Singing training as a musical intervention for people in early stages of Alzheimer's Disease

A multiple case study

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Master's thesis

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UNIVERSITY OF BERGEN

Spring 2019

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Abstract

Singing training has the potential to provide psychosocial care for people in early stages of Alzheimer's disease (AD) and may also be an effective non-pharmacological intervention. At the same time singing training is a recreational activity for people who may find themselves more isolated as the AD progresses and may allow for the participation of carers and loved ones in individual singing training sessions, and in choir rehearsals. This study investigated three participants receiving the singing training intervention in the ALMUTH study. By providing the singing intervention to these participants and audio recording the sessions, systematic and naturalistic observations were used to describe the sessions, observe the participants singing abilities and behaviors within sessions, and how these developed over the course of four sessions. The cases were compared to each other, and the data from the naturalistic and systematic observations were interpreted and used to discuss similarities and differences between cases, and how the music intervention was implemented. A very slight improvement in vocal range was observed in two out of three participants over four singing training sessions. An investigation of the fidelity of the singing training intervention revealed that the intervention can be structured in different ways to address different individual needs of the participants, suggesting a need for flexibility within how the intervention is implemented. More research is needed to further develop and evaluate the singing training intervention by integrating multiple perspectives from people with AD, relatives of people with AD, carers and music therapists providing singing training sessions.

Keywords:
Alzheimer's disease, music therapy, singing training, music intervention, psychosocial care, multiple case study

Acknowledgements

This master's thesis marks the end of a five-year long journey of studying music therapy at the Grieg Academy, University of Bergen. I would like to show my gratitude towards those of you who have helped me along the way and made this thesis possible.

First, I would like to thank my fellow music therapy students. You have been an amazing community to be part of. I wish you all the best of luck in the future as music therapists.

Simon Gilbertson, thank you for leading the master's seminars, and helping me with the recording equipment.

Natalie Myrvold Alvsåker, thank you for reading my thesis and giving me valuable feedback.

Jørgen Aasen Berget, thank you for our study groups, and for all your honest thoughts and suggestions.

Masha Sri Vestrheim, thank you for helping me out with the roleplay interventions, and for all the times we spent writing together.

Thank you, Stefan Koelsch, Anna Maria Matziorinis and Birthe Kristin Flo for letting me be a part of the ALMUTH research project, and for being available whenever I needed your help.

Kathrine Dahle, thank you for our collaboration in the ALMUTH project, and for all your encouraging words.

Christian Gold, thank you for being my supervisor, and for believing in me and my project.

My parents, Trine Laastad and Hågen Vatshelle Lexander, thank you for your endless love and support.

My fiancé, Camilla Kitty Karlsen, thank you for staying by my side through good times, bad times and times yet to come.

And finally, I would like to thank the study participants. This project would not have been possible without you. I am forever grateful.

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1.0 Introduction

The topic of this master's thesis will be on musical training for people in early stages of Alzheimer's Disease (AD).

1.1 Topic

This master's thesis is a multiple case study investigating the implementation of a standardized singing training intervention protocol for three participants with an early stage AD diagnosis. Each participant attended four singing training sessions, and the sessions were audio recorded. Systematic and naturalistic observations were used to describe each session, and the findings are discussed in view of MT theory and research.

1.1.1 Motivations regarding choice of topic

My reasons for wanting to write about musical training for people with AD can be categorized in to three main motivations. These are *intellectual*, *practice-related*, and *political* reasons.

The *intellectual* reasons for my choice of topic are concerned with increasing my own knowledge about MT for clients with AD. By writing a thesis I am also contributing to the MT body of knowledge. The *practice-related* reasons for writing this thesis are concerned with increasing my own skills as a music therapist in clinical settings. Developing my skills as a music therapist is something that is not only related to what I know about MT within a specific context, but also how this knowledge can be applied to provide therapy to the clients I meet in real life. My *political* reasons for writing this thesis are related to a personal belief in the effects MT for people with AD, and a hope that more research on this topic will contribute to increased recognition for, and solidify, the role of MT within geriatrics in Norway, and the rest of the world.

1.1.2 The ALMUTH study

The ALMUTH study (ALzheimer and MUsic THerapy: Randomized trial of Singing Lessons versus Exercise or No Treatment on Brain Age and Depression Symptoms in People with Alzheimer Disease) is a randomized controlled trial (RCT) located in Bergen, studying the

effects of therapeutic singing lessons on patients with AD. Participants will be randomized and placed in one of three groups: 1) A musical singing training intervention group, 2) a non-musical exercise intervention group, or 3) a no intervention group. The aims of the ALMUTH study are to examine brain plasticity and depression in the patients participating in the study, over a 12-month period. (Koelsch et al, 2018).

My role in the ALMUTH study was to provide singing training intervention for some of the patients in the musical group. This was done under the supervision of a clinically trained music therapist. Over the course of the ALMUTH study I provided singing training for five study participants, and this master's thesis describes three of these participants as cases. Each case represents a participant attending the musical intervention over four sessions. The first two participants will not be included in this thesis, as I worked with these with the intention of becoming familiar with the singing training intervention, while waiting for the necessary approvals from Regionale komiteer for medisinsk og helsefaglig forskningsetikk (REK). The singing training sessions will be audio recorded, and these audio recordings will be analyzed by using a coding system as a tool to quantify predefined behaviors and analyzing them. These cases will be the basis in answering the research questions of my master's thesis, combined with baseline data from quantitative measurements. I decided to use only baseline data collected by the ALMUTH study, as the post-intervention measurements were not collected in time for me to be able to use them in this thesis.

By doing my master's thesis in collaboration with the ALMUTH study, I hope to be able to provide a perspective on what is happening within the situations where the musical interventions are provided.

1.2 Literature review

In this chapter I will provide the necessary background information regarding the pathology of AD, a theoretical background for MT in dementia care, an overview of current research on the use of singing in dementia care, and a review of the current body of meta-analyses published on the use of music and MT in dementia care.

1.2.1 Alzheimer's Disease

AD is a neurodegenerative disease, wherein neurons in the cerebral cortex, and certain subcortical areas deteriorate. AD causes bodily functions to decline, ultimately resulting in death. Symptoms include worsening of episodic and semantic memory and decline in language and cognitive functions. There is no known cure for AD, although medicine can be used to decrease symptoms. (Selkoe, 2001).

In 2050 it is estimated that 2,1 billion people will be above 60 years of age, and in 2017 more than 1 in 5 were aged 60 or older, in Europe and North America, where the ageing population is most advanced. (UN, 2017). Although dementias mostly occur in older people and is one of the most common causes of disability in later life, this is not a normal part of the ageing process. (WHO, 2012, p. 8). Dementias currently affects approximately 50 million people, and this number is expected to grow to 152 million by 2050. The imposed global cost of dementia is currently estimated to be approximately 818 billion USD.

The World Health Organization (WHO) have proposed a dementia plan to address the needs of people living with dementia, their carers and their families. This plan is aimed at improving quality of life, enhance equitable access to services and reduce stigma and social isolation. (WHO, 2018, p. 4). WHO have described seven action areas to reach these goals: "1) Dementia as a public health priority, 2) Dementia awareness and friendliness, 3) Dementia risk reduction, 4) Dementia diagnosis, treatment, care and support, 5) Support for dementia carers, 6) information systems for dementia, and 7) dementia research and innovation." (WHO, 2018, p. 7). MT may have a unique potential in the pursuit of reaching these goals proposed by the WHO. I will provide a brief description of how MT can be used in dementia risk reduction, treatment, care and support, as well as on support for dementia carers.

Verghese et al. (2003) found that leisure activities such as reading, playing board games, playing musical instruments and dancing were activities associated with reduced risk of developing dementia, indicating that a MT program for healthy older adults may be a way of achieving dementia risk reduction. Research have also found other benefits of participating in musical activities, also after the onset of dementia (Särkämö et al., 2014; Satoh et al., 2015; Simmons-Stern et al., 2010; Sung et al., 2010), suggesting the potential benefits of MT in providing treatment, care and support. Musical activities are also found to be able to improve

the relationships between people with dementia and their carers. (Camic et al., 2013; Osman et al., 2016).

1.2.2 Neural plasticity

Neural plasticity refers to the brain's ability to change and reorganize neural structures and pathways, and this happens in response to environmental inputs. Neural changes in brain structures are most noticeable in the cerebral cortex, and especially in areas associated with higher cortical functions, such as mathematical ability, language and musical ability. (Huttenlocher, 2002, p. 5). To make and perform music is a complex task, and requires integration of multimodal sensory and motor information, as well as a precise monitoring of motor performance by auditory feedback. (Altenmüller, 2008). This has made the brains of musicians particularly interesting in the study of neural plasticity, because of the complexity and extent of musical stimuli. (Münte et al., 2002). Neurologic music therapy (NMT) is a clinical MT model utilizing the therapeutic effects of music-elicited neuroplasticity, by using standardized interventions in the treatment of symptoms in speech/language, sensorimotor and cognitive domains. (Thaut, 2010; Thaut & McIntosh, 2014).

Satoh et al. (2015) found that patients with AD showed increased neural activity in the right angular gyrus, and the left lingual gyrus, after receiving MT weekly over six months, and this correlated with better performances on cognitive processing exercises. This suggests, that there may be a potential for utilizing music-elicited neuroplastic changes in rehabilitation of people with AD. However, more research is needed before the therapeutic effects of MT on neural plasticity in people with AD can be properly understood.

1.2.3 Music, emotions and memories

Music can evoke emotions and memories. This has important clinical implications for music therapists, when working with patients with mood disorders. For instance, Aalbers et al (2017) found that MT added to the treatment of depression show short-term beneficial effects, as well as showing efficacy in decreasing anxiety levels. Eschrich et al (2008) suggest that strong emotional reactions related to musical experiences can facilitate memory formation and retrieval. This makes music an important tool in the neuroscientific study of human emotion and memory.

Brattico et al (2011) have studied the role of lyrics in the emotional processing of music. By studying the participants self-selected musical excerpts and sorting them into categories sad/happy and lyrics/no lyrics and seeing how these musical excerpts relate with emotional processing reflected by emotion recognition and activation of limbic areas involved in affective experience, they found that the presence of lyrics has different effects in happy and sad music. Lyrics seemed to be important in defining sad emotions in the musical excerpts, while acoustic cues seemed to be most important in the experience of happy emotions.

In a meta-analysis of neuroimaging studies, Koelsch (2014) have studied the neural correlates of music-evoked emotions and found that music can modulate activity in brain structures known to be involved in emotion, such as the amygdala, nucleus accumbens, hypothalamus, hippocampus, insula, cingulate cortex and orbitofrontal cortex. The functions of significance of the superficial amygdala is related to socio-affective information and modulate approach, and withdrawal behavior in response to such information (Koelsch, 2014, p. 171). The laterobasal amygdala codes the positive or negative reward value of music and regulates neural input into the hippocampal formation, while the central nucleus of the amygdala is involved in autonomic, endocrine and behavioral responses, and expressions of emotions (Koelsch, 2014, p. 171). The nucleus accumbens is sensitive to motivation and rewards, and initiates behaviors to obtain rewards (Koelsch, 2014, p. 171). The hippocampal formation is involved in regulating hypothalamus-pituitary-adrenal axis activity, and is vulnerable to emotional stressors, and generates attachment related emotions (Koelsch, 2014, p. 171). The insula is involved in autonomic regulation and sensory interoceptive representation of bodily reactions accompanying emotions (Koelsch, 2014, p. 171). In the cingulate cortex, the rostral cingulate zone is a convergence zone for interoceptive awareness, internal selection of movements and autonomic regulation (Koelsch, 2014, p. 171). Finally, the orbitofrontal cortex is involved with the control of emotional behavior and automatic (non-conscious) appraisal and is activated by breaches of expectancy (Koelsch, 2014, p. 171).

One of the reasons dementia is of interest to the study of music therapy, is the robustness of musical memory within patients, despite severe decline in other memory areas. This has led researchers to believe that musical memory may be independent from other memory systems. Jacobsen et al. (2015) studied this by using fMRI to investigate brain responses to music excerpts on 32 healthy subjects, and then using multivariate pattern classification to identify brain regions associated with long-term musical memory. The results showed that the caudal

anterior cingulate, and the ventral pre-supplementary motor area seemed to be crucial in the neural encoding of long-term musical memory. These areas were then used as areas of interest for AD biomarkers in 20 patients with AD. The findings showed that these regions exhibited substantially less cortical atrophy, compared to the rest of the brain. (Jacobsen et al., 2015). This may be an explanation for why musical memory can be preserved in patients with AD.

Deason et al (2019) studied the explicit and implicit musical memory of music, with and without lyrics. 15 participants with probable mild AD, and 13 healthy participants, listened to auditory clips of either spoken lyrics, music with lyrics or instrumental music, varied across three sessions, and had their memory tested afterwards. They found that a significant implicit memory mere exposure effect could be observed for both groups in the music with lyrics, and the instrumental condition, but not in the spoken words condition (Deason et al, 2019). Both groups showed the best explicit memory following the spoken words condition, followed by music with lyrics, and then instrumental music (Deason et al, 2019). Healthy adults performed better than participants with mild AD in music with lyrics and spoken words conditions, but both groups performed similarly in the instrumental music condition (Deason et al, 2019). The participants with AD showed more familiarity in the instrumental and sung music conditions, than in the spoken condition (Deason et al, 2019). The implicit memory findings suggest that AD patients may show a preference for information that is familiar to them, while the explicit memory results suggest that there may be limitations to the effects of music on recognition memory performance on people with mild AD. (Deason et al, 2019).

1.2.4 Meta-analyses of effects on music interventions in dementia care

There are several meta-analyses on the effects of music interventions in dementia care. (Chang et al., 2015; Pedersen et al., 2017; van der Steen et al., 2017; Tsoi et al., 2018; Ueda et al., 2013; Vasionyte & Madison, 2013; Zhang et al., 2017). Ueda et al. (2013) investigated the effects of music therapy on psychological and behavioral symptoms of dementia. The primary outcome measures of the meta-analysis were to assess changes in anxiety, depression and behavioral symptoms, and they found moderate effects on anxiety symptoms, and small effects on depression and behavior, while there was not enough evidence to support effects of music therapy on any secondary outcome measures. Vasionyte and Madison (2013) investigated the effects of different music interventions and concluded that the music

interventions seemed to have effect on behavioral, cognitive and physiological outcomes, but many of the included studies suffered from poor methodological quality, reducing the strength and generalizability of the conclusions. Chang et al (2015) investigated the efficacy of MT on disruptive behavior, anxiety, depression and cognitive function, and found indications that MT significantly improved disruptive behaviors, and anxiety levels, and may also affect depressive moods and cognitive functioning. Music also seemed to exert larger effect for people with mild to moderate levels of dementia. Despite this, since patients with moderate levels of dementia were assigned to both groups, interpretations of the results are difficult. (Chang et al., 2015, p. 3437). Pedersen et al (2017) studied the effects of musical interventions on agitation in people with dementia, and the results suggested a stable medium positive effect, while also noting that the subgroup analysis suffers from a low number of included studies, and therefore may not provide enough statistical information. Zhang et al (2017) studied the effects of MT on cognitive function and disruptive behavior as primary outcome measures. The study suggested that MT had positive effects on disruptive behavior and anxiety, and a positive trend for cognitive function, depression and QOL. Although most of the trials included in the study associated MT with improvement in cognitive function and disruptive behavior, many of these did not reach statistical significance. (Zhang et al., 2017, p. 7). There was extensive heterogeneity in the outcome measures in the included trials, as well as heterogeneity in the baseline outcomes. (p. 9). van der Steen et al. (2017) investigated the effects of music based therapeutic interventions for people with dementia and concluded that the interventions probably reduce depressive symptoms, but not agitation or aggressive behavior. It was also stated that there may be little or no effect on emotional well-being, quality of life, overall behavioral problems or cognition. Despite this, the included studies were described as suffering from poor methodological quality. Tsoi et al. (2018) have compared the effectiveness of interactive music therapy to receptive music therapy, and concluded that receptive music therapy could reduce agitation, behavioral problems, and anxiety in older people with dementia, and appears to be more effective than interactive music therapy. Interestingly, this is something that is not consistent with the findings from several of the previously mentioned meta-analyses. Zhang et al. (2017), for instance, found that interactive interventions exhibited stronger beneficial effects. (p. 8), while Pedersen et al. (2017) stated that passive and active musical interventions seemed to yield similar mean effects. (p. 5).

To summarize: the meta-analyses presented seems to agree that there is reason to believe that MT can improve depressive symptoms, anxiety, cognition and disruptive behavior/agitation, although these improvements may be very slight, and are not always found to be statistically significant. (Chang et al., 2015; Pedersen et al., 2017; van der Steen et al., 2017; Tsoi et al., 2018; Ueda et al., 2013; Vasionyte & Madison, 2013; Zhang et al., 2017). However, generalizability of the results is difficult, in view of the methodological quality of the current published trials, and extensive heterogeneity in baseline assessments, as well as in outcome measures. There is also a problem with extensive heterogeneity in the musical interventions provided. This may account for some of the differences in the outcomes reported by different meta-analyses.

1.2.5 Theoretical perspectives on MT in dementia care

Ridder (2016) has written about MT in dementia care and describes the use of music in a person-centered perspective, making use of Kitwood's (1997) work regarding person-centeredness and *personhood* in dementia care. Ridder (2016) describes Kitwood's work as a turning point within the field of dementia care, providing a biopsychosocial perspective on health for people suffering from dementia. (p. 39). This biopsychosocial perspective incorporates a medical, a psychological and a social understanding of care for the person. (p. 40). Personhood is a central concept and can be understood as interaction between people in a way that confirms one's status as a person. (Ridder, 2016, p. 40). Personhood, as a concept in dementia care, is relevant not only to music therapists, but all caregivers, loved ones, and others interacting with the patient.

According to the biopsychosocial health perspective, dementia care must be considered on a biological/neurological level, on an individual level, as well as on a social level. On a biological/neurological level, music can evoke emotions, and cause neural reorganization in the brain, and knowledge of this can be used for therapeutic effect (Skeie & Brean, 2016, p. 34). Research on music and brain has shown that learning to play a musical instrument can prevent the onset of AD. (Verghese et al., 2003). MT has also been proven to reduce depressive symptoms (Aalbers et al., 2017), and can also be used in rehabilitation of brain damage resulting from traumatic injuries or stroke (Thaut & McIntosh, 2014).

On an individual level, person-centered care is described as something that is: "[…] beyond the reduction of behavioral and psychological symptoms. Individual preferences of music are

preserved throughout the process of dementia. Sustaining musical and interpersonal connectedness would help value who the person is and maintain the quality of their life." (McDermont et al., 2014). This means that music is not merely understood as an aesthetic phenomenon (Ridder, 2016, p. 43), but also as an action used to facilitate intersubjective experiences.

Stige (2016) has written about music in elderly care through *health musicking*. The term *musicking* is taken from Small (1998) who argues that "music" as a noun limits our understanding of what music is as an activity and proposes the verb "musicking" as an alternative. Musicking implies musical activities such as performing music and listening, but the term also implies the contextual understanding of how different actions and people are necessary for the musical activity to take place. (Small, 1998). *Health musicking* can therefore be understood as an active use of the possibilities within musical activities for promoting health (Stige, 2016, p. 54), implying the importance of how different people and actions are needed to facilitate health promotion within musical activities.

1.2.6 Singing in dementia and elderly care

Oostendorp and Montel (2014) suggests that "[…] elderly people with AD are capable of encoding and retrieving new information through singing, despite severe memory loss". (p. 983). Although these results are retrieved from a small sample size, they may indicate that singing can activate brain areas involved in learning and memory. Qualitative research has also found benefits of group singing activities for people with AD, and their caregivers. (Osman et al., 2016). This study interviewed 20 participants, consisting of people with AD, and their caregivers, about the impact of a group singing intervention for people with dementia and their carers. They found that the participants seemed to enjoy the group singing, and that it helped them coping with dementia.

In her PhD-thesis, Ridder (2003) suggest that the use of familiar songs in music therapy can be used as a way of entering dialogue with people suffering from severe dementia. She found that:

> *1) Singing has a positive influence on the 6 participants, defined by degree of compliance, by changes in heart rate levels, and by various ways of taking part in the music therapy; 2) The six participants communicate responsively, and this*

> *communication can be recognized by a system of communicative signs, representing different levels of communication: emotional valence, receptive participation, sociality, active participation, communicative musicality, and dialogue. […] 3) In 5 of 6 concrete cases music therapy shows an influence on aspects in residential daily life, defined in a statistical significant decrease in heart rate levels pre/post therapy, for persons with severe dementia showing agitated behavior.* (Ridder, 2003, p. 2).

Ridder (2003) argues that the participants profit from music therapy, and that music can provide a way of bringing people who suffer from severe dementia into a state where dialogue can take place. In view of this, music therapy may be a way of fulfilling psychosocial needs, and possibly prevent onset of behavioral and psychological symptoms of dementia.

In a quasi-experimental study, Cohen et al (2006) investigated the effects of cultural programs on the physical and mental health, as well as on social functioning, in healthy older adults, by assigning study participants to a chorale intervention, or a comparison group, and assessing them at baseline, and after one year. They found the participants in the chorale intervention group to have a higher overall reported rating of physical health, fewer doctor visits, less use of medications, and fewer health problems than the comparison group, as well as better morale, and less loneliness. There was also an observed decline in the total number of activities for the comparison group, while there was a trend towards increased activity for the intervention group (Cohen et al, 2006). These findings suggest that professionally conducted chorale programs for elderly people may be an important addition to promoting health and reducing social isolation.

Camic et al (2013) conducted a pilot evaluation study of a "singing together group" for people with dementias and their carers, where they investigated mood, and quality of life, and the people with dementias behavioral and psychological problems, daily activities and cognitive status. This was measured pre-, post- and at a 10-week follow-up. There were also pre-post interviews, and carers rated the engagements levels of the people with dementia in each session (Camic et al, 2013). The study found that despite the progression of the disease, the quality of life levels of the people with dementia, as well as their carers, remained relatively stable. Engagement levels, and attendance rate, was found to be very high, and the qualitative data suggest that the group had improved well-being. (Camic et al, 2013). This study may suggest that the benefits of singing groups can be important in promoting health, emotional

well-being and quality of life, for elderly people, even if they already suffer from a dementia disease, such as AD. The study also suggest that these programs also may be important for the emotional well-being, and quality of life of carers.

1.3 Research questions

The initial research questions for my thesis were:

- In what ways are the different cases described in the thesis comparable, and how can the cases be understood in relation to theoretical frameworks of MT?
- Are there observable changes in behaviors and musical abilities of the patients during the intervention period? Can these changes be predicted by measured levels of depression, or mental abilities such as memory and attention?

Towards the end of this project I wanted to add an additional research question as well, a research question that could provide insight into the singing intervention, and how it was implemented, and if there are changes that can be done to improve it in the future. Hence, an additional research question was added:

- Was the singing intervention implemented as intended, and can it be improved?

1.3.1 Reflections on the choice of research questions

The research questions are also formed by the literature review. When I compare the cases to each other, this gives me an opportunity to assess the heterogeneity of my own informants. This is important, as the current body of research on musical interventions for people with AD, seems to be limited by extensive heterogeneity at baseline assessments.

As previously mentioned, I hope that my master's thesis will be able to provide a perspective on what is happening in the situations where the participants described in my case studies are receiving the musical intervention. By comparing my cases, and reflecting on them in relation to MT theory, I hope to be able to discuss how musical interventions can be implemented and further developed, with people in early stages of AD. The music intervention in the ALMUTH-study consists of singing training, and choir practice, and follows a standardized protocol for how this intervention should be implemented. The strengths and limitations of

following a standardized music intervention protocol will be an important subject for future discussion.

2.0 Method

For my master's project, I have decided to do a multiple case study. A case study is defined by Yin (2009) as: "[…] a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence." In this master's thesis, the contemporary phenomena that are investigated are the three study participants receiving the musical intervention. The sources of evidence that will be used are audio recordings of the sessions they attend, as well as some of the scores from their baseline assessments in the ALMUTH-study.

2.1 Participants

The cases in my master's thesis describes three participants in the ALMUTH-study, who are receiving the musical intervention over four sessions. The inclusion and exclusion criteria for my project is therefore identical to the criteria for participation in the ALMUTH-study.

At the time of writing, participants are currently being recruited for the ALMUTH-study. They will be randomly assigned to a music intervention group, an exercise intervention group, or a control group. Five of the ALMUTH-study participants assigned to the music intervention group will be presented in my master's thesis as case studies.

2.1.1 Inclusion criteria

To participate in the ALMUTH-study one must be an adult with an AD diagnosis, who lives at home, and not in a nursing home or care facility, although they will not be excluded if they move to one over the course of the intervention period. Participants must be able to give informed consent for the study. They need to be able to undergo testing, including answering questionnaires in Norwegian, and undergo MRI. They must attend assessment and intervention sessions in Bergen, Norway. They can be non-musicians, hobby musicians or professional musicians. (Koelsch et al., 2018).

2.1.2 Exclusion criteria

Due to the importance of listening, participants with hearing impairments, that cannot be improved with hearing aids, will be excluded. Participants may also be excluded if they have

a condition preventing them from taking part in MRI scans, for instance metal operated into the body, or claustrophobia. (Koelsch et al., 2018).

2.1.3 Changes in inclusion and exclusion criteria

Over the course of this project, some changes in the inclusion and exclusion criteria were made to help with recruitment. Notably, a decision was made to also include people with mild cognitive impairment (MCI), as well as people with subjective cognitive impairment (SCI). Despite this, all the participants included as cases in this thesis have an AD diagnosis.

2.2 Interventions

A description of the musical intervention is provided in the following paragraphs. For more details, see Appendix A.

2.2.1 Musical intervention

The musical intervention in the ALMUTH-study consists of singing lessons, and choir practice. Singing lessons will take place once a week, at the participant's home or day center. Once or twice a month the participants will sing the songs together in a choir. The participants will receive a CD or MP3-files with warm-up exercises, play songs, and the songs they will learn during the singing lessons. The music intervention is standardized, but therapists can make adaptions to fit the patient's needs. (Koeslch et al., 2018).

Table 2.1 will be used as a template for the music intervention sessions (estimated time per session = 45-60 minutes). The musical intervention is important for my master's thesis because this defines the context of the case studies. The case studies of my master's project will describe five of the ALMUTH-participants assigned to the musical intervention condition.

Table 2.1 Template for structuring individual music intervention sessions

Part of intervention	Minutes	Activities
Warm-up	10-15 minutes	Stretching arms, breathing exercises, singing scales
Singing	15-20 minutes	Singing known songs, practicing singing technique
Choir song	15-20 minutes	Singing songs from choir practice, practice singing in harmonies
Listening	5-10 minutes	Listening to music chosen by the client. The music can be a recording, or played live by someone

2.2.2 Non-musical intervention and control group

The patients assigned to the exercise intervention, or control group, are not relevant to this thesis, but are briefly described in the following paragraphs. All study participants in the ALMUTH-study had information about these experimental conditions when they gave informed consent to participate. This means that the clients may have a preferred group to be referred to, which may influence motivation or expectations of the intervention. Because of this I believe it is important for the reader to know about the different experimental conditions of the ALMUTH-study. The exercise intervention of the ALMUTH-study consists of weekly group training, and they will also be followed up by a physiotherapist, or an occupational therapist, before and after the weekly group training sessions. In addition, group tours, such as mountain hiking, will be offered twice a month. (Koelsch et al., 2018). Participants in the control group will not receive any interventions, except continuing medications and activities they usually do. They will not be asked to abstain from exercise or musical activities if they already are taking part in such activities regularly. (Koelsch et al., 2018).

2.3 Pilot clients, and preparation for data collection

The data collection was prepared for by providing the music intervention for two pilot clients. These clients were ALMUTH-study participants, assigned to the music group. This was done to get used to the structure of the musical intervention, and to help predefine the variables that will be extracted from the future audio recordings. The pilot clients will not be used as cases in this study. Another way I prepared for data collection is by roleplaying the intervention with a fellow student and recording the musical intervention. By doing this I was able to work, and gain experience, with the audio recording equipment, while also getting used to handling the data material, before the data collection process had begun. The following chapters contain a brief description of the two pilot clients, as well as a description of the roleplay intervention. Note that all descriptions of individuals are covered by informed consent and REK-approval. No information that can be used to identify the clients are included.

2.3.1 The first pilot client

The first pilot client began to receive the musical intervention in the Autumn of 2018. The intervention took place in the client's home, every other week. The client had little prior singing knowledge and expressed that she was hoping to be assigned to the exercise intervention. Despite this, she was interested in participating in the singing intervention. The first sessions were used to make the client comfortable singing along with the therapist, and singing songs she had learned at school, and knew the lyrics to. The first pilot client is still receiving the musical intervention.

2.3.2 The second pilot client

The second pilot client also began receiving the musical intervention program at home, in the Autumn of 2018. The client loved listening to music but had little singing experience. The sessions started out by singing songs the client had learned at school. He was sometimes struggling with the lyrics of some songs, and the therapist provided a lyric sheet as an aid. The client was eager to sing, but had trouble staying concentrated for whole sessions. After attending one of the choir practices, the client decided to leave the ALMUTH-study, stating that he did not feel he was able to keep up with the intervention. He apologized for this and thanked the music therapist for the time they had spent together. This may suggest that the

standardized music intervention may not be suitable for all clients, or needs slight modifications, for instance by shortening the duration of the intervention.

2.3.3 Roleplay intervention

As a way of preparing for data collection and analysis before necessary REK-approvals I arranged two roleplay intervention sessions with a fellow MT student. These roleplay intervention sessions were shorter than the actual singing intervention sessions, and were done to become familiar with the equipment, as well to practice extracting the relevant data from the recordings.

2.4 Data collection

My primary sources of evidence from these case studies are audio recordings of individual music therapy sessions. These audio recordings will be used to gather objective data about observable behaviors such as predefined musical interactions, non-musical interactions, micro-outcomes and treatment fidelity. The secondary sources of evidence are the baseline assessments of the patients gathered by the ALMUTH-study.

2.4.1 Naturalistic observations

Some of the data that will be analyzed comes from naturalistic observations. These observations are made by the therapist within the sessions and are of a more qualitative nature than the systematic observations described in the next chapter. The naturalistic observations will be used to provide a vignette of each case, where the sessions are described from the point of view of the therapist, with the intention of providing a better understanding of what happened within each session. A problem with naturalistic observations is the subjective nature of the data gathered. By combining a naturalistic observational method with a systematic observational method, a subjective narrative description of the progression of the sessions may be supplemented by quantitative measurements as reference points.

2.4.2 Systematic observations

The singing training sessions will be audio recorded. A systematic observational method will be used to observe specific behaviors, that will be used as variables. The variables are total session time, time in music, vocal range, voice dynamics, time in warm-up, time in singing, time in choir song, and time in listening. When listening to the recordings, time in music and micro-outcomes related to singing abilities, can be assessed. These behaviors can then be studied over time and be compared to ALMUTH-study baseline assessments. The audio recordings are also going to be used to assess the fidelity of the singing training interventions. Note that all values are extracted by listening to an audio recording. The objective is not to have exact measurements down to a microscopic level, but rather to give a description of each session, using quantified observations as a tool.

2.4.3 Time in music

The audio recordings of the sessions will be used to observe how much of the time was spent doing music and musical activities. The amount of time spent doing music, and how this change over time, might tell something about how well the musical intervention was received by the client. Time in music is also important in view of treatment fidelity, as the musical interventions may not have been implemented properly if most of the sessions are spent talking together instead of singing. There can also be different interpretations of differences occurring in time spent in music. If time in music decreases over the time of the intervention period, this may be a sign of the disease progressing, but can also mean that the singing training has provided the client with increased confidence in using her voice, and then has made her more talkative. This also means that increased time spent in music also can be interpreted as something the client does to avoid having to keep conversations with the therapist, as singing may be easier to do than talking. Such differences are going to be individual, and each case may need different interpretations of the change. These interpretations therefore must be seen in relation to other variables. Table 2.2 provides an overview of the “Time in music” and “Total session time” variables.

This dataset will be gathered from each session recording. By marking a timestamp when music starts and finishes, one can add up the total amount of time spent in music for each session.

Table 2.2 Overview of variables “Time in music” and “Total session time”

Variable	Definition	Possible values	To analyze
Time in music	Total time spent playing music/singing in a session. This includes vocal warm-up, but not breathing or stretching	0-90 minutes	Time spent singing/playing/listening to music.
Total session time	Total length of audio recording of the session.	0-90 minutes	Total duration of each session.

2.4.4 Micro-outcomes

Micro-outcomes refer to the changes that may occur over time as the music intervention progresses. These changes can be hard to observe without the aid of software or other technology that can be used to give objective measurements that can be compared. The micro-outcomes of interest in this study are specific to the singing training intervention, such as development of vocal register, and volume of the voice. The singing training intervention is intended to improve the clients singing, and changes in vocal range and volume of the voice is therefore highly relevant for this study. These micro-outcomes will be gathered by listening to the audio recordings from the sessions, and vocal range and dynamics will be evaluated by the author. This means that the values that are given to the observations, are dependent on being possible to evaluate by a human from a recording. This may leave out small changes, that can still be of therapeutic importance, from the analysis. Table 2.3 provides an overview of micro-outcome variable.

Table 2.3 Overview of micro-outcome variables

Variable	Definition	Possible values	To analyze
Vocal range	The difference between the highest and lowest notes reached by the client in a session	One note – several octaves	Difference between highest and lowest note in a session
Dynamic singing range	The dynamic range of the client's voice while singing in a session	pp-p-mp-mf-f-ff, (1-6 (1=pp, 6=ff))	Difference between strongest and softest dynamic of singing voice in a session

2.4.5 Fidelity

Fidelity refers to which degree the music intervention was implemented as intended. In contrast to the other observations, this data material is used to study the music therapist, and not the client. Audio recordings can provide objective information about the singing training sessions, and it is possible to retrospectively evaluate to which degree the intervention followed the study protocol. An overview of the fidelity variables is provided in Table 2.4.

2.4.6 Baseline measures from the ALMUTH-study

This master's project will make use of some of the baseline measurements from the ALMUTH-study. These will be used to provide additional context to the findings from the audio recordings. Results from the audio recordings will be discussed in view of the baseline measurements of the Geriatric Depression Scale (GDS) and the Mini-Mental State Examination (MMSE). These psychometric tests will be further described in Table 2.5.

Table 2.4 Overview of fidelity variables

Variable	Definition	Possible values	To analyze
Time in warm-up	Minutes spent doing warm-up exercises	0 – 90 minutes	Time spent warming up
Time in singing	Minutes spent singing songs that are not sung in the choir	0 – 90 minutes	Time spent singing
Time in choir	Minutes spent singing songs that are also sung in the choir	0 – 90 minutes	Time spent practicing choir songs
Time in listening	Minutes spent listening to music	0 – 90 minutes	Time spent listening to music

Table 2.5 Overview of psychometric tests

Name of test	What it measures	Possible values	Values explained
Geriatric depression scale (GDS)	Depression	0-15	Higher scores indicate more severe depression symptoms
Mini-Mental State Examination (MMSE)	Memory and attention	0-30	Higher scores indicate a good mental state, while lower scores indicate a poorer mental state

Table note: The information in the above table is extracted from Koelsch et al. (2018).

2.5 Data analysis

The primary sources of data in this study are as follows: the audio recordings, and the GDS and MMSE tests. The recordings will be used to provide secondary sources of data that will be used in the analysis. These secondary sources of data are vignettes for each case, measurements of "Total session time" and "Time in music", measurements of micro-outcomes and measurements of fidelity. Table 2.6 provides an overview of the data sources that are analyzed and an explanation for how the data will be used.

The audio recordings are used to provide a narrative description of each case. This is done by describing what occurred in each session, and the analysis of these descriptions are interpretations of what occurred in the sessions. These descriptions are qualitative in nature and are added to provide a richer representation of the phenomena being studied (Cozby & Bates, 2012, p. 116) and are also supplemented by additional quantitative variables retrieved from systematic observations of the audio recordings. Tables will be used to provide an overview of each session to supplement the narrative descriptions.

Table 2.6 Overview of data, and data processing

Primary data source	Secondary data source	Use of data
Audio recordings	Description of the singing training sessions	Provide a narrative description of the singing training intervention sessions
Audio recordings	"Total session time" and "Time in music"	Describe the length of the session, and amount of time spent in music
Audio recordings	Micro-outcomes: "Vocal range", "Dynamic singing range"	Describe changes in singing abilities
Audio recordings	Fidelity: "Time in warm-up", "Time in singing", "Time in choir song", "Time in listening"	Evaluate the singing training intervention
Baseline measurements from the ALMUTH study	Scores of GDS and MMSE	Evaluate levels of depression, memory and attention before starting the singing training intervention

The audio recordings are used to provide a narrative description of each case. This is done by describing what occurred in each session, and the analysis of these descriptions are interpretations of what occurred in the sessions. These descriptions are qualitative in nature and are added to provide a richer representation of the phenomena being studied (Cozby & Bates, 2012, p. 116) and are also supplemented by additional quantitative variables retrieved from systematic observations of the audio recordings. Tables will be used to provide an overview of each session to supplement the narrative descriptions.

The variables I am going to analyze are as follows: baseline score on GDS, baseline score on MMSE, "Total session time", "Time in music", "Vocal range", "Dynamic singing range", "Time in warm-up", "Time in singing", "Time in choir" and "Time in listening". Values from the observed behaviors will be studied in relation to the ALMUTH baseline measurements. As each participant attend four session, it is possible to investigate changes over time. These changes will be interpreted and compared with the changes of the other participants, and these interpretations are used to further discuss similarities and differences between the cases.

2.6 Reflections on methodology

Case studies have been central for the development of music therapeutic practice. A reason for doing a multiple case study is to be able to provide deeper insights into the standardized music intervention, which can be used to further investigate and develop MT practice, through reflections on the cases being described. A central point in my choice of research method is the reliance on quantitative data from audio recordings of MT sessions, as well as narrative descriptions of each intervention session. A reason for me to rely on quantitative data to answer my research questions is because such data extracted from an audio recording can give concrete and objective knowledge about the sessions. However, objective data does not in itself imply that the data gathered is of relevance. Therefore, it is important that the data collected and used in statistical analyses is relevant to answering the research questions and can give insights into music therapeutic practice. Due to my choice of method, there will be several limitations to generalizability. Because of this, it is important to clearly state to what extent the findings can be generalized or not. The behaviors I observe, and how I relate these to the baseline measures of the ALMUTH study, are only valid within the context of these case studies. It is my hope that the findings and discussions from my thesis can be used to provide new perspectives on MT within the field of dementia care, and that they also can be

used to formulate hypotheses, that can be investigated further, using different methodological frameworks. A further discussion on the limitations of my findings is presented in chapter 4.2.

At the start of the project I wanted to study different behaviors and relate them to the baseline Brain age measures from the ALMUTH study. This was not possible to do within the timeframe of this master's project, because of a slow recruitment process, and because the Brain age assessments are extensive and may not be ready in time to be used in this project. Studying the correlations between Brain ages and the effects of MT interventions may be an interesting topic for future research.

2.7 Ethical considerations

Carrying out my master's research project require several ethical considerations. Robson and McCartan notes that: "Ethics is a process and not an endpoint, meaning that it should be reviewed throughout the research process and should be done in tandem with others, not as a stand-alone, one time only, pursuit." (2016, p. 208). Reflections on the ethics of my master's project will be happening throughout the whole process, and I will have supervisors connected with the University of Bergen, as well as with the ALMUTH study I will be able to discuss ethical topics regarding my project with. Formalities regarding approval from an ethics board, and consent from the participants, will be addressed through the ALMUTH study. Some ethical issues are still of relevance for my master's project. For instance, anonymity and confidentiality. In this chapter I will further discuss consent and confidentiality.

All the informants in the ALMUTH project must be eligible to give informed consent to participate. The participants will be informed about the contents of the interventions, and control group (no intervention). Due to the nature of the interventions, the participants will also know if they are participating in the music group, the exercise group, or the control group. They can withdraw from the study if they wish, and can still receive the intervention, even if they are no longer being studied. The patients may also choose to not receive the intervention, but still be tested. (Koelsch et al., 2018).

The data collected during the ALMUTH study, and my master's project, will be treated with utmost confidentiality. When reporting the findings from my case studies, I will abstain from using names to preserve the patient's anonymity. Recordings of sessions from the case studies

will be used in a way that does not violate the confidentiality agreement (see Appendix B for more information about the formal agreement made between the participants and the researchers).

As clinically trained health care professionals, we have a responsibility to provide the best possible care for our patients. To do this we are dependent on research to be informed about what, and how, musical interventions work, and how these can be used to provide the best possible care for our patients.

3.0 Results

In the following chapters I will provide vignettes of the sessions with the participants. Tables will be provided to present the structure of each session and will also be used to provide an overview of the descriptions. In the vignettes I will describe the sessions from my point of view as therapist. Then I will provide an overview of the variables I got from analyzing the audio recordings of the sessions. After I have done this for all my cases, I will compare the results of my variables, to look at differences and similarities within the cases, and compare them to each other. Note that the vignette descriptions are described subjectively by the therapist. The vignettes are used to provide a description of what happened within each session, while discussions and interpretations of the findings are provided in chapter 4.1. All graphical representations of the findings are made using the R programming language and software.

3.1 The first case

In the first case I worked with a woman who started receiving the musical intervention condition in the spring of 2019. The four sessions I am describing in this case are the first four sessions she attended. After these, she will continue to receive music therapy from another music therapist, until she has had all the sessions required for the musical condition in the ALMUTH study.

One week before the first session I met with the first participant and her husband at their home. The meeting was arranged so the participant and music therapists could get to know each other, before starting with the singing intervention. The participant, and her husband, were both talkative and friendly. They were eager to get started with the intervention. Both loved music and listened to recordings of their favorite classical pieces regularly. The husband also sang in a local choir.

I was also joined by another music therapist. For the purpose of my project, I was only supposed to lead the first four sessions with the client, before the other music therapist would take over. Because of this, the other music therapist would be present during the interventions led by me, to make the transition as natural as possible for the participant.

3.1.1 Vignette

I met with the participant and her husband at a nursing home for our first session. I was also together with the other music therapist in the ALMUTH project, who would also be present during the sessions. This would be the first session with a participant that would be included as a case in my master's project. I had experience from providing the music intervention for the pilot clients described in 2.3.1 and 2.3.2, but these sessions were not audio recorded.

This would also be, at least to my knowledge, the first music therapy session the participant had ever attended. Being dependent on the participant's willingness to attend the music therapy sessions, I had to make sure the activities within the session were experienced as meaningful.

In this first session (see Table 3.1 for an overview of the session structure), the husband also participated. He was talkative and comfortable singing. During the session he took up much of the musical space by singing loudly, and he also talked a lot in between songs. This made the audio recording of the session somewhat difficult to analyze. The singing of the participant was sometimes drowned out by the voice of her husband. When assessing the participant's vocal range, it was sometimes difficult to determine if she was singing at all. This was also a problem for voice dynamics, as anything she sang that was softer than p, was particularly difficult to assess properly.

Despite this we managed to sing through a couple of songs. I tried singing different songs, to get a picture of what kind of music she was into. She seemed to enjoy old songs from Bergen, such as "Fjellveisvisen", "Madam Felle" and "Jenter fra Bergen". We spent a lot of time singing these songs in the first session. I also wanted to introduce her to some of the choir songs as well, such as "Alle fugler" and "Kråkevisa", so she could learn them before participating in her first choir rehearsal.

She seemed to enjoy the first session and was in a good mood when we were done. Despite this, she also seemed to be a bit confused about why she was there. This may be the result of a progressing neurodegenerative disease but can also be a lack of knowledge about music therapy, even though I had tried to explain the intervention to her at our first meeting a week before. The location of the sessions at a nursing home may suggest a clinical medical intervention, but the singing training may also feel like singing songs together and having a

nice time. These different expectations and experiences may be somewhat confusing to someone who is experiencing a music therapy session for the first time.

The second session (see Table 3.2 for an overview of the session structure) started out in much the same way as the first session did, with stretching, breathing, and vocal warm-up exercises. However, we were not joined by the husband this time, or in any of the remaining sessions. We sang a lot of the same songs as we did the previous week, except for adding in a few new ones. We sang "Oppi Fjellveien" because the participant started humming this song when I suggested singing "Fjellveisvisen". We also sang "Nordmannen" and "My Bonnie", as these are well known songs, and I wanted to see how well she knew them. She knew the lyrics, and sang along, but did not light up the same way as she did when we sang "Oppi Fjellveien", or "Jenter fra Bergen".

We also listened to some recordings of the choir songs, such as "Alle fugler" and "Jeg gikk meg ut i lunden grønn", and some more of the recorded songs that the participants are provided with. "Jeg gikk meg ut i lunden grønn" was a song I did not know before I learned it in the choir rehearsals. The participant did not know the song either, so we tried to learn it together by listening, and singing along to the recording. The participant had not yet attended the choir rehearsals, so she learned the song from scratch. There are a lot of verses in this song and learning all the lyrics seemed to be the most difficult part.

Unfortunately, the recorder went out of power towards the end of the session, and some of the songs we listened to were not included on my audio recording of the session.

The third session (see Table 3.3 for an overview of the session structure) was a bit shorter than the other sessions. This was because the participant had to complete one of the neuropsychological tests before we could start. This took up about half of the time we had available. The test was part of the baseline assessments of the ALMUTH study but was postponed to this date because of technical difficulties during her initial attempt to complete the test.

Table 3.1 Structure of session 1 – First participant

First participant – Session 1 (Total session time (mm.ss): 49.39)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	01.26	07.03	Stretching-, and breathing exercises	--
Warm-up	07.04	07.16	Quick voice-range assessment	pp
Warm-up	07.34	09.24	Singing on scales upwards	pp
Warm-up	10.04	10.22	Singing on scales upwards	pp
Warm-up	11.09	12.53	Singing on scales downwards	pp
Choir song	14.17	16.39	Singing “Alle fugler”	p
Singing	18.56	20.03	Singing “Fjellveisvisen”	pp-mp
Singing	22.30	23.41	Singing “Fjellveisvisen”	pp-p
Singing	27.07	29.15	Singing “Den glade vandrer”	pp-mp
Singing	30.07	30.49	Singing “Madam Felle”	mp
Singing	31.07	32.40	Singing “Madam Felle”	mp
Singing	34.17	35.52	Singing “Jenter fra Bergen”	p
Choir song	37.53	39.04	Singing “Kråkevisa”	pp
Singing	43.23	43.35	Singing “Fjellveisvisen”	pp
Singing	43.56	45.09	Singing “Fjellveisvisen”	pp-p

Table 3.2 Structure of session 2 – First participant

First participant – Session 2 (Total session time (mm.ss): 41.45)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	00.20	05.06	Stretching-, and breathing exercises	--
Warm-up	05.07	07.42	Singing on scales upwards and downwards.	pp
Choir song	08.22	09.23	Singing “Alle fugler”	pp
Singing	10.06	10.22	Client starts singing “Oppi Fjellveien”	mp
Singing	10.33	11.23	Client and therapist sings “Oppi Fjellveien”	mp
Singing	12.02	12.44	Singing “Fjellveisvisen”	pp-mp
Singing	13.02	14.34	Singing “Jenter fra Bergen”	pp-p
Singing	19.07	19.42	Singing “Den glade vandrer”	pp-mf
Singing	19.46	22.42	Singing “Blåveispiken”	pp-mf
Singing	23.50	25.22	Singing “Nidelven”	pp-mf
Singing	25.32	26.51	Singing “My Bonnie”	p-mp
Singing	27.23	28.15	Singing “Nordmannen”	pp-mf
Choir song	29.55	31.15	Singing “Kråkevisa”	pp-mp
Choir song	34.18	35.30	Singing “Kråkevisa”	pp
Listening	37.35	39.11	Listening and singing along to “Alle fugler”-recording	pp-mp
Listening	39.18	39.58	Listening and singing along to “Alle	pp-mp

			fugler"-recording	
Listening	40.15	41.45	Listening to "Jeg gikk meg ut i lunden grønn"-recording	pp

Table 3.3 Structure of session 3 – First participant

First participant – Session 3 (Total session time (mm.ss): 23.43)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	00.26	06.17	Stretching-, and breathing exercises	--
Warm-up	06.18	06.51	Singing on scales upwards	pp-p
Warm-up	08.07	09.49	Singing on scales upwards and downwards	pp-p
Choir song	10.44	11.43	Singing "Alle fugler" together	pp
Choir song	12.04	12.58	Singing "Alle fugler" together	pp-p
Choir song	13.22	14.18	Singing "Alle fugler" together	pp-p
Choir song	16.11	19.30	Singing "Kråkevisa" together	pp-mp
Singing	19.44	22.14	Singing "Jenter fra Bergen" together	pp-mf

We started the session with the usual warm-up exercises, and then went on to sing "Alle fugler". This is a nice song to start with after the warm-up exercises, because it is easy to sing, and the participant knows it well. This time I also wanted to challenge the participant by adding a second voice over the main melody. I did this by singing the main melody together with her, while the other therapist sang the second voice. We managed to sing through the song, but the participant did not sing the lyrics very clearly, and her voice seemed to be

somewhat held back. This might have been because of the test she did right before the session.

After this we sang through “Kråkevisa”. This song has a lot of verses, and the lyrics can be difficult, but she seemed to be able to sing through it with the support of me and the other therapist. Towards the end of the session I wanted to finish the session with a song I knew she had enjoyed singing in the previous sessions, and when we sang “Jenter fra Bergen” her voice seemed less held back.

In the last session (see Table 3.4 for an overview of the session structure) we started out as usual, with the normal warm-up exercises, and then by singing “Alle fugler” together. First everybody sang the song together, then me and the participant sang the main melody while the other therapist added the second voice. After this I tried to sing the second voice together with the participant while the other therapist sang the main melody. This seemed to be somewhat challenging for the participant, but she did not seem to mind, jumping from one voice to the other in the middle of the song.

I suggested singing “Jeg gikk en tur på stien” as the next song. This song can be sung in canon, which may be a bit simpler than adding a second voice to another song. We started out by singing the song together, and then we sang it again, but this time the second therapist added the canon. The addition of a second voice to the song seemed to be a somewhat confusing to the participant, as she did not seem to remember which voice she should follow, and after singing a few lines of the song she slowly faded out.

We then sang some of the songs I knew she liked from the previous sessions. “Jenter fra Bergen” we sang twice, to give her an extra chance to join in, as she seemed to struggle with singing it. I also changed the key of the song the second time, to make it fit better with her vocal range.

After this we started practicing the lyrics of “Jeg gikk meg ut i lunden grønn”. I started by singing the first verse. Then I asked the participant to join in with me on the same verse. We repeated the first verse a few times, and she sang along as best as she could, but as this was a song she had not heard before she joined the study, she seemed to struggle with the lyrics and holding back her voice, despite having practiced it a few times together. The session ended with us singing “Per Spelmann” and “Madam Felle”. On “Madam Felle” her voice opened a little more than it had done previously in the session, but she still fell out of the song

sometimes, and needed some help from one of the therapists to get in again.

Table 3.4 Structure of session 4 – First participant

First participant – Session 4 (Total session time (mm.ss): 42.39)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	00.44	04.44	Stretching-, and breathing exercises	--
Warm-up	04.45	06.58	Singing on scales upwards and downwards	pp
Choir song	07.52	09.56	Singing “Alle fugler”	pp-p
Choir song	10.07	11.00	Singing “Alle fugler”	pp-p
Choir song	11.16	11.40	Singing “Jeg gikk en tur på stien”	p-mp
Choir song	11.58	12.47	Singing “Jeg gikk en tur på stien”	pp-mp
Singing	13.49	15.21	Singing “Jenter fra Bergen”	pp-mp
Singing	16.07	18.40	Singing “Jenter fra Bergen”	p-mp
Singing	19.25	21.23	Singing “Madam Felle”	p-mf
Singing	21.53	25.17	Singing “Fjellveisvisen”	pp-p
Singing	28.51	30.41	Singing “Den glade vandrer”	pp-mp
Listening	33.44	34.12	Client listens to therapist singing “Jeg gikk meg ut i lunden grønn”	--
Choir song	34.38	35.18	Singing “Jeg gikk meg ut i lunden grønn”	pp-p
Choir song	35.35	36.23	Singing “Jeg gikk meg ut i lunden grønn”	pp-p
Choir song	36.38	37.36	Singing “Jeg gikk meg ut i lunden grønn”	pp-p

Singing	38.10	39.20	Singing “Per Spelmann”	pp-p
Singing	40.32	41.58	Singing “Madam Felle”	p-mf

3.1.2 Total session time and time in music

The “time in music”-variable is compared to the “total session time”-variable, by showing the percentage of the session time spent doing musical activities. This is done because of the different lengths of the sessions. By looking at the percentage of how much time was spent in music, it is easier to interpret the importance of the “time in music”-variable, as it reveals more about the context the “time in music” took place in.

Table 3.5 shows the percentage of time spent in music for the first participant. It reveals that the first session lasted longer than the rest of the session, but also contained less time spent in music than the second and fourth session. The third session contains a low score in both the “Time in music”-variable and “Total session time”-variable because of the neuropsychological test the participant had to complete before the session. Percentage wise the time spent in musical activities in the third session is comparable to time spent in music in the second and fourth sessions.

3.1.3 Micro-outcomes

Table 3.6 shows that the first participant had a stable vocal range of a major ninth, except for in the third session where the vocal range had dropped to an augmented octave. The lowest and highest note achieved by the first participant changes considerably between the sessions. Another change that is worth noting is that the client had less dynamic range during the first session, than in the three next sessions.

Table 3.5 Overview “Total session time” and “Time in music” for the first participant

Session	Total session time (In seconds)	Time in music (In seconds)	Percent of session time in music
1	2979	1038	34,84%
2	2505	1228	49%
3	1423	652	45,8%
4	2559	1390	54,3%

Table 3.6 Overview of micro-outcomes for the first participant

Session	Vocal range	Singing dynamics
1	G-A (Major ninth)	pp-mp
2	F-G (Major ninth)	pp-mf
3	G-G# (Augmented octave)	pp-mf
4	G-A (Major ninth)	pp-mf

3.1.4 Fidelity

Fidelity is investigated using the structure template of the music therapy sessions to investigate to what extent the music therapy intervention was implemented as intended by the ALMUTH-study. Table 3.7 is an overview of time spent in the different parts of the intervention: Warm-up, singing, choir and listening.

Table 3.7 shows that the first session contained the most “Time in warm-up”, while the last session contained the least. For the “Time in singing” variable, there is decrease in time in the third session. “Time in choir” shows an increase in the last two sessions. There was no time spent in the “Time in listening” variable for the first and third session. In the second session

“Time in listening” was 3 minutes and 46 seconds, and in the fourth session it was 28 seconds.

Table 3.7 Overview of fidelity for the first participant

Session	Time in warm-up	Time in singing	Time in choir	Time in listening
1	09.54	09.41	03.33	00.00
2	07.22	10.34	03.33	03.46
3	08.06	02.30	06.08	00.00
4	06.14	13.53	06.36	00.28

3.2 The second case

In the second case I worked with a man who started receiving the musical intervention condition in the spring of 2019. The four sessions I am describing in this case are the first four sessions he attended. After these, he continued to receive music therapy from another music therapist, until he has completed all the sessions required for the musical condition in the ALMUTH study.

The second participant I met for the first time for our first session. He had recently been assigned to the music intervention, and I was made aware that he had explicitly hoped to be assigned to the physical exercise intervention. Although he would not receive his preferred intervention, he was interested to try out the music condition. He did not describe himself as very “musical”, but music was always important to him. In his youth he had danced regularly, and he still did, together with his wife and friends, despite his AD diagnosis. His wife was also present during all the sessions described in this case.

As with the first participant, another music therapist joined me in my sessions, to make the transition from one therapist to another more natural. He arrived about ten minutes early, and spent some time talking to the other music therapist about the intervention, the structure, and the choir.

3.2.1 Vignette

In the first session (see Table 3.8 for an overview of the session structure) I started out by showing the participant my usual warm-up exercises and asked him to do them with me. I then asked him to join me in singing “Den glade vandrer”. He had a deep and strong voice, and sang clearly on the first verse, and on the chorus. On the other verses he seemed to be somewhat unsure about the lyrics and seemed to hold a bit back. Despite this, he always came back to the chorus and sang this clearly, but not necessarily very loudly.

I then tried to sing some old songs from Bergen with him. “Fjellveisvisen” he knew, but he did not know the lyrics for it. I sang the song, while he hummed along. The next song, “Jenter fra Bergen”, he knew better. He sang along to the whole song, but at the same time he seemed to hold back, singing it quiet but firmly.

After this, I started talking to him and his wife about the choir. They both seemed interested and eager to try it out. I then suggested we could try to sing one of the choir songs. I showed them “Kråkevisa”, and we tried to sing a few verses of it. He seemed to know the song, but he also sometimes struggled with the lyrics. Despite this, he always came back to the song at the chorus.

When we finished singing a few verses of “Kråkevisa”, I showed him some lyrics sheets for songs he might know and asked him if he wanted to sing some of them. He recognized two songs by the Beatles: “Let it Be”, and “Hey Jude”. I started playing “Let it Be”, and we all sang along. He obviously knew this song very well, and had no problem singing through it all. He seemed to be moved by this song. I then suggested we should try to sing “Hey Jude”, which he also knew well. This song also seemed to move him on an emotional level, as tears appeared in his eyes. But he did not seem to be sad, as he was smiling while he sang along.

The second session (see Table 3.9 for an overview of the session structure) took place two weeks after his first session. We started out with the usual warm-up exercises, and then continued with singing “Den glade vandrer”. He sang along to the first verse and the chorus, but also seemed to struggle somewhat with the lyrics on the other verses. I then asked him to join me in singing “Let it Be”, and he gladly did. Once again, he seemed to be moved by this song. The same was true for “Hey Jude”.

After “Hey Jude”, I asked about his relationship to the Beatles, and asked about what other types of music he liked. The wife then told me that she was a fan of Elvis Presley, so I started singing some of his songs. The participant and his wife joined in. First, we sang “Hound dog”, and then we sang “Blue suede shoes”. They both enjoyed singing along with these songs, even though they sometimes forgot the lyrics.

I then provided the participant with a lyrics sheet of “Kråkevisa” and asked if he wanted to try to sing the song all the way through, with the aid of the lyrics sheet. We sang through the

Table 3.8 Structure of session 1 – Second participant

Second participant – Session 1 (Total session time (mm.ss): 41.07)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	00.31	06.32	Stretching-, and breathing exercises	--
Warm-up	06.33	08.51	Singing on scales upwards	p
Warm-up	09.11	10.33	Singing on scales downwards	p
Singing	11.01	12.20	Singing “Den glade vandrer”	pp-mf
Singing	12.35	12.58	Singing “Fjellveisvisen”	pp
Singing	13.13	15.46	Singing “Jenter fra Bergen”	mp
Choir song	16.37	17.45	Singing “Kråkevisa”	pp-p
Choir song	18.00	18.47	Singing “Kråkevisa”	pp-p
Singing	22.44	24.40	Singing “Let it Be”	mp-mf
Singing	25.06	29.36	Singing “Hey Jude”	mp-mf

whole song, and he managed to sing with me when he had the lyrics sheet in front of him. He sometimes struggled with singing the words correctly but sang clearly along with the chorus. We then practiced singing in harmonies by trying to sing the main melody while the other therapist joined in with the harmony.

We then sang through a few other songs towards the end of the session. First “My Bonnie which the client knew well. Then we sang through “Nordmannen”, with the aid of a lyrics sheet. We ended the session by singing “Per Spelmann” together.

The third session (see Table 3.10 for an overview of the session structure) started out in the usual way with the usual warm-up exercises. We then continued by practicing singing in harmonies. We started out with “Alle fugler” and sang the main voice together. Then the other therapist added the second voice when we repeated the song, and on the last repetition I tried to sing the second voice together with the participant, while the other therapist sang the main melody. He ended up switching between the different voices but sang clearly and seemed to enjoy this exercise. We then sang “Jeg gikk en tur på stien” in canon, where he managed to sing independently in the canon, with two other voices.

I then sang some Bob Dylan songs for him and asked if he knew them. He did, but not to the extent that he knew the Beatles’ songs. I asked if he wanted to sing “Let it Be”, and he sang this song clearly together with me. I played an extract from “Blackbird” for him, but he did not know the song well. I asked him what other Beatles song he liked, and he mentioned “Yesterday”. His wife then said Elvis Presley was her favorite, and I started playing “Blue suede shoes” on the guitar, and continued with “Yesterday”, and “Have You Ever Seen the Rain?” by Creedence Clearwater Revival. The participant sang along to all of these. When I started singing “Hound Dog”, he exclaimed: “I want to dance!” And dragged his wife out on the floor of the therapy room, and they danced together.

The rest of the session was spent drilling the lyrics for “Jeg gikk meg ut i lunden grønn”, and “Kråkevisa”.

Table 3.9 Structure of session 2 – Second participant

Second participant – Session 2 (Total session time (mm.ss): 52.22)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	00.12	05.09	Stretching-, and breathing exercises	--
Warm-up	05.10	08.30	Singing on scales upwards and downwards	pp-p
Singing	08.49	10.54	Singing “Den glade vandrer”	p-mf
Singing	11.30	13.36	Singing “Let it Be”	p-mp
Singing	14.16	18.37	Singing “Hey Jude”	p-f
Singing	19.04	20.25	Singing “Hound Dog”	pp-mp
Singing	20.46	21.33	Singing “Blue Suede Shoes”	pp-p
Choir song	22.23	25.36	Singing “Kråkevisa”	p-mp
Choir song	27.13	28.06	Singing “Alle fugler”	mp
Choir song	28.30	29.24	Singing “Alle fugler”	mp
Singing	40.36	41.58	Singing “My Bonnie”	p-mp
Singing	42.18	44.27	Singing “Nordmannen”	p-mp
Singing	45.03	46.40	Singing “Per Spelmann”	p-mf

In the last session (see Table 3.11 for an overview of the session structure) we started with the usual breathing and singing exercises, followed by practicing the second voice of “Alle fugler”. They told me that they had been practicing the choir songs regularly after they had received audio recordings of the songs, and that they would like to sing through them in this session as well. They had brought the sheet music and lyrics to the songs. We then started by

singing “Vem kan segla” together. We sang through it without much problems, as they knew the song well.

After this we sang “Jeg gikk en tur på stien” and practiced it in canon with both two and three voices. The participant managed to sing along without much problems when he was aided by the music therapist but had some trouble when he sang his voice independently and ended up joining the voice of one of the therapists. Singing independently may be challenging but may also be something the participant can learn through practice, despite being diagnosed with a neurodegenerative disease.

We then started to sing “Dona nobis pacem”. This song can be sung with three independent voices. This is a song that has been practiced by the choir for some time by learning each voice independently, and then trying to put them all together. We started by trying to sing through all the melodies, but the participant and his wife did not seem to know the song very well. We then continued by trying to drill the first melody a few times, until he seemed a bit more comfortable singing it. “Dona nobis pacem” is not a song I have used in these sessions much, because I deem it a bit too complex for participant without much prior singing experience. While practicing singing in harmonies I have preferred to use “Alle fugler” and “Jeg gikk en tur på stien”, as these have the added benefit of being well known.

When we felt done drilling the first melody of “Dona nobis pacem” a few times, we started singing “Bela mama”. The participant said that he had never heard this song before. We sang through it once. Then we found a recording of it and listened to it while singing along. The recorded audio seemed to facilitate the participant’s singing, as he sang much more clearly along with the audio.

Towards the end of the session we sang “Kråkevisa” and “Jeg gikk meg ut i lunden grønn”. This was done to repeat the lyrics we drilled in the previous session. The participant managed to do so without problems, with the aid of the lyrics sheets he brought. Finally, we sang “Let it Be”, as I wanted to end the session with a song that I knew he enjoyed singing. Once again, this song seemed to move him emotionally.

Table 3.10 Structure of session 3 – Second participant

Second participant – Session 3 (Total session time (mm.ss): 53.40)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	00.42	04.41	Stretching-, and breathing exercises	--
Warm-up	04.42	05.33	Singing on scales upwards	pp-mp
Warm-up	07.13	09.03	Singing on scales upwards	pp-mp
Warm-up	09.14	09.47	Singing on scales downwards	pp-mp
Warm-up	10.32	11.33	Singing on scales downwards	p-mp
Choir song	12.01	15.07	Singing “Alle fugler”	mp
Choir song	15.54	17.14	Singing “Jeg gikk en tur på stien”	mp-mf
Listening	18.11	18.35	Client listens to therapist singing “Blowin’ in the Wind”	--
Listening	19.19	20.30	Client listens to therapist singing “One More Cup of Coffee”	--
Singing	21.15	24.13	Singing “Let it Be”	mp-mf
Listening	24.36	25.01	Client listens to therapist singing “Blackbird”	--
Singing	27.06	27.57	Singing “Blue suede shoes”	p
Singing	29.13	31.44	Singing “Yesterday”	p-mp
Singing	32.39	33.53	Singing “Have You Ever Seen the Rain”	pp-p
Listening	34.33	35.48	Client listens to therapist singing “Hound Dog”	--

Choir song	39.37	41.28	Singing “Jeg gikk meg ut i lunden grønn”	mp-mf
Choir song	42.28	44.24	Singing “Jeg gikk meg ut i lunden grønn”	mp-mf
Choir song	44.44	47.25	Singing “Kråkevisa”	pp-mf

Table 3.11 Structure of session 4 – Second participant

Second participant – Session 4 (Total session time (hh.mm.ss): 01.00.02)				
Part of intervention	**Starts (mm.ss)**	**Ends (mm.ss)**	**Activity**	**Singing dynamics**
Warm-up	01.06	05.58	Stretching-, and breathing exercises	--
Warm-up	07.29	09.50	Singing on scales upwards	p-mp
Warm-up	10.22	11.52	Singing on scales downwards	mp
Choir song	15.13	18.45	Singing “Alle fugler”	mp-mf
Choir song	19.26	21.21	Singing “Vem kan segla”	p-mp
Choir song	22.26	23.12	Singing “Jeg gikk en tur på stien”	p-mp
Choir song	23.46	25.27	Singing “Jeg gikk en tur på stien”	p-mp
Choir song	26.02	26.40	Singing “Dona nobis pacem”	pp
Choir song	27.32	29.27	Singing “Dona nobis pacem”	pp-p
Choir song	31.12	32.26	Singing “Bela mama”	pp-p
Listening	33.07	35.39	Listening and singing along to recording of “Bela mama”	p-mp
Choir song	36.35	39.55	Singing “Kråkevisa”	mp-mf
Choir song	40.47	42.38	Singing “Jeg gikk meg ut i lunden	mp-mf

			grønn”	
Singing	48.40	51.51	Singing “Let it Be”	mp-mf

3.2.2 Total session time and time in music

As is evident from Table 3.12, there is a steady increase in time spent in music in the sessions for the second participant. The percentage of “Time in music” is also increasing, even though there is an increase in “Total session time” as well.

Table 3.12 Overview “Total session time” and “Time in music” for the second participant

Session	**Total session time (In seconds)**	**Time in music (In seconds)**	**Percent of session time in music**
1	2467	956	38,75%
2	3142	1448	46%
3	3220	1558	48,38%
4	3602	1878	52,13%

3.2.3 Micro-outcomes

Table 3.13 shows some inconsistencies in the participant’s vocal range. There is a slight increase in vocal range in the first three sessions, and then a slight decline between the third and the fourth session. Throughout all the four sessions the dynamic range of his voice has remained constant, except for a slight increase in the second session.

Table 3.13 Overview of micro-outcomes for the second participant

Session	Vocal range	Singing dynamics
1	G-A (Major ninth)	pp-mf
2	F#-B (Perfect eleventh)	pp-f
3	F-C (Perfect twelfth)	pp-mf
4	F-B (Augmented eleventh)	pp-mf

3.2.4 Fidelity

Just as with the first case, the second case also contains less time in warm-up, singing, choir song and listening, than suggested by the template. “Time in warm-up" remains relatively stable over all the sessions. In the first session the “Time in warm-up" is slightly longer than in the following session. Table 3.14 also reveals a decrease in “Time in singing” after the second session, and a steady increase in “Time in choir”. “Time in listening” is only present in the two last sessions and remains relatively low throughout the sessions.

Table 3.14 Overview of fidelity for the second participant

Session	Time in warm-up	Time in singing	Time in choir	Time in listening
1	09.42	10.41	01.55	00.00
2	08.18	15.48	05.00	00.00
3	08.15	07.34	10.54	03.15
4	08.43	03.11	16.52	02.32

3.3 The third case

The third participant had already received the intervention for some time by the other music therapist. I had also met him a few times before we started with the intervention, at the ALMUTH-choir rehearsals. He was a talkative and friendly man with great humor, who always seemed to have a good time at the choir rehearsals. He also had experience from choir singing, prior to his participation in the ALMUTH-study. In his younger days he had sung in a local men's choir together with his father. Singing was something he enjoyed, and a choir seemed to be a perfect context wherein he could meet people, be social and sing together with others.

Since the third participant already had received the singing intervention for some time, this was the only participant who I worked with, without another music therapist present. I also provided the intervention at the home of the participant, and not at a room at the nursing home the other participants came to for their sessions. This made the sessions with this participant somewhat different, then the sessions with the other participants. Not only because of the different context of being in the participant's home, but also because he was already a singer. While the other participants could be somewhat uncomfortable with singing together with the therapist at first, the third participant was completely comfortable doing this.

3.3.1 Vignette

The first session (see Table 3.15 for an overview of the session structure) started out very differently compared to the first two participants. Being in the comfort of his own home, he was not only a study participant, but also a host. This was a role he took seriously, as I was offered coffee and chocolate, and made sure that I was comfortable throughout the whole session. He had also prepared for my visit by having a memory stick with recordings of the choir songs plugged in to his computer, so that they were ready to be played.

The session started by him playing the recording of "Bela mama". We listened to it, without singing along, and had a little chat about the song afterwards. Then he put on "Dona nobis pacem", and we sang all three melody lines of the song together with the recording. When the recording ended, he started to tell me about his previous choir experience, about the other people in the choir, where they rehearsed, and so on. He had the control of the session, and I did not mind this, as he was actively suggesting which songs he wanted to sing. This made the

session structured around the recorded songs, and he was eager to listen, or sing, through them all. We then sang “Jeg gikk en tur på stien”. He sang clearly together with the recording, but he did not sing in canon.

He then put on “Jeg gikk meg ut i lunden grønn”. This song he did not sing with the same confidence as he did with the previous songs. I guessed the reason was that he did not know the song well, and indeed, he told me afterwards that he had not heard it before attending the ALMUTH-choir rehearsals. There is also a lot of verses in this song, and a lot of lyrics to remember. Despite having attended the ALMUTH-choir rehearsals, and received the musical intervention, for several months prior to me starting to work with him, he had still not learned all the lyrics to the song. We continued the session by singing along to the recordings of “Kråkevisa” and “Savoleia”. “Savoleia” is a circle song wherein a drone is held by the choir, while the choir leader adds a melody on top of this foundation. I have not used this song with the other participants, as this is a song that I feel works best in a choir setting, and not in a one-to-one session. The participant quietly held the drone along with the recording. We then sang “Vem kan segla”, and the participant once again sang along with the same strength in his voice that he had on “Dona nobis pacem” and “Bela mama”.

I then had to insist on doing some warm-up exercises, as this was something I had planned to do, to assess vocal range. Doing the warm-up exercises is also a way for me as a therapist to take care of my own voice, when singing with different clients over time. He joined in with the exercises, and we sang some scales up and down.

After this I wanted to map his musical preferences by trying to sing different songs that he might have known from his childhood. I gave him a song book and asked if he saw any songs that he knew in it. He told me he knew “My Bonnie”, and could add a second voice on chorus, and he did. After this we sang “Nordmannen”. He knew the first verse well but mixed up the lyrics to the other verses. We then repeated the song, this time with a lyrics sheet as aid, and he sang the song much better. We sang “Nordlandsnetter”, and “Fjellveisvisen”, and he hummed along to them. We ended the session by repeating “Kråkevisa” one last time.

In the second session, the audio was not recorded for the first few minutes. These minutes were not important for the intervention, as only small talk happened within this time. The recorded audio contained the full intervention, save from the first few seconds from the first song.

The second session (see Table 3.16 for an overview of the session structure) started much like the first session. I was welcomed into his home, he offered me coffee, and we started singing along with his recordings together. We started out by singing “Jeg gikk en tur på stien”. This time we also sang in canon together with the recording. After this we sang “Kråkevisa”, and we sang through the whole song, despite some struggles with the lyrics. This was also true for when we sang “Jeg gikk meg ut i lunden grønn”. The participant knew the first few verses well but struggled on some of the later verses.

After this we sang “Vem kan segla” along with the recording. The participant knew this song well, and sang it clearly with a musical dynamic control, with a clear intentional varying between singing mp and mf, to create his own musical expression of the song. When the song ended, he started to talk about his previous choir experience, repeating some of the stories he told me in the previous session, about the people he sang with, and about tours they had been on. We then continued by singing through “Savoleia” and “Bela mama” together with the recording.

Like in the first session, I had to insist on doing the warm-up exercises in about the middle of the second session. We then did some warm-up exercises by singing on scales upwards and downwards. After this we practiced singing in harmonies, by singing “Alle fugler” and “Dona nobis pacem” along with the recordings. While singing “Alle fugler” the client added the second voice and sang along without much problems. When we sang “Dona nobis pacem” he managed to sing along with the main voice of the recording, while I sang the other voices. We ended the session by singing through “My Bonnie”, “Nordmannen” and “Per Spelmann” together, and adding the second voice over the chorus to “My Bonnie”.

In the third session (see Table 3.17 for an overview of the session structure) I asked the participant if he was okay with starting with the warm-up exercises before we started listening through the recorded songs, and he agreed to this. We then sang through “My Bonnie”. He also added his second voice over the chorus of the song.

Table 3.15 Structure of session 1 – Third participant

Third participant – Session 1 (Total session time (mm.ss): 46.50)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Listening	00.15	01.11	Listening to recording of "Bela mama"	--
Listening	01.58	03.56	Listening and singing along to recording of "Dona nobis pacem"	mf
Listening	06.45	08.07	Listening and singing along to recording of "Jeg gikk en tur på stien"	mf
Listening	08.25	10.20	Listening and singing along to recording of "Jeg gikk meg ut i lunden grønn"	pp-p
Listening	10.51	13.02	Listening and singing along to recording of "Kråkevisa"	pp-p
Listening	13.35	14.26	Listening and singing along to recording of "Savoleia"	pp-p
Listening	15.07	15.59	Listening and singing along to recording of "Vem kan segla"	mf
Warm-up	19.48	22.29	Singing on scales upwards	pp-mp
Warm-up	23.28	24.49	Singing on scales downwards	pp-p
Singing	31.05	33.37	Singing "My Bonnie"	mf
Singing	33.50	34.40	Singing "Nordmannen"	pp-mf
Singing	34.59	36.57	Singing "Nordmannen"	mf
Singing	37.15	40.00	Singing "Nordlandsnetter"	p
Singing	40.41	42.15	Singing "Fjellveisvisen"	pp-mp

Choir song	42.51	46.00	Singing “Kråkevisa”	p-mf

We started listening through the recordings, as had become the usual way to structure our sessions. By listening to songs, and singing along to the recordings, we were able to practice all the choir songs at least once every session. We started by listening through “Jeg gikk en tur på stien”, and practicing singing it in canon. This was followed by listening and singing along to “Dona nobis pacem”. We also managed to add the second and third voice to the recorded main melody. The participant also added the second voice of “Alle fugler” while singing together with the recording. After this we sang “Bela mama”, “Kråkevisa” and “Jeg gikk meg ut i lunden grønn”. Then we sang “Savoleia”, and then “Vem kan segla”.

I asked if he was interested in trying to sing some of the songs we had sung in the previous sessions, and I suggested “Nordmannen”. We started singing it together. After the song he said that he had a lyrics sheet for it somewhere, and he started looking for it, as he had some trouble remembering the lyrics to some of the verses. While he was looking for the lyrics sheet, I started playing “Nidelven” and he hummed along to it, joining in on the chorus and other parts that he knew. When he found the lyrics sheet we sang through “Nordmannen” once more. The lyrics sheet had two verses that I did not know about, and the participant sang them to me, while I accompanied him with the guitar.

Towards the end of the session I asked if he wanted to practice “Alle fugler”. We sang through it once without the recording, and then with it. We then sang “Per Spelmann” and ended the session by singing together with the recording of “Kråkevisa”.

In the last session (see Table 3.18 for an overview of the session structure) I had with the third participant, I started out with the usual warm-up exercises. After we had completed these exercises, he told me that he was not feeling to well this day, and that he had had some trouble sleeping. He did not feel sick but asked if we could take it a bit easier this session, and I told him that was fine, and that he should tell me if he needed a break within the session.

Table 3.16 Structure of session 2 – Third participant

Third participant – Session 2 (Total session time (mm.ss): 43.42)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Listening	00.00	01.09	Listening and singing along to recording of "Jeg gikk en tur på stien"	mp
Listening	01.50	04.04	Listening and singing along to recording of "Kråkevisa"	p-mp
Listening	04.38	06.34	Listening and singing along to recording of "Jeg gikk meg ut i lunden grønn"	pp-mp
Listening	12.46	13.39	Listening and singing along to recording of "Vem kan segla"	mp-mf
Listening	15.07	16.08	Listening and singing along to recording of "Savoleia"	p-mp
Listening	16.40	17.36	Listening and singing along to recording of "Bela mama"	mp
Warm-up	18.54	21.36	Singing scales upwards	p-mp
Warm-up	22.38	24.33	Singing scales downwards	pp-mp
Listening	25.18	27.41	Listening and singing along to recording of "Alle fugler"	mf
Listening	28.11	30.08	Listening and singing along to recording of "Dona nobis pacem"	mf
Listening	33.40	35.38	Listening and singing along to recording of "Dona nobis pacem"	mf
Singing	36.42	38.23	Singing "My Bonnie"	mf

Singing	38.30	39.48	Singing “Nordmannen”	p-mf
Singing	40.48	41.20	Singing “Per Spelmann”	mf

His singing voice did not seem to be affected, but he still seemed to be tired, and this affected his ability to stay focused in the session. I told him that we could take our time, listen through the recordings together, and sing along to them if we felt like it, and he agreed to this.

We then sang along to the recording of “Alle fugler”, followed by singing “Jeg gikk en tur på stien” in canon with the recording. We then listened through the recordings of “Kråkevisa”, and “Jeg gikk meg ut i lunden grønn”. We repeated “Jeg gikk meg ut i lunden grønn”, and then we sang through the voices of “Dona nobis pacem” twice. The session ended with us singing through “Vem kan segla”, “Savoleia” and “Bela mama”. The session felt slow-paced compared to the previous sessions we had together.

Table 3.17 Structure of session 3 – Third participant

Third participant – Session 3 (Total session time (mm.ss): 49.46)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	01.42	03.53	Singing on scales upwards	pp-mp
Warm-up	04.34	06.51	Singing on scales upwards and downwards	pp-mp
Singing	07.14	08.35	Singing “My Bonnie”	p-mf
Listening	11.28	12.54	Listening and singing along to recording of “Jeg gikk en tur på stien”	p-mp
Listening	13.35	15.35	Listening and singing along to recording of “Dona nobis pacem”	p-mf
Listening	16.07	18.32	Listening and singing along to recording of	mp

			“Alle fugler”	
Listening	19.04	20.01	Listening and singing along to recording of “Bela mama”	p-mp
Listening	20.31	22.47	Listening and singing along to recording of “Kråkevisa”	pp-mp
Listening	23.17	25.13	Listening and singing along to recording of “Jeg gikk meg ut i lunden grønn”	pp-p
Listening	25.46	26.42	Listening and singing along to recording of “Savoleia”	p
Listening	27.27	28.23	Listening and singing along to recording of “Vem kan segla”	mp-mf
Singing	29.18	31.36	Singing “Nordmannen”	pp-mf
Singing	32.17	33.41	Singing “Nidelven”	pp-mp
Singing	34.04	37.03	Singing “Nordmannen”	p-mf
Choir	39.20	40.14	Singing “Alle fugler”	p-mp
Listening	40.31	42.56	Listening and singing along to recording of “Alle fugler”	p-mf
Singing	43.43	44.55	Singing “Per Spelmann”	mp-mf
Listening	46.15	48.32	Listening and singing along to recording of “Kråkevisa”	pp-mp

Table 3.18 Structure of session 4 – Third participant

Third participant – Session 4 (Total session time (mm.ss): 48.06)				
Part of intervention	**Starts**	**Ends**	**Activity**	**Singing dynamics**
Warm-up	09.30	12.42	Singing on scales upwards	pp-mp
Warm-up	19.49	21.48	Singing on scales downwards	pp-mp
Listening	23.53	26.19	Listening and singing along to recording of "Alle fugler"	pp-p
Listening	26.59	28.24	Listening and singing along to recording of "Jeg gikk en tur på stien"	pp-mp
Listening	28.35	30.51	Listening and singing along to recording of "Kråkevisa"	p-mf
Listening	31.29	33.24	Listening and singing along to recording of "Jeg gikk meg ut i lunden grønn"	p-mp
Listening	33.28	35.23	Listening and singing along to recording of "Jeg gikk meg ut i lunden grønn"	p-mp
Listening	36.52	38.53	Listening and singing along to recording of "Dona nobis pacem"	p-mp
Listening	38.54	40.56	Listening and singing along to recording of "Dona nobis pacem"	p
Listening	41.02	41.55	Listening and singing along to recording of "Vem kan segla"	mp
Listening	44.40	45.35	Listening and singing along to recording of "Savoleia"	p
Listening	46.33	47.30	Listening and singing along to recording of	p-mp

			“Bela mama”	

3.3.2 Total session time and time in music

When looking at “Time in music” from the sessions with the third participant, the percentage of time spent in music remains stable between the first and second session. The most time spent in music is seen in the third session, while the lowest amount is in the last. There is also a notable increase in “Time in music” in the third session.

3.3.3 Micro-outcomes

Table 3.20 shows that there were no changes in the participant’s singing dynamics over the course of these sessions for the third participant. There is also a slight increase in vocal range over time.

3.3.4 Fidelity

Table 3.21 shows that “Time in warm-up” remained stable within all the sessions of the third participant, with less than a minute in difference between the most time spent in warm-up (first session) and the least time spent (third session). The amount of “Time in singing” varied between the sessions, with the most time spent in the first and third session. In the second session the time spent in singing was considerably less, and no time was spent singing in the fourth session. A small amount of time was spent practicing choir songs in the first and third sessions, while no time was spent on this in the second and fourth sessions. “Time in listening” has been high in all sessions, and even higher than suggested by the structuring template for the music interventions. The least amount of “Time in listening” is seen in the first session, while the other sessions show a considerably higher amount.

Table 3.19 Overview “Total session time” and “Time in music” for the third participant

Session	Total session time (In seconds)	Time in music (In seconds)	Percent of session time in music
1	2810	1615	57,47%
2	2622	1355	51,67%
3	2986	1930	64,63%
4	2886	1315	45,56%

Table 3.20 Overview of micro-outcomes for the third participant

Session	Vocal range	Singing dynamics
1	F-C (Perfect twelfth)	pp-mf
2	E-B (Perfect twelfth)	pp-mf
3	E-C# (Major thirteenth)	pp-mf
4	E-D (Major fourteenth)	pp-mf

3.4 Data comparisons

By comparing the results of the variables between the cases it is possible to gain new insights in to the similarities and differences between the cases, and how this can be used to improve the singing intervention protocol by investigating how the protocol was implemented for different individuals, if the protocol was implemented as intended or if there are trends within the different cases that may need further investigation to properly explain. I will use graphs to provide a visual representation of the variables for all the cases over all the sessions. Note that the measurements of “Time in music”, “Time in warm-up”, “Time in singing”, “Time in

Table 3.21 Overview of fidelity for the third participant

Session	Time in warm-up	Time in singing	Time in choir	Time in listening
1	05.16	09.39	03.09	10.05
2	04.37	03.31	00.00	14.27
3	04.28	09.14	00.54	17.34
4	05.11	00.00	00.00	16.44

choir" and "Time in listening" cannot be compared between the cases directly, without controlling for differences in "Total session time".

3.4.1 Time in music

Figure 3.1 shows that the percentages of time spent in music are similar for the first two cases, and they both seem to trend towards an increase over the course of the sessions, despite a slight drop in the third session for the first participant. This trend towards an increase in time spent in music over time for the first two participants contrasts with the third participant, where the time spent in music varies considerably between his sessions.

3.4.2 Micro-outcomes

As seen in Table 3.22, the singing voice dynamics within whole sessions seemed to remain stable with all the participants. The only changes were in the first session for the first participant, and in the second session for the second participant. The first participant went from a maximum dynamic range of mp in the first session to a maximum dynamic range of mf in the last three sessions. The second participant had a peak maximum dynamic range at f in the second session, and a maximum dynamic range of mf in the other sessions. The third participant remained stable at mf throughout all the sessions. All the participants had a minimum dynamic range of pp in every session.

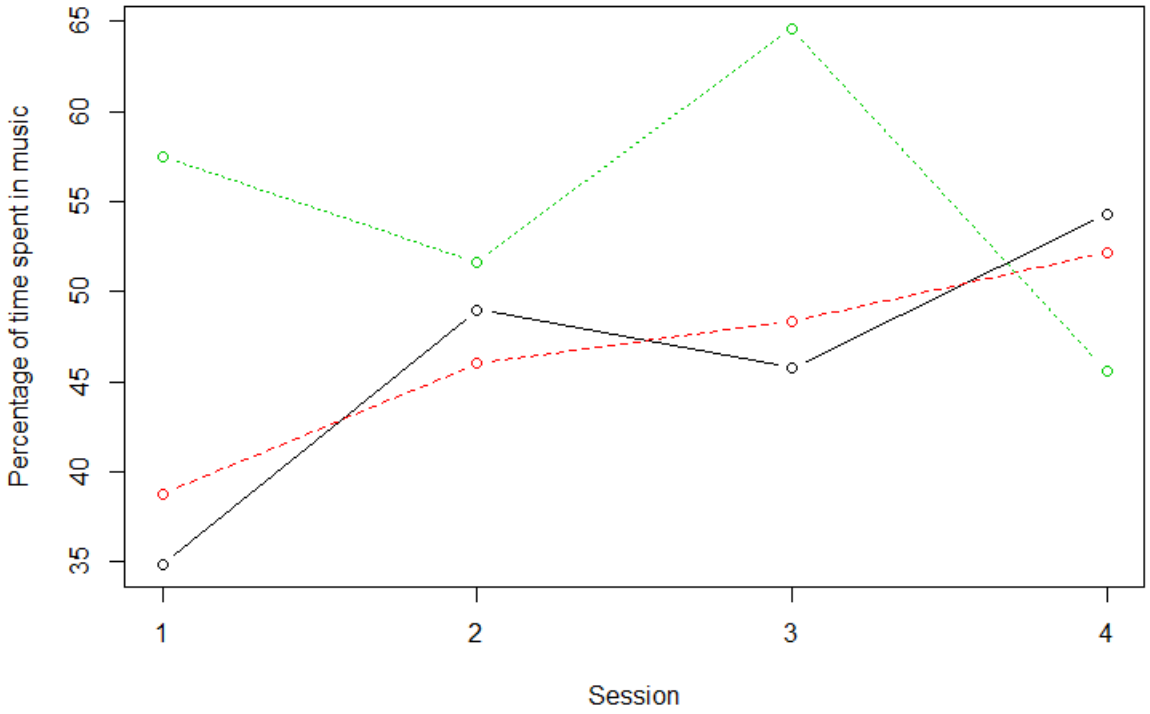

Figure 3.1 Percentage of time spent in music for all participants

Figure note: The black line represents the first participant. The red dotted line represents the second participant. The green smaller dotted line represents the third participant.

Table 3.22 Overview of dynamic singing ranges for all participants

Session	Participant 1	Participant 2	Participant 3
1	pp-mp	pp-mf	pp-mf
2	pp-mf	pp-f	pp-mf
3	pp-mf	pp-mf	pp-mf
4	pp-mf	pp-mf	pp-mf

As seen in Table 3.23, the third participant had the biggest vocal range of all the participants. The second participant seemed to have a small development in his vocal range after the first session, with a peak vocal range performance of a perfect twelfth in the third session. The third participant seemed to have a steady increase in vocal range. There were no dramatic

changes in either the “Vocal range”-variable or the “Singing dynamics”-variable over the four sessions for the first participant.

Table 3.23 Overview of vocal range for all participants

Session	Participant 1	Participant 2	Participant 3
1	G-A (Major ninth)	G-A (Major ninth)	F-C (Perfect twelfth)
2	F-G (Major ninth)	F#-B (Perfect eleventh)	E-B (Perfect twelfth)
3	G-G# (Augmented octave)	F-C (Perfect twelfth)	E-C# (Major thirteenth)
4	G-A (Major ninth)	F-B (Augmented eleventh)	E-D (Major fourteenth)

3.4.3 Fidelity

Figure 3.2 shows considerably less time spent doing warm-up exercises for the third participant, while the first two participants seemed to spend about the same amount of time warming up, except for a slight drop in the second session, and a slightly bigger drop in the fourth session by the first participant. For the second participant, “Time in warm-up" remains relatively stable over all the sessions. For the third participant, the “Time in warm-up" is also significantly lower than suggested in the singing intervention protocol, as well as when compared with the other participant.

Figure 3.3 shows the “Time in singing” for all the participants over all the sessions. The graph shows big differences of “Time in singing” between all participants, and over all sessions. The second participant has a steady decline in “Time in singing” after the second session, but at the same time has a steady increase throughout all the sessions in “Time in choir”. For the first participant a similar trend is visible, except for in the last session where both “Time in singing” and “Time in choir” seemed to peak. This also caused a peak in “Time in music” in the fourth session for the first participant. For the third participant, “Time in singing” varied a lot between the different sessions. In the first and third sessions there was more time spent in singing songs unrelated to the ALMUTH-choir, than in the second and fourth sessions.

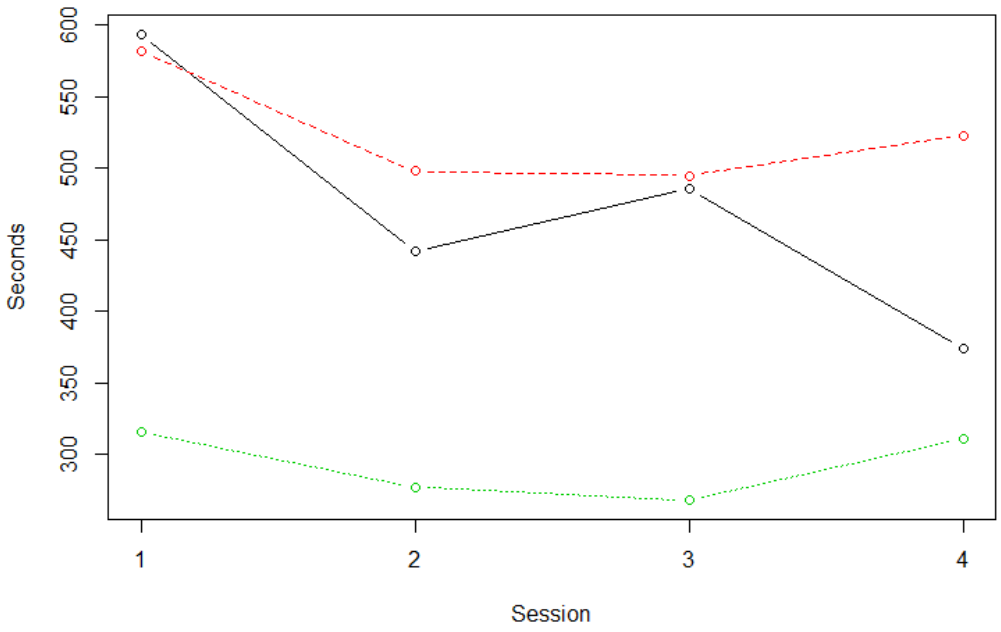

Figure 3.2 “Time in warm-up” for all participants

Figure note: The black line represents the first participant. The red dotted line represents the second participant. The green smaller dotted line represents the third participant.

Figure 3.4 shows a steady increase of “Time in choir” over the four sessions for the first two participants, and especially for the second. The third participant does not see an increase in “Time in choir” over the sessions.

Figure 3.5 shows that the third participant spent more time in listening than the other two participants. For the first participant, the “Time in listening”-variable is only present for two of the four sessions, and only for a brief time. For the second participant, “Time in listening” is only present in the third and fourth sessions.

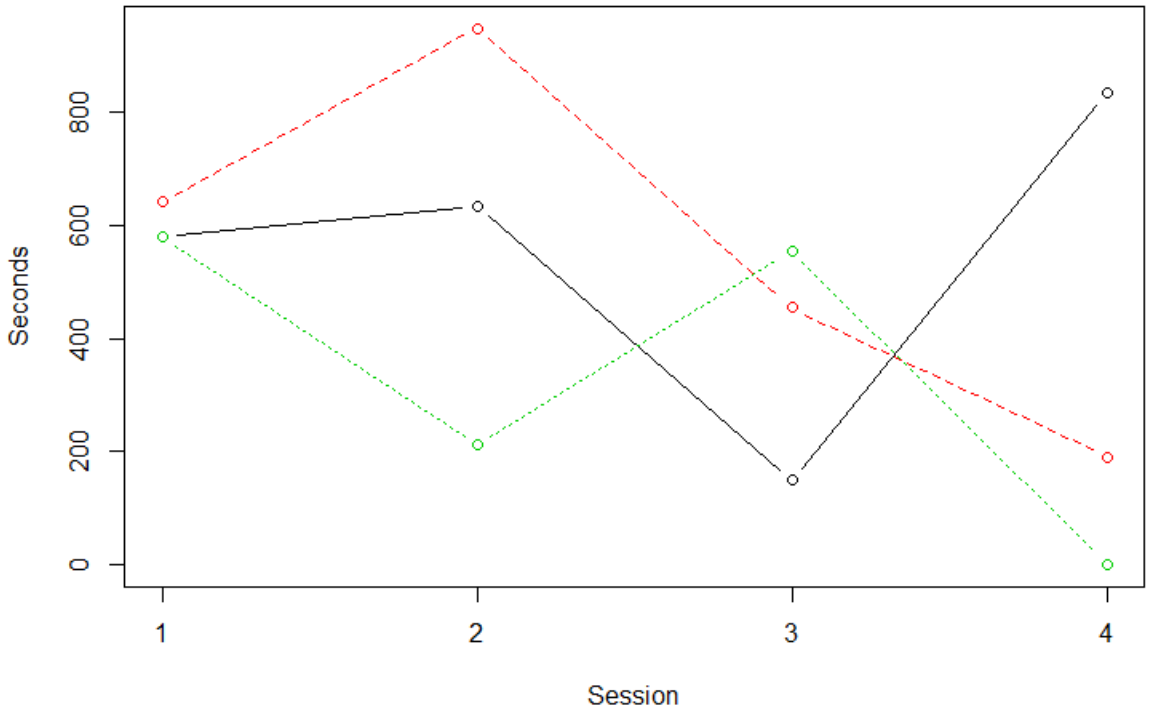

Figure 3.3 “Time in singing” for all participants

Figure note: The black line represents the first participant. The red dotted line represents the second participant. The green smaller dotted line represents the third participant.

3.4.4 GDS and MMSE

Table 3.24 shows the baseline measurements of GDS and MMSE for the participants in this master’s project. This overview of baseline measurements reveals that the third participant seemed to show more signs of depressive symptoms than the other two participants. The MMSE baseline measurements are equal for the second and third participant, and slightly lower for the first participant.

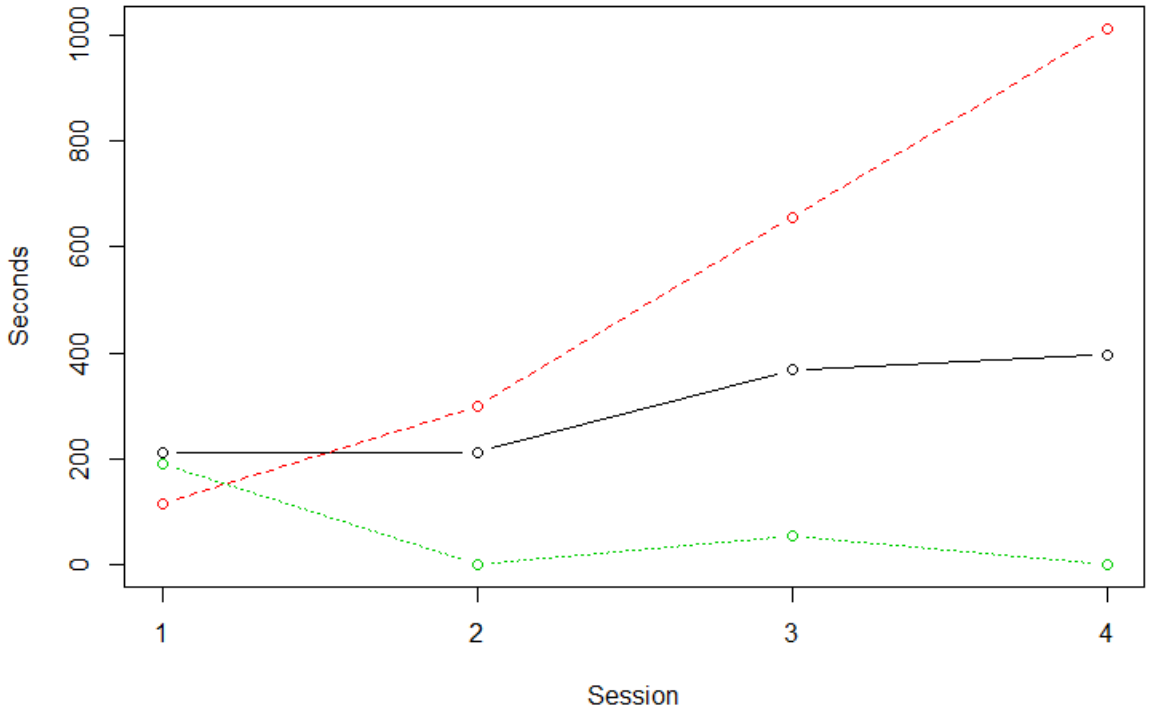

Figure 3.4 “Time in choir” for all participants

Figure note: The black line represents the first participant. The red dotted line represents the second participant. The green smaller dotted line represents the third participant.

Table 3.24 Overview of the participants GDS and MMSE baseline scores

	Participant 1	**Participant 2**	**Participant 3**
GDS Total	4	6	12
MMSE Total	17	23	23

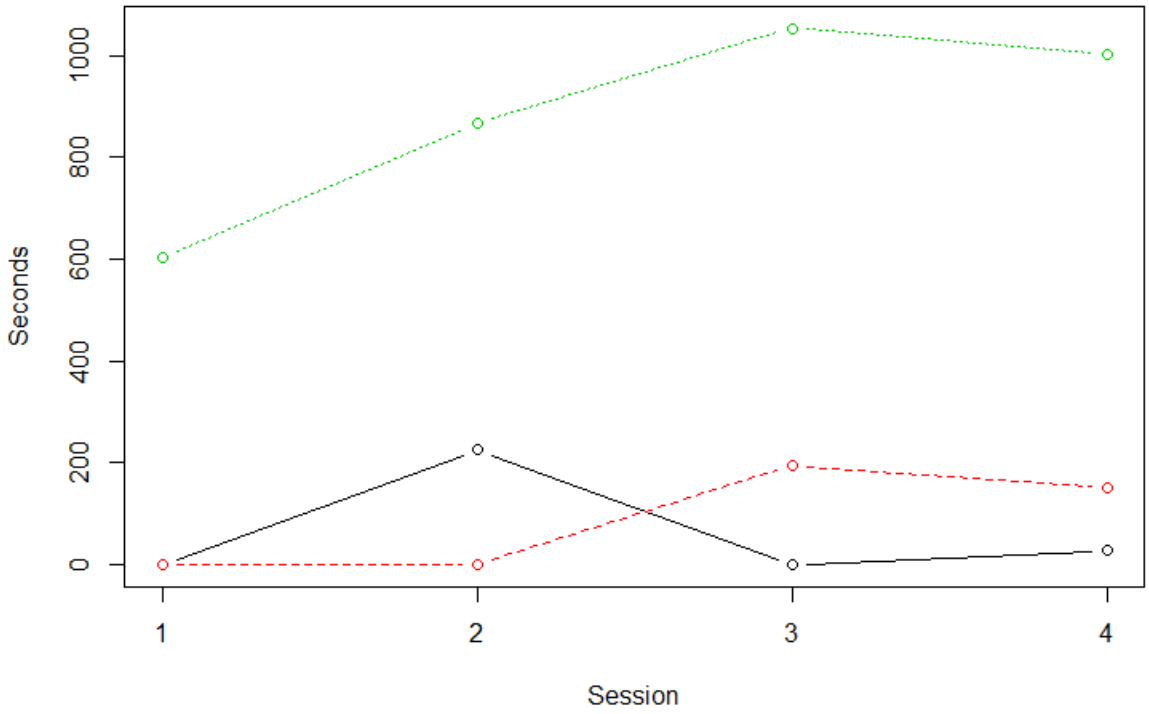

Figure 3.5 “Time in listening” for all participants

Figure note: The black line represents the first participant. The red dotted line represents the second participant. The green smaller dotted line represents the third participant.

4.0 Discussion

The findings of this study raise some discussions as some phenomena described may need further investigation to be properly understood. The following discussions will be about how the results can be understood, implications for practice, limitations and possible areas of future research.

4.1 Findings

Further discussion is needed to properly understand the meaning of the results. For instance, a high value of "Time in music" may be interpreted in different ways based on the context of what happened within each session. A low percentage value of "Time in music" can mean that the participant did not enjoy singing, was talkative, or avoided singing for other reasons. In general, the first session may also be expected to contain less time spent doing musical activities, because of the need for explanations of the musical activities, and because of the need to get to know each other and building the foundations of a therapeutic relationship. Looking at the individual scores of each participant also raises different topics of discussion than when the scores of all the participants are compared, as the comparisons may reveal certain similarities and differences that may need further investigation to be understood properly.

4.1.1 The vignettes

The vignette describing the singing training sessions of the first participant is a description of how the singing training intervention can be implemented for people without prior music training. In the first two sessions, most of the time was spent building a therapeutic relationship and exploring the participants' musical preferences. Towards the end of the second session, there was a shift towards practicing the choir songs. The practicing of choir songs also seemed to be more important in the last two session, even when the third session was much shorter than the other sessions, as seen in Table 3.5.

The husband of the first participant was present during the first session, and this may account for some of the reduced time spent in music (see Table 3.5), as there were two people unfamiliar with MT attending the session, and they both had questions, stories or digressions

that they brought up during the intervention. The second participant was joined by his wife in all the sessions, and their interactions with each other within the sessions may be an example of how MT also can be valuable for carers and relatives of people with dementia, providing a context for musical interactions and shared experiences. (Unadkat et al., 2017). The spontaneous dancing in the third session of the second participant is especially notable. Camic et al. (2013) have suggested that carers singing together with people with dementia may improve the quality of life for both. Similar findings are also seen in Osman et al. (2016), suggesting that group singing activities may provide social inclusiveness and improvements in relationships for people with dementia and their carers. Despite these promising findings, Kreutz and Brünger (2012) also notes that negative associations with amateur group singing may come up, due to social problems and conflicting aesthetic goals, suggesting that more research is needed to provide a proper understanding of potential issues that may appear in singing groups, and how these can be prevented.

The third case is an example of how the different location of the session may affect the intervention. The therapy was provided at the participant's home, and he also took more control over the session. Rolvsjord (2015) identified four main categories of agency of clients within a therapeutic process: 1) taking initiatives, 2) exerting control in the sessions, 3) commitment to the relationship and 4) engagement across contexts. These categories might be important within the context of MT for people with dementia, and familiarity in the location of therapeutic processes might make it easier for clients to take initiatives and exert control. This may also influence the development of the therapeutic relationship and support engagement across contexts. These findings suggest a need to further investigate how people with dementia contribute to their MT sessions.

4.1.2 Interpretations of "Total session time" and "Time in music"

A reason for the steady increase in "Time in music" for the second participant (as seen in Table 3.12) can be that the participant and therapist became better known, and the sessions could then be structured more around practicing singing, and less on mapping musical preferences. The "Time in singing" and "Time in choir" shown in Table 3.14 seem to support the notion that the steady increase in "Time in music" is the result of an increase in time spent practicing and singing choir songs, as these songs become more familiar to the second participant.

The similarities in “Time in music” between the first and second participant (see Table 3.5 and Table 3.12) is consistent with the fact that they came from similar starting points, as none of them had received the singing intervention before these sessions. This contrasts with the third participant (see Figure 3.1) who had already worked with another music therapist and received the intervention for several months prior to these sessions. One should also factor in the different environments the sessions were held in, as the third participant received the intervention at his home, while the first and second participant received the intervention at a local nursing home.

Figure 3.1 also showed a decreased amount of time spent in music for the third participant in the last session, and this makes sense in view of him saying he did not feel well during the session. It is difficult to provide a clear explanation for the third participant’s increased “Time in music” in the third session (see Figure 3.1), although part of the explanation can be the development of the relationship between the participant and the therapist.

4.1.3 Interpretation of micro-outcomes

The lowest and highest note of the first and second participant fluctuated between sessions, as seen in Table 3.23. The first participant fluctuated from augmented octave to major ninth, while the second participant fluctuated from major ninth to augmented eleventh. Some possible explanations can be the overall health of these participants, or other hidden factors affecting their ability to sing at the full extent of their vocal range. Sleep, hydration, nutrition, a cold or something else may affect how well the participants perform in a session. Table 3.22 reveals that all the participants’ singing dynamics does not change considerably over time. This may be because the participants were happy singing within this dynamic range and did not care about pushing this range to the limit. Location may also have played a role for the first and second participants, as they might have wished to not disturb people in nearby rooms when singing at a nursing home.

The differences in singing dynamics for the first participant (as seen in Table 3.22) could be because of the development of the therapeutic relationship. In the first session, the first participant may not have been comfortable singing for a person she had not become properly known with yet. This may have prevented her from singing with the full extent of her dynamic range. It is also possible that she did not hold back her voice, and it is the difficulties

in evaluating the correct dynamic from an audio recording that accounts for the dynamic differences in the voice between the first session and the following ones, as the difficulties in assessing her voice in the first sessions may have impacted the following sessions. This can be done by placing the recorder in different areas of the music therapy room, or by the therapist choosing to hold back his own voice to make more room for the voice of the participant within the musical space.

Because of the methodological framework of this study, the steady increase in vocal range for the third participant (see Table 3.23) cannot be directly credited to the musical intervention. This will be discussed further in chapter 4.2. It is possible that the vocal range of the participant remained constant throughout all the sessions, but he was only pushed to reveal his full potential in the last session. This also reveals the power of the dual role of being a music therapist and researcher, as this allows to frame some of the results towards a desired outcome and will be further discussed in chapter 4.2. The fact that the third participant displayed the biggest vocal range makes sense in view of his history as a choral singer, as well as the fact that he was already receiving the singing intervention before the start of this master's project.

The fact that the singing exercises used to measure vocal range was led by the therapist makes it difficult to draw conclusions based on the vocal range assessments shown in Table 3.22. This implies a certain power within the dual role of being the researcher as well as the therapist, as the therapist role can be used to influence the data outcomes. This dual role of being a researcher and a therapist in the same research project will be further discussed in chapter 4.2.

4.1.4 Interpretation of fidelity

The warm-up part of the intervention was estimated to last for 10-15 minutes, as suggested in Table 2.1. This is longer than the "Time in warm-up"-variables ended up at for all the participants, despite the first and second participant almost reaching 10 minutes in some of their sessions (see Table 3.7, Table 3.14 and Table 3.21). The total time spent doing warm-up activities did not extend 10 minutes, but there was a need to explain the activities or to let the participants ask questions. This means that there is a difference between "Warm-up" and "Time in warm-up", where one is the planned time of the total session time to be spent on warm-up activities, while the other is the actual total time spent on warm-up. In view of this,

the “Time in warm-up"-variable being slightly lower than the estimated time, may not mean that the warm-up activities were not implemented as intended, but that there may be a need for further clarification into what is meant by “Warm-up” in Table 2.1.

For the third participant, the “Time in warm-up" did not vary considerably between the sessions (see Table 3.21), as there was a structured plan for going through the warm-up exercises, and this took approximately the same amount of time in all the sessions. “Time in warm-up" is also significantly lower than suggested by Table 2.1. The fact that the third participant shows a lower amount of “Time in warm-up”, compared to both the intervention template as well as the other participants, may indicate that the protocol may need to be flexible to account for individual differences within the people receiving the intervention.

Table 3.14 shows a decrease in “Time in singing” after the second session, and a steady increase in “Time in choir” over all the sessions for the second participant. This may reveal a shift in how the sessions are structured. The first sessions were structured around singing together, talking about the participant’s musical background and mapping musical preferences. In the later sessions more time is spent learning new songs that are sung in the choir. A similar change is seen for the first participant in Table 3.7, as the “Time in choir”-variable starts out low in the first two sessions, and then increases in the last two sessions. In the first sessions the goal was to build a relationship with the participant, and get to know her musical background, and preferred songs to sing. After this, the objective shifted towards learning new songs for the choir, and practicing singing technique, or singing in harmonies. Notably, the third participant also attended the ALMUTH choir rehearsal for the first time between his second and third session, while the first participant attended her first ALMUTH choir rehearsal between her third and fourth session. This may have been an important contribution to the increased “Time in choir” in the last two sessions and suggests that the choir rehearsals can become an important motivational tool in the musical intervention as it as a way of facilitating participation in a social context.

The lack of increase in “Time in choir” for the third participant (see Table 3.21) can be attributed to the sessions being structured around singing along to recordings of the choir songs. Therefore, the third participant also has a higher “Time in listening” than the other participants, as practicing of choir songs fell under the definition of this variable. At the same time, Table 3.21 shows fluctuations in the “Time in singing” variable between the different

sessions for the third participant. In the first and third sessions more time was spent singing songs unrelated to the ALMUTH choir, than in the second and fourth session.

Table 3.7 shows that time was spent listening to music in two of the four sessions for the first participant, and in one of those sessions for only about half a minute. This is also the part of the intervention that is supposed to take up the least amount of time. There can be several reasons for why not more time was spent in listening within the sessions with this participant. For instance, the possibility that if the therapist tried to sing a song for the participant to listen to, she joined in singing, and then this was analyzed as “Time in singing” or “Time in choir” instead.

The reason why the third participant’s sessions contained more time spent in listening is that his sessions were structured around practicing the choir songs along with a recording. As is evident from Figure 3.4, this has also caused the “Time in choir”-values to be lower with this participant than it is with the other participants, as the practicing of choir songs have happened while listening to recordings. “Time in listening” can be used to facilitate strucutre and may be an extra aid in practicing choir songs, and may also help facilitate practice without a therapist present. As is evident from Figure 3.4, this has also caused the “Time in choir”-values to be lower with this participant than it is with the other participants. The fourth session of the third participant was explicitly structured around singing along to the recordings, because the participant did not feel well, and this explains why there is no time spent in “Time in singing” in this session.

This reveals that there may be a need to rethink how the music intervention is implemented in the protocol. The current protocol structures the sessions by suggesting what should be done in every session. There may be a need to increase the flexibility of the protocol by using “Time in singing”, “Time in choir” and “Time in listening” as guidelines towards how to structure the sessions to suit the needs of the individual participant.

4.1.5 Interpretation of GDS and MMSE results

The fact that Table 3.24 revealed more signs of depressive symptoms for the third participant than the other two participants is interesting, as the third participant also showed the biggest changes in vocal range over the course of the sessions (see Table 3.23), and also exhibited more control and initiative in the sessions, as described in chapters 3.3.1 and 4.1.1. Notably,

the third participant had also received the musical intervention for a longer time than the two other participants, as he had been part of the ALMUTH study before joining this master's project. Since the baseline measurements were assessed prior to the start of the musical intervention, it is possible that there may have been a drop in depressive symptoms over the course of the sessions for the third participant, although this is not possible to know for certain until outcome measures have been made. This would, however, be consistent with the current body of literature on the effects on music therapy on people with depression. (Aalberts et al., 2017; Särkämö et al., 2014; van der Steen et al. 2017). The high "Time in music" measures for the third participant may seem to suggest that the music intervention can be used as a way to engage with clients, despite high scores on depressive symptoms.

Since being in an early stage of AD is listed as a inclusion criteria, it is expected that the MMSE scores are relatively high at baseline for all participants (see Table 3.24), and that this score decreases for the outcome measures. Lower scores on MMSE may indicate a need for more repetition and structure in the music sessions. As AD progresses, memory and attention may be further impaired, and structure and repetition in the sessions may be a way to keep the music intervention accessible, despite the gradual progression of the disease.

4.2 Limitations

The combinations of systematic and naturalistic observations are used with the intention to strengthen the findings. Naturalistic observations may provide good representations of what happened in the sessions, and systematic observations may give information about certain predefined concrete behaviors that can be quantified, and therefore may provide some concrete references to the naturalistic observations, such as timestamps and dynamