølgning, så hypotese 1d blev ikke bekræftet. Med hensyn til effekten på indlæggelsestiden, EPJ, havde GMA-gruppen en kortere gennemsnitlig indlæggelsestid end de andre to grupper. Resultaterne af ANOVA fandt dog ingen signifikante forskelle mellem grupperne, og hypotese 1e kunne derfor ikke bekræftes.

Resultater i relation til de supplerende forskningsspørgsmål viste, at 56,8% af deltagerne i GMA og ML-grupperne foretrak easy listening stilen til afspænding. Klassisk blev foretrukket af 29,5%, specialkomponeret (MusiCure) af 11,4%, og ingen foretrak jazz. 'Structural Model of Music Analysis, SMMA, afdækkede, at enkelhed, forudsigelighed, og ingen udtalt fortolkning eller artikulation af følelser var karakteristiske træk ved easy listening eksemplet (uddrag). 'Music

Imaging Analysis', MIA, viste, at alle uddrag og alle fire musikprogrammer havde en flad intensitetsprofil som fælles træk.

Skønt forskellene var ikke-signifikante, rapporterede GMA-gruppen på tre tidspunkter musikken som mere gavnlig for deres afspænding end ML-gruppen. Signifikante forskelle blev fundet over tid og mellem grupperne ved sammenligning af målinger rapporteret efter den første (præoperative) session til dagen mellem session 3 og 4 (tidspunkt 4), og i effekten af behandlingen (gruppe) ($p < .03$) ved sammenligning af målinger foretaget efter den præoperative session og ved opfølgning.

Ved rapportering af hvad der fik deltagerne til at vælge deres foretrukne musikstil, prioriterede GMA-gruppen 'melodi' oog 'tempo' højt, mens 'klang' blev tredje højeste prioritet. Denne gruppe prioriterede 'Kender genren' lavt, og lavere på alle tre tidspunkter sammenlignet med ML-gruppens resultater. Begge grupper (GMA og ML) prioriterede 'solist' lavest i forhold til deres valg af musikstil. Dette antyder, at melodi, tempo og klang er vigtigere for deltagernes valg end hvor kendt de er med musikken.

Da de blev spurgt, hvilke aspekter af musikken, der hjalp dem til at slappe af GMA-gruppen rapporterede 'tempo' af højere prioritet på alle tre tidspunkter end ML-gruppen. På samme måde som hvad der fik deltagerne til at vælge deres foretrukne musikstil, prioriterede GMA-gruppen 'Kender genren' lavere end ML-gruppen, hvilket indikerer at dette aspekt betød mindre for dem, fordi de oplevede relationen med musikterapeuten (RTM), som de kom til at 'kende'.

GMA-gruppen rapporterede guidningen som meget gavnlig for deres hvile/ afspænding, dog var fordelingen af gennemsnit forskudt mod maksimum værdien (10 på VAS). Derfor må der udvises forsigtighed i tolkningen af dette resultat. 'Stemmeføring' og 'stemmeklang' var de vigtigste aspekter ved guidningen for deltagernes afspænding, og betydningen af stemmeklang blev tillagt stor betydning på dagen mellem session 3 og 4, eller efter endt behandling ved opfølgning. Afspænding påvirkes af stemmekvalitet og – klang, og terapeuten/ RTM bør have en velmoduleret blød stemmekvalitet i en individuel session (Grocke & Wigram, 2007). Deltagerne tillagde det stor betydning, at guidningen 'passede til musikken' for hvor gavnlig de oplevede afspændingen at være, hvilket antyder, at deltagerne har oplevet musikken som en integreret del af behandlingen.

På alle måletidspunkter fra indlæggelse til udskrivelse rapporterede GMA-gruppen højere gennemsnitsværdier (selv-rapporterede, VAS) af, hvor gavnlig afspændingen var for dem i sammenligning med ML og NM grupperne, og ved sammenligning af værdierne fra indlæggelse (baseline) til udskrivelse og opfølgning. De højere værdier kunne give en ide om, at Guided

MusikAfspænding kan være mere gavnlig for deltagerne under deres indlæggelse end musiklytning uden guidning (ML-gruppen) eller hvile uden guidet afspænding og uden musik (NM-gruppen). . Skønt forskellen var ikke-signifikante indikerer disse resultater, at behandlingen med guidet musikafspænding var mere gavnlig for deltagerne under deres hospitalsindlæggelse end musiklytning uden guidning eller hvile/afspænding uden guidning og uden musik.

Ved den sene opfølgning (*n*=12) rapporterede GMA-gruppen højere gennemsnitlige værdier i syv ud af otte spørgsmål i sammenligning med de andre to grupper, og i tre af spørgsmålene vedrørende atmosfæren under afspændingen, hvorvidt de ville anbefale denne form for behandling til andre, og det at have selskab mens man hviler, var standardafvigelsen nul, hvilket viser enstemmighed/enighed mellem deltagerne. I spørgsmål 4 om betydningen af at skulle besvare spørgeskemaer, var standardafvigelsen ens og lavere i GMA og ML-grupperne end i NM – gruppen. Dette antyder, at alle deltagere fandt at denne del af deres deltagelse havde nogen indflydelse og bød på visse vanskeligheder. NM-gruppen rapporterede ens værdier på spørgsmålet, om hvad de syntes om at hvile alene og hvor gavnligt hvile var for dem, som rapporteret i GMA-gruppen. På grund af det lille deltagerantal i den sene opfølgning og 'ceiling effects', må der udvises forsigtighed i tolkningen af disse resultater.

Diskussion og anvisninger for videre forskning

Patientudsnittet var relativt lille, hvilket reducerer den statistiske styrke. Alligevel viser resultaterne tendens til at støtte fund fra tidligere undersøgelser, som har omfattet interventioner for postoperative patienter. Denne undersøgelse bygger på tidligere undersøgelser, som har vist reduktion i postoperativ angst og smerte. Særligt to undersøgelser handlede om lignende populationer. Voss et al. (2004) fandt, at patienters angst og smerte mindskedes mere når de lyttede til beroligende musik mens de hvilede oppe-siddende første gang efter deres hjerteoperation end hvile uden musik. I den anden undersøgelse af Tusek et al. (1999) indikerede resultaterne, at guidet billeddannelse med baggrundsmusik mindskede præ- og postoperativ smerte signifikant hos patienter, som fik foretaget hjerte-karkirurgi. Behandling med musik og afspænding mindskede postoperativ smerte hos patienter som fik foretaget en tarmoperation (Good et al., 2005).

Nærværende undersøgelse giver foreløbig evidens for, at musikterapiinterventionen GMA kunne være medspiller som støtte til patienter i deres rehabiliteringsproces efter en hjerteoperation. På baggrund af værdifulde resultater i alle tre grupper på forskellige tidspunkter og i forskellige parameter er det meget muligt, at patienter som er ved at komme sig efter hjertekirurgi kan profitere af personligt tilpasset afspænding (hvile). Hvis dette udforskes i fremtidige undersøgelser bør det overvejes at inddrage personlig præference for flere former for hvile/ afspænding.

Mennesker, som er i en angstprovokerende situation, som giver anledning til bekymring, vil respondere bedst, hvis de tilbydes en forudsigelig og systematisk intervention. Guidning procedurens struktur og instruktionernes rækkefølge er tilrettelagt, således at patientens opmærksomhed guides på en sådan måde gennem dennes krop, at guidningen giver indtryk af systematik og at den ikke var tilfældig, men planlagt.

Når musik anvendes til at reducere angst og smerte, er det nødvendigt at overveje individuelle præferencer. I nærværende undersøgelse kunne deltagerne vælge mellem fire musikstilarter af afspændende musik, af hvilke easy listening var den hyppigst foretrukne. I fremtidig forskning bør flere forskellige musikstilarter inkluderes, særligt af hensyn til afspejlingen af den kulturelle kontekst og deltagernes kulturelle baggrund.

Musikterapiinterventionen i denne undersøgelse omfatter en guidningsproces, som faciliterer afspænding til musik, og patienter vil måske vælge eller have behov for denne form for intervention, på tidspunkter hvor de har behov for pleje. Dog kan der være tidspunkter, hvor de vil nyde den 'rene' afslappende virkning ved blot at lytte til beroligende musik. Fremtidig forskning kunne se på måder, hvorpå patienter gør brug af disse modaliteter, og hvad der fører til, at de vælger den ene frem for den anden.

Fremtidig forskning vil muligvis afdække, om individuelle sessioner med Guidet MusikAfspænding støtter patienter i at føle egen krop, at vende opmærksomheden indad og om muligt forbinde sig med egne ressourcer, og/eller styrke patienternes engagement i egen situation ved at give dem en oplevelse af kontrol og indflydelse på deres eget fysiske og psykiske velbefindende. Nærværende undersøgelse er den første af sin art i forbindelse med hjerteoperationer, og resultaterne antyder, at dette kan være et område for frugtbar udforskning af en musikterapeutisk intervention, som er non-invasiv, relativt billig indenfor et højteknologisk medicinsk område, attraktiv, ikke-krævende og behagelig for patienterne.

References

Abel, H-H., Geier, J.S., Pratt, R. R., Spintge, R., & Droh, R. (1996). Effects of Selected Music Listening on Cardiovascular-Respiratory Parameters of Chronic Back Pain Patients. *MusicMedicine*, *2*, 192-205.

Aldridge, D. (1996). *Music Therapy Research and practice in medicine – From out of the Silence.* London, Bristol, Pennsylvania: Jessica Kingsley.

Almerud, S., & Petersson, K. (2003). Music Therapy – a complementary treatment for mechanically ventilated intensive care patients. *Intensive Critical Care Nursing, 19*, 21-30.

Altman, D.G., Schultz, K.F., Moher, D., Egger, M., Davidoff, F., Elbourne, D., Gøtzsche, P.C., & Lang, T. for the CONSORT Group. (2001). The Revised CONSORT Statement for Reporting Randomized Trials: Explanation and Elaboration. *Annals of Internal Medicine, 134*(8), 663-694. www.annals.org.

Andersen, K., Holland, P., & Jacobsen, A.F. (1999). *Ataraxia*. Unpublished project in Theory of Science. Denmark: Aalborg University.

Andersen, K., Holland, P., Jacobsen, A.F., & Nilsen, J. (1997). *Musikkens Helende Kraft.* Unpublished project in Music Psychology. Denmark: Aalborg University.

Andreasen, J.J., Bisgaard, M., Andresen, L., Rokkedahl, G., & Jacobsen, A. (2003). *Hjerteklapoperation*. Patient information about heart valve operation. Denmark: Aalborg Hospital. Århus University Hospital, Heart and Lung Surgical Department.

APA (2005). *Concise rules of APA style*. Washington DC: American Psychological Association

Arendt-Nielsen, L., & Mogensen, T. (2003). *Klinisk smertemåling.* In Jensen, T.S., Dahl, J.B., & Arendt-Nielsen, L. (Eds.) *Smerter – en lærebog*. Copenhagen, Denmark: FADLs Forlag A/S.

Axelsen, J. (2002). *Dansk-engelsk ordbog.* Copenhagen, Denmark: Gyldendal.

Barnason, S., Zimmerman, L., & Nieveen, J. (1995, March/April). The effects of music interventions on anxiety in the patient after coronary artery bypass grafting. *Heart and Lung*, 124-132.

Benenzon, R.O., Hemsy De Gainza, V., & Wagner, G. (1997). *Sonido – Comunicación – Terapia*. Salamanca, Spain: Amarú Ediciones.

Benner, P., Hooper-Kyriakidis, P., & Stannard, D. (1999). *Clinical wisdom and interventions in critical care: A thinking-in-action approach.* Philadelphia, PA: W.B. Saunders.

Benson, H. (1975/2000). *The Relaxation Response.* New York: HarperCollins.

Benson, H. & Clipper, M.Z. (1976). *The Relaxation Response.* London: Collins.

Benson, H. (1996). *Timeless Healing: The Power and Biology of Belief.* New York: Scribner.

Bernstein, D.A. & Borkovec, T.D. (1973). *Progressive relaxation training: a manual for the helping professions*. Illinois, USA: Research Press, 25-29.

Bjellånes, N.A.L. (1998). Musikk og avspennign som helsefaktorer for mennesker med fibromyalgi. Receptiv musikterapi og autogen trenng som metode for å øke livskvalitet. *Nord Tidskr Musikkterapi*, *7*(2): 135-149.

Blankfield, R.P., Zyzanski, S.J., Flocke, S.A., Alemagno, S., & Scheurman, K. (1995, January). Taped Therapeutic Suggestions and Taped Music as Adjuncts in the Care of Coronary-Artery-Bypass-Patients. *American Journal of Clinical Hypnosis 37*(3), 32-42.

Bonde, L. O. (1999). Introduction to Helen L. Bonny's article "Music and Consciousness". *Nordic Journal of Music Therapy, 8*(2), 168-170.

Bonde, L.O. (2004). *The Bonny Method of Guided Imagery and Music (BMGIM) with Cancer Survivors. A Psychological Study with Focus on the Influence of BMGIM on Mood and Quality of Life.* Unpublished PhD Dissertation. Denmark: Department of Music and Music Therapy. Aalborg University.

Bonde, L.O. (2007). Steps in Researching the Music in Therapy. Chapter 19 in Wosch, T., & Wigram, T. (Eds.) *Microanalysis in Music Therapy*. UK and USA: Jessica Kingsley.

Bonde, L.O., Pedersen, I. N., & Wigram, T. (2001). *Når ord ikke slår til*. Århus, Denmark: Klim.

Bonny, H.L., & Savary, L.M. (1973, 1990). *Music and Your Mind: Listening with a New Consciousness.* Saint Louis, MO: MMB Music.

Bonny, H.L. (1978). *GIM Monograph # 1: Facilitating Guided Imagery and Music sessions*. Baltimore: ICM Books.

Bonny, H.L. (1983). Music Listening for Intensive Coronary Care Units*:* A Pilot Project. *Music Therapy*, *3*(1), 4-16.

Bonny, H.L. (1999). Music and Consciousness. *Nordic Journal of Music Therapy*, *8*(2), 171-179.

Bonny, H.L. (2002). Summer, L. (Ed.) *Music and Consciousness: The Evolution of Guided Imagery and Music.* Gilsum, NH: Barcelona.

Broadbent, E., Petrie, K.J., Alley, P.G., & Booth, R.J. (2003). Psychological Stress Impairs Early Wound Repair Following Surgery. *Psychosomatic Medicine*, *65,* 865-869.

Broscious, S. (1999). Music: an intervention for pain during chest tube removal after open heart surgery. *American Journal of Critical Care, 8*(6), 410-415.

Brown, J. (1997) Working toward freedom from violence. The process of change in battered women. *Violence Against Women, 3*(1), 5-26.

Brull, R., McCartney, C.J., Chan, V.W. (2002). Do preoperative anxiety and depression affect quality of recovery and length of stay after hip and knee arthroplasty? *Canadian Journal of*

Anaesthesiology, 49, 109.

Bruscia, K. E. (1998). *Defining Music Therapy, second edition.* Gilsum, NH: Barcelona.

Bruscia, K. E. & Grocke, D.E. (2002). *Guided Imagery and Music. The Bonny Method and Beyond.* Gilsum, NH: Barcelona.

Bunt, L. (1994). *Music Therapy: An Art Beyond Words*. London: Routledge.

Burke, M. (1997). Effects of Physioacoustic Intervention on Pain Management of Postoperative Gynaecological Patients. In Wigram, T., & Dileo, C. (Eds.) *Music Vibration*. USA: Jeffrey Books.

Butler, C., & Butler, P. J. (1997). Physioacoustic Therapy with Cardiac Surgery Patients. In Wigram, T., & Dileo, C. (Eds.) *Music Vibration.* USA: Jeffrey Books.

Byers J.F., & Smyth, K.A. (1997, May). Effect of a music intervention on noise annoyance, heart rate, and blood pressure in cardiac surgery patients. *American Journal of Critical Care, 6*(3), 183-91.

Carpenter, J., Pocock, S., & Lamm, C.J. (2002) Coping with missing data in clinical trials: A model-based approach applied to asthma trials. *Statistics in Medicine, 21*, 1043-1066.

Cepeda, M.S., Carr, D.B., Lau, J., & Alvarez, H. (2006). Music for pain relief. *Cochrane Database of Systematic Reviews 2006, Issue 2*. Art. No.: CD004843. DOI: 10.1002/14651858. CD004843.pub2.

Chlan, L.L. (1995, May). Psychophysiologic Responses of Mechanically Ventilated Patients to Music: A Pilot Study. *American Journal of Critical Care, 4*(3), 233-238.

Chlan, L. (1998). Effectiveness of a music therapy intervention on relaxation and anxiety for patients receiving ventilatory assistance. *Heart and Lung, 27* (3), 169-176.

Chlan, L., Tracy, M.F., Nelson, B., & Walker, J. (2001, November/December). Feasibility of a Music Intervention Protocol for Patients Receiving Mechanical Ventilatory Support. *Alternative Therapies*, *7*(6), 80-83.

Cooke, M., Chaboyer, W., & Hiratos, M.A. (2005). Music and its effect on anxiety in short waiting periods: a critical appraisal. *Journal of Critical Nursing, 14*, 145-155.

Cowan, D. S. (1991). Music Therapy in the Surgical Arena. *Music Therapy Perspectives 9,* 42-45.

Crawley, M.J. (2007). *The R Book.* West Sussex, England: John Wiley & Sons.

Cullberg, J. (2007). *Krise og udvikling.* Denmark: Hans Reitzels Forlag.

Damsgaard, I. (2005). Sygepleje til den hjertekirurgiske patient. In *Kirurgi – Sygdomslære og sygepleje.* Copenhagen, Denmark: Nyt Nordisk Forlag Arnold Busck.

Dalgaard, P. (2002). *Introductory Statistics with R.* (*Statistics & Computing*). New York: Springer.

Davidson, P.M., Daly, J., Hancock, K., Moser, D., Chang, E., & Cockburn, J. (2003). Perceptions and experiences of heart disease: a literature review and identification of a research agenda in older women. *European Journal of Cardiovascular Nursing, 2*, 255-264.

Davis, W. B. (2003). Ira Maximilian Altshuler: Psychiatrist and Pioneer Music Therapist. *Journal of Music Therapy, 40* (3), 247-263

Davis-Rollans, C. & Cunningham, S.G. (1987). Physiologic responses of coronary care patients to selected music. *Heart and Lung, 16*(4), 370-378.

Decker-Voigt, H.H. (1991). *Aus der Seele gespielt.* Germany: Der Goldman Verlag.

Denber, H. (1995). *Cardiac Surgery: Biological and psychological implications.* Armonk, New York: Futura Publishing.

Dileo, C. (Ed.) (1999). *Music Therapy and Medicine.* Silver Spring, MD: American Music Therapy Association.

Dileo, C., & Bradt, J. (2005). *Medical Music Therapy. A Meta-Analysis and Agenda for Future Research*. Silver Spring MD: Jeffrey Books.

Dölner, N. (2005). Nænsom hjerteklapoperation i Aalborg. *Dagens Medicin 29.04.2005*. Accessible on the internet: www.dagensmedicin.dk/nyheder/2005/04/29/nansom-hjerteklapoperation-/

Eliade, M. (1989). *Shamanism*, *Archaic techniques of ecstasy.* England: Arkana.

Elliott, D. (1993). Comparison of three instruments for measuring patient anxiety in a coronary care unit. *Intensive and Critical Care Nursing, 9*, 195-200.

Elliott, D. (1994, January/February). The effects of music and muscle relaxation on patient anxiety in a coronary care unit. *Heart and Lung,* 27-35.

Escher, J., Dayer, E., & Anthenien, L. (1996). Music Therapy in Early Rehabilitation of Patients with Acute Myocardial Infarction. *MusicMedicine,* (2), 129-141.

Evans, D. (2002). The effectiveness of music as an intervention for hospital patients: a systematic review. *Journal of Advanced Nursing*, *37*(1), 8-18.

Everitt, B.S. (1996). *Making Sense of Statistics in Psychology.* New York: Oxford University Press.

Everitt, B.S. & Hothorn, T. (2006). *A Handbook of Statistical Analyses Using R.* Boca Raton, Florida: Chapman & Hall/CRC.

Gaberson, K.B. (1991, November). The Effect of Humorous and Musical Distraction on Preoperative Anxiety. *AORN Journal, 62*(5), 784-791.

Gabrielsson, A. & Lindström, E. (2001). The Influence of Musical Structure on Emotional Expression. In Juslin, P.N. & Sloboda. J.A. *Music and Emotion*. New York: Oxford University Press.

Gaston, E.T. (1951). Dynamic music factors in mood change. *Music Educators Journal, 37*, 42.

Gold, C., Rolvsjord, R., Aaro, L.E., Aarre, T., Tjemsland, L. & Stige, B. (2005). Ressource-oriented music therapy for psychiatric patients with low therapy motivation: Protocol for a randomised controlled trial. *BMC Psychiatry, 5*:39. http://www.biomedcentral.com/1471-244X/5/39.

Good, M. (1995). A comparison of the effects of jaw relaxation and music on postoperative pain. *Nursing Research, 44*, 52-57.

Good, M. (1996). Effects of relaxation and music on postoperative pain: a review. *Journal of Advanced Nursing*, *24*, 905-914.

Good, M., & Chin, C.-C. (1998). The Effects of Western Music on Postoperative Pain in Taiwan. *Kaosiung Journal of Medical Science, 14*, 94-103.

Good, M., Stanton-Hicks, M., Grass, J.A., Cranston, A.G., Choi, C., Schoolmeesters L.J., & Salmon, A. (1999). Relief of postoperative pain with jaw relaxation, music and their combination. *Pain. 81*(1-2), 163-72.

Good, M., Stanton-Hicks, M., Grass, J.A., Anderson, G.C., LAI, H-L., Roykulcharoen, V., & Adler, P. (2001) Relaxation and music to reduce postsurgical pain. *Journal of Advanced Nursing, 33*(2), 208-215.

Good, M., Anderson, G.C., Ahn, S., Cong, X., and Stanton-Hicks (2005). Relaxation and Music Reduce Pain Following Intestinal Surgery. *Research in Nursing & Health, 28*, 240-251. (www.interscience.wiley.com).

Grocke, D.E. (1999). *A Phenomenological Study of Pivotal Moments in Guided Imagery and Music (GIM) Therapy*. Unpublished PhD dissertation, University of Melbourne.

Grocke, D.E. (2007). *A Structural Model of Music Analysis*. Chapter 11 in Wosch, T., & Wigram, T. (Eds.) *Microanalysis in Music Therapy*. UK and USA: Jessica Kingsley.

Grocke, D.E., & Wigram, T. (2007). *Receptive Methods in Music Therapy.* London: Jessica Kingsley.

Hammer, S. E. (1996). The Effects of Guided Imagery Through Music on State and Trait Anxiety. *Journal of Music Therapy*, *33*(1), 47-70.

Hamel, W. J. (2001). The effects of music intervention o anxiety in the patient waiting for cardiac catheterization. *Intensive and Critical Care Nursing, 17*, 279-285.

Hansen, M., Thomsen, P., & Varming, O. (1997). *Psykologisk-pædagogisk ordbog*. Copenhagen, Denmark: Gyldendalske boghandel, Samlerens Bogklub.

Hanser, S.B. (1985). Music Therapy and Stress Reduction Research. *Journal of Music Therapy, 22*(4), 193-206.

Hanser, S., & Mandel, S.E. (2005). The Effects of Music Therapy in Cardiac Health Care. Review article. *Cardiology in Review, 13*(1), 18-23 http://gateway.ut.ovid.com/gw2/ovidweb.cgi 15.03.2005.

Heal, M., & Wigram, T. (Eds.) (1993). *Music Therapy in Health and Education*. London: Jessica Kingsley.

Heitz, L., Symreng, T., & Scamman, F.L. (1992, February). Effects of music therapy in the postanesthesia care unit: a nursing intervention. *Journal of Post Anaesthesia Nursing, 7*(1) 22-31.

Henry, L.L. (1995). Music Therapy: A Nursing Intervention for the Control of Pain and Anxiety in the ICU: A Review of the Research Literature. *Dimensions of Critical Care Nursing, 14*(6), 295-304.

Hevner, K. (1935, January). The Affective Character of the Major and Minor Modes in Music. *The American Journal of Psychology, 47*(1), 103-118. http://www.jstor.org

Hevner, K. (1936, April). Experimental Studies of Expression in Music. *The American Journal of Psychology, 48*(2), 246-268. http://www.jstor.org

Hevner, K. (1937, October). The Affective Value of Pitch and Tempo in Music. *The American Journal of Psychology, 49*(4), 621-630. http://www.jstor.org

Hull, C.H. & Nie, N.H. (1979). *SPSS Update.* New York: McGraw-Hill.

Jacobson, E. (1959). *Progressive Relaxation.* Chicago: The University of Chicago Press.

Janis, I.L. (1958). *Psychological Stress. Psychoanalytical and behavioural studies of surgical patients.* USA: John Wiley & Sons.

Johnson, J.E. (1973). Effects of accurate expectations about sensations on the sensory and distress components of pain. *Journal of Personality and Social Psychology, 27*, 261-275.

Justice, R.W., & Kasayka, R.E. (1999, November-December). Guided Imagery and Music with Medical Patients. In Dileo, C. *Music Therapy and Medicine*. Silver Spring, MD: American Music Therapy Association: 295-304.

Kane, F.M.A., Brodie, E.E., Coull, A., Coyne, L., Howd, A., Milne, A., Niven, C.C., & Robbins, R. (2004). The analgesic effect of odour and music upon dressing change. *British Journal of Nursing, 13*(19), 4-12.

Kelbæk, H., Paulsen, P. K., & Aldershvile, J. (2005). Hjertesygdomme. In Schroeder, T. et al. (Eds.) *Basisbog i medicin og kirurgi*. Denmark: Munksgaard.

Kiecolt-Glaser, J.K., Page, G.G., Marucha, P.T., MacCallum, R.C., & Glaser, R. (1998). Psychological influences on surgical recovery: perspectives from psychoneuroimmunology. *Am Psychol, 53*, 1209-1218.

Koch, M.E., Kain, Z.N., Ayoub, C., & Rosenbaum, S.H. (1998). The sedative and analgesic sparing effect of music. *Anesthesiology, 89*, 300-309.

Krout, R. E. (2007). Music listening to facilitate relaxation and promote wellness: Integrated aspects of our neurophysiological responses to music. *The Arts in Psychotherapy, 34*, 134-141.

Lazarus, R.S. (1999). *Stress and emotion. A New Synthesis*. London: Free Association Books.

Liebman, S.S., & MacLaren, A. (1991). The Effects of Music and Relaxation on Third Trimester Anxiety in Adolescent Pregnancy. *Journal of Music Therapy, 28*(2), 89-100.

Linow, L. (2005). Søvn og hvile. In Bydam, J., & Hansen, J.M. (Eds.) *Sygeplejens fundament (2)*. Copenhagen, Denmark: Nyt Nordisk Forlag Arnold Busck.

MacDonald, R. A. R., Ashley, E.A., Davies, J.B., Serpell, M.G., Murray, J.L., Rogers, K., & Millar, K. (1999). The Anxiolytic and Pain reducing effects of Music on Post-Operative Analgesia. In *Music Medicine,* (3), 12-17.

MacDonald, R.A.R., Mitchell, L.A., Dillon, T., Serpell, M.G., Davies, J.B., & Ashley, E.A. (2003). An empirical investigation of the anxiolytic and pain reducing effects of music. *Psychology of Music, 31*(2), 187-203.

MacNay, S. K. (1995). The influence of Preferred Music on the Perceived Extersion, Mood, and Time Estimation Scores of Patients Participating in a Cardiac Rehabilitation Exercise Program. *Music Therapy Perspectives, 13*(2), 91-96.

Mandel, S.E. (1996). Music for Wellness: Music Therapy for Stress Management in a Rehabilitation Program. *Music Therapy Perspectives, 14*, 38-43.

Matthews, G., Jones, D.M., & Chamberlain, A.G. (1990). Refining the measurement of mood: The UWIST Mood Adjective Checklist. *British Journal of Psychology*, *81*: 17-42.

McCaffrey, R.G., & Good, M. (2000, December). The Lived Experience of Listening to Music While Recovering From Surgery. *Journal of Holistic Nursing, 18*(4), 378-390.

McCrone, S., Lenz, E., Tarzian, A, & Perkins, S. (2001, August). Anxiety and Depression: Incidence and Patterns in Patients after Coronary Artery Bypass Graft Surgery. *Applied Nursing Research, 14*(3), 155-164.

McGuire, D.B. (1992). *Measuring Pain.* In Frank-Stromborg. M. (Ed.) *Instruments for Clinical Nursing Research*. Boston: Jones & Bartlett.

McNair, D., Lorr, M., Droppleman, L.F.+ (revised 1992). *Profile of Mood States*. San Diego, CA: Educational and Industrial testing Service (1971).

Melzack, R. (1975). The McGill Pain Questionnaire: Major properties and scoring methods. *Pain*, *1*, 277-299.

Metzger, K.L. (2004). Assessment of Use of Music by Patients Participating in Cardiac

Rehabilitation. *Journal of Music Therapy*, *41*(1), 55-69.

Miller, R.K., & Bornstein, P.H. (1977). Thirty-Minute Relaxation: A Comparison of some Methods. *Journal of Behavioural Therapy and Experimental Psychology, 8,* 291-294.

Miller, K.M. & Perry, P.A. (1990). Relaxation techniques and postoperative pain in patients undergoing cardiac surgery. *Heart and Lung*, *19*(2), 136-146.

Miluk-Kolasa, B., Matejek, M., & Stupnicki, R. (1996). The Effects of Music Listening on Changes in Selected Physiological Parameters in Adult Pre-Surgical Patients. *Journal of Music Therapy*, *33*(3), 208-218.

Miluk-Kolasa, B., Klodecka-Rózka, J., & Stupnicki, R. (2002). The effect of msuic listening on perioperative anxiety levels in adult surgical patients. *Polish Psychological Bulletin, 33*(2), 55-60.

Mok, E. & Wong, K.-Y. (2003, February). Effects of Music on Patient Anxiety. *AORN Journal, 77*(2), 396-410.

Munafò, M.R., & Stevenson, J. (2001). Anxiety and surgical recovery. Reinterpreting the literature. *Journal of Psychosomatic Research, 51*, 589-596.

Myskja**,** A**.** (2000). *Den Musiske medisin.* Oslo, Norway: Grøndahl Dreyer.

Myskja, A. (2005). *Musik som medicin: Lyd, musik og terapi*. København, Denmark: Borgen.

Mynchenberg, T., & Duncan, J.M. (1995). A Relaxation Protocol to Reduce Patient Anxiety. *Dimensions of Critical Care Nursing, 14*(2), 78-85.

Møllehave, J. (2002, 2. udgave). "*Hånden på hjertet*". In *Mit livs vennepunkter: Forskel /ligheder*. Denmark: Lindhardt og Ringhof.

Nightingale, F. (1995). *Notes on Nursing. Bemærkninger om sygepleje*. Copenhagen, Denmark: Munksgaard.

Nilsson, U. (2003). *The effect of Music and Music in Combination with Therapeutic Suggestions on Post operative Recovery*. Academic dissertation. Sweden: Linköpings Universitet, Faculty of Health Sciences.

Nilsson, U., Rawal, N., Uneståhl, L.E., Zetterberg, C., & Unosson, M. (2001). Improved recovery after music and therapeutic suggestions during general anaesthesia: a double-blind randomised controlled trial. Denmark: *ACTA Anaesthesiologica Scandinavica 45:* 812-817 (In Nilsson, 2003, paper I).

Nilsson, U. Rawal, N., Enquist, B., & Unosson, M. (2003). Analgesia following music and therapeutic suggestions in the PACU in ambulatory surgery: a randomized controlled trial. Denmark: *ACTA Anaesthesiologica Scandinavica 47:* 278-283 (In Nilsson, 2003, paper II).

Nilsson, U., Unosson, M., & Rawal, N. (2003a). Stress and immune response in patients exposed to intra- or postoperative music: a randomised controlled trial. (In Nilsson, 2003, paper III).

Nilsson, U., Rawal, N., & Unosson, M. (2003b). A comparison of intra-operative or postoperative exposure to music – a controlled trial of the effects on postoperative pain. *Anaesthesia*, *58:* 699-703. Blackwell Publishing Ltd. (In Nilsson, 2003, paper IV).

Nilsson, U., Unosson, M., & Rawal, N. (2005). Stress reduction and analgesia in patients exposed to calming music postoperatively: a randomized controlled trial. *European Journal of Anaesthesiology. 22*: 96-102.

Oz, M. (1999). *Healing from the Heart*. USA: Plume, Penguin Putnam.

Pelletier, C.L. (2004). The effect of music on decreasing arousal due to stress: A meta-analysis. *Journal of Music Therapy, 41*, 192-214.

Petterson, G., Stolz-Löfgren, M., & Åström, M. (1999). *Mit hjerte skal opereres.* Copenhagen, Denmark: Hjerteforeningen (The Danish Heart Society).

Pratt, R.R., & Spintge, R. (1996). *MusicMedicine 2*. USA: MMB Music.

Pratt, R.R., & Grocke, D.E. (1999). *MusicMedicine 3: MusicMedicine and Music Therapy: Expanding Horizons*. Australia: University of Melbourne, The Australian Music Therapy Association.

Priestley, M. (1994). *Essays on Analytical Music Therapy*. USA: Barcelona.

Reilly, M.P. (1996). Relaxation, Imagery, and Music as Adjunct Therapy to Narcotic Analgesia in the Perioperative Period. In *Music Medicine, 2*, 206-217.

Reynolds, S.B. (1984). Biofeedback, relaxation training and music; homeostasis for coping with stress. *Journal of Biofeedback and Self-Regulation*, *9*(2), 169-179.

Rider, M. S. (1985). Entrainment Mechanisms are involved in Pain Reduction, Muscle Relaxation, and Music-Mediated Imagery. *Journal of Music Therapy, 22*(4), 183-192.

Robb, S.L., Nichols, R.J., Rutan, R.L., Bishop, B.L., & Parker, J.C. (1995): The Effects of Music Assisted Relaxation on Preoperative Anxiety. *Journal of Music Therapy 32*(1), 2-21.

Robb, S.L. (2000) Music assisted Progressive Muscle Relaxation, Progressive Muscle Relaxation; American Music Therapy Association: *Journal of Music Therapy* XXXVII (1):2-21

Robson, C. (2002). *Real World Research*. *Second edition*. USA, UK, Australia: Blackwell.

Rowntree, D. (1981). *Statistics without Tears*. England: Penguin Books.

Rymaszewska, J., Kiejna, A., & Hadryś, T. (2003). Depression and anxiety in coronary artery bypass grafting patients. *European Psychiatry, 18,* 155-160.

Ruud, E. (1990). *Musikk som kommunikasjon og samhandling*: *Teoretiske perspektiv på musikkterapien*. Oslo, Norway: Solum Forlag.

Saperston, B. (1999). Music-Based Individualized Relaxation Training in Medical Settings. In

Dileo, C. (Ed.) *Music Therapy and Medicine*. Silver Spring, MD: American Music Therapy Association.

Schmidt, T. A. (2005). Hjertekirurgi. In *Kirurgi – Sygdomslære og sygepleje*. Copenhagen, Denmark: Nyt Nordisk Forlag Arnold Busck.

Schou, K. (2007). Musikmedicin og Musikterapi i medicin. *Psyke & Logos*. Tema: Musik og psykologi. *28*(1): 525-547. København: Dansk Psykologisk Forlag.

Schultz, J.H. & Luthe, W. (1969). Autogenic training (vol. 1). *Autogenic methods*. New York: Grune and Stratton.

Schwartz, F.J., & Ritchie, R. (1999). Music Listening in Neonatal Care Units. In Dileo, C. *Music Therapy and Medicine*. Silver Spring, MD: American Music Therapy Association.

Sendelbach, S.E., Halm, M.A., Doran, K.A., Miller, E.H., & Gaillard, P. (2006). Effects of Music Therapy on Physiological and Psychological Outcomes for Patients Undergoing Cardiac Surgery. *Journal of Cardiovascular Nursing, 21*(3) 194-200.

Shacham, S. (1983). A Shortened Version of the Profile of Mood States. *Journal of Personality Assessment, 47*(3), 305-306.

Short, A. (1991). The role of Guided Imagery and Music in diagnosing physical illness or trauma. *Music Therapy, 1,* 9-14.

Short, A. (2002). Guided Imagery and Music in Medical Care. In Bruscia, K. E., & Grocke, D.E. (2002) *Guided Imagery and Music. The Bonny Method and Beyond*. Gilsum, NH: Barcelona.

Short, A.E. (2003). *Holistic Aspects of Rehabilitation Post-Cardiac Surgery in the Bonny Method of Guided Imagery and Music*. Unpublished PhD Dissertation. Sydney: University of Technology.

Sloboda, J.A. & O'Neill, S.A. (2001). Emotions in everyday listening to music. In Juslin, P.N. & Sloboda, J.A. (Eds.) *Music and Emotion. Theory and research.*UK: Oxford University Press.

Spiegal, D. (1991). A psychosocial intervention and survival time of patients with metastatic breast cancer. *Advances – The Journal of Mind-Body Health, 7,* 10-19.

Spielberger, C.D. (1983). Manual for the state-trait anxiety inventory. Palo Alto, CA: Consulting Psychologists Press.

Spindler, H. & Pedersen, S. (2005). Posttraumatic Stress Disorder in the Wake of Heart Disease: Prevalence, Risk Factors, and Future Research Directions. *Psychosomatic Medicine67*, 715-723.

Spintge, R. (1983): Psychophysiologische Operations-Fittness mit und ohne anxiolytisher Musik. In *Angst, Schmerz, Musik in der Anästhesie; 1. Internationales Symposion Sportkrankenhaus Hellersen Lüdenscheid*. Basel, Germany: Editiones Roche.

Spintge, R. (1985-1986). Some Neuroendocrinological Effects of Socalled Anxiolytic Music. *International Journal of Neurology, 19-20,* 186-196.

Spintge, R. (1989). The anxiolytic effects of music. In Lee, M.H.M. (Ed.): *Rehabilitation, Music and Human Well-Being*. Saint Louis: MMB Music.

Spintge, R. (1993). Paper to the Joint Conference for North American Music Therapy Associations.

Spintge, R., & Droh, R. (Eds.) (1992). *MusicMedicine*. USA: MMB Music.

Spintge, R., & Droh, R. (1983). *Angst, Schmerz, Musik in der Anästhesie. 1. Internationales Symposion Sportkrankenhaus Hellersen Lüdenscheid/Deutschland*. Basel, Switzerland: Editiones Roche.

Standley, J. (1986). Music research in medical/dental treatment: Meta-analysis and clinical applications. *Journal of Music Therapy, 23*, 56-122.

Standley, J. (1995). Music as a Therapeutic Intervention in Medical and Dental Treatment: Research and Clinical Applications. In Wigram, T., Saperston, B., & West, R. (Eds.): *The Art and Science of Music Therapy: A Handbook.* London, Toronto: Harwood Academic Publications.

Standley, J. (1996). Music Research in medical/dental treatment: an update of a prior meta-analysis. In Furman. C. (Ed.), *Effectiveness of Music Therapy Procedures: Documentation of Research and Clinical Practice* (2nd ed.). Silver Spring, MD: National Association for Music Therapy.

Standley, J. (2000). *Effectiveness of Music Therapy Procedures: Chapter 1: Music Research in Medical Treatment*. Third edition. Silver Spring, MD: American Music Therapy Association.

Steelman, V.M. (1990, November). Intraoperative Music Therapy. Effects on anxiety, blood pressure. *AORN Journal, 52*(5), 1026-1034.

Szeto, C.K. & Yung, P.M.B. (1999, October). Introducing a music programme to reduce preoperative anxiety. *British Journal of Theatre Nursing, 9*(10), 455-459.

Taylor, D.B. (1997). *Biomedical Foundations of Music as Therapy.* Fourth printing, 2006.USA: EC Printing, Eau Claire, WI (ECPrinting.com).

Taylor, L.K., Kuttler, K.L., Parks, T.S., & Milton, D. (1998, April). The Effect of Music in the Postanesthesia Care Unit on Pain Levels in Women Who have Had Abdominal Hysterectomies. *Journal of PeriAnaesthesia Nursing, 13*, 88-94.

Thorgaard, B., Henriksen, B.B., Pedersbæk, G., & Thomsen, I. (2004). Specially selected music in the cardiac laboratory - an important tool for improvement of the wellbeing of patients. *European Journal of Cardiovascular Nursing (3)* 21-26.

Thorgaard, P., Ertmann, E., Hansen, V., Nørregaard, A., & Spanggaard, L. (2005). Designed sound and music environment in post anaesthesia care units – a multicentre study of patients and staff. *Intensive and Critical Care Nursing. 21*, 220-225.

Thybo, P. (1999) "Hvorfor bruke musikk i fysioterapi? *Fysioterapeuten*, *14*,10-14.

Tusek, D.L., Church, J.M., Strong, S.A., Grass, J.A., & Fazio, V.W. (1997, February). Guided Imagery: A Significant Advance in the Care of Patients Undergoing Elective Colorectal Surgery. *Diseases of the colon and rectum*, *40*(2), 172-178.

Tusek, D.L., Cwynar, R., & Cosgrove, D.M. (1999, March/April). Effect of Guided Imagery on Length of Stay, Pain and Anxiety in Cardiac Surgery Patients. *Journal of Cardiovascular Management,* 22-28.

Twisk, J.W.R. (2003). *Applied Longitudinal Data Analysis for Epidemiology*. UK: The University Press: Cambridge.

Twiss, E., Seaver, J., McCaffrey, R. (2006). The effect of music listening on older adults undergoing cardiovascular surgery. *British Association of Critical Care Nursing in Critical Care, 11*(5)224-231.

Updike, P. (1990). Music therapy results for ICU patients. *Dimensions of Critical Care Nursing, 9*(1), 39-45.

Updike, P.A. & Charles, D.M. (1987, July). Music Rx: Physiological and Emotional Responses to Taped Music Programs of Preoperative Patients Awaiting Plastic Surgery. *Annals of Plastic Surgery, 19*(1), 29-33.

Vincent, S. & Thompson, J. (1929) The effects of Music on the Human Blood Pressure. *The Lancet, 1*, 534-537.

Vollert, J.O., Störk, T., & Möckel, M. (1999). A Communicative Music Approach in Receptive Music Therapy and Music Medicine Based on Physiological Studies. *MusicMedicine, 3*, 19-32.

Voss, J. A., Good, M., Yates, B., Baun, M.M., Thompson, A., & Hertzog, M. (2004). Sedative music reduces anxiety and pain during chair rest after open-heart surgery. *Pain 112*, 197-203.

Waldon, E. (2001) The Effects of Group Music Therapy on Mood States and Cohesiveness in Adult Oncology Patients. *Journal of Music Therapy 38 (3)*, 212-238.

Wall, P.D. (1999) Introduction to the fourth edition. In Wall, P.D. & Melzack, R. *Textbook of Pain.* 4th edition. Edinburgh: Churchill Livingstone.

Wang, S-M., Kulkarni, L., Dolev, J., & Kain, Z.N. (2002). Music and Preoperative Anxiety: A Randomized, Controlled Study. *Anaesthesia and Analgesia*, *94*, 1489–1494.

Watkins, G.R. (1997). Music Therapy: Proposed Physiological Mechanisms and Clinical

Implications. *Clinical Nurse Specialist, 11*(2), 43-50.

White, J. (1992). Music Therapy: An Intervention to Reduce Anxiety in the Myocardial Infarction Patient. *Clinical Nurse Specialist, 6*(2), 58-63.

White, J.M. (1999). Effects of relaxing music on cardiac autonomic balance and anxiety after acute myocardial infarction. *American Journal of Critical Care, 8*(4), 220-230.

Wigram, A.L. (1996). *The Effects of Vibroacoustic Therapy on Clinical and Non-clinical Populations*. PhD Thesis. London, UK: London University, St. Georges Hospital Medical School.

Wigram, T. (2002). Physiological Responses to Music. In Wigram, T., Pedersen, I.N., & Bonde, L.O. (Eds.) *A Comprehensive Guide to Music Therapy: Theory, Clinical Practice, Research, and Training.* London: Jessica Kingsley.

Wigram, T. (2004). *Improvisation*. London: Jessica Kingsley.

Wigram, T., & Dileo, C. (Eds.) (1997). *Music Vibration and Health*. Cherry Hill, NJ: Jeffrey Books.

Winter, M.J., Paskin, S., & Baker, T. (1994, December). Music Reduces Stress and Anxiety in the Surgical Holding Area. *Journal of Post Anaesthesia Nursing, 9*(6)*,* 340-343.

Wong, H.L.C., Lopez-Nahas, V., & Molassiotis, A. (2001). Effects of music therapy on anxiety in ventilator-dependent patients. *Heart and Lung 30*(5), 376-387.

Yung, P.M.B., Kam, S.C., Lau, B.W.K., & Chan, T.M.F. (2003). The Effect of Music in Managing Preoperative Stress for Chinese Surgical Patients in the Operating Room Holding Area: A Controlled Trial. *International Journal of Stress Management, 10*(1), 64-74.

Zachariae, B. (1997). Hjerne og immunitet. *Psyke & Logos, 18,* 342-356.

Zimmerman, L., Nieveen, J., Barnason, S., & Schmaderer, M. (1996). The Effects of Music Interventions on Postoperative Pain and Sleep in Coronary Artery Bypass Graft (CABG) Patients. *Scholarly Inquiry for Nursing Practice: An International Journal, 10*(2), 153-170.

Zimmerman, L., Pierson, M.A., Marker, J.M. (1988). Effects of music on patient anxiety in coronary care units. *Heart and Lung, 17*(5), 560-566.

Zuckerman, M., & Lubin, B. (1965). *Manual for the Multiple Affect Adjective Checklist*. San Diego, CA: Educational and Industrial Testing Service.

Reports & pamphlets

Hjerterehabilitering på danske sygehuse (2004). (*Heart Rehabilitation in Danish Hospitals*)

Denmark: DHS[84] in cooperation with Danish Cardiological Society.

DHS 1997: *Rehabilitering af hjertepatienter* (*Rehabilitation of Heart Patients*): Guidelines. Denmark: DHS.

DHS, 2003: *Psykologisk selvhjælp efter en hjertesygdom – om følelsesmæssige reaktioner* (*Psychological self help after a heart disease – on emotional reactions*) 2003. Denmark: DHS (pamphlet).

Hjertenyt (2003). (*News of the Heart*) No. 4, Nov. Denmark: DHS.

Hjertestatistik /Heart Statistics (2004). Denmark: DHS and SIF (National Institute of Public Health).

Discography

Zachariae, B. (2005). *Visualisering og helbredelse, 9*: Redskaber til håndtering af angst og nervøsitet. [CD] Copenhagen, Denmark: Rosinante.

Front page photo of mitral valve of the heart:

Nilsson, L. & Lindberg, J. (1973). *Se mennesket*. Stockholm: AB Bonniers.

[84] DHS: *Danish Heart Society,* Hjerteforeningen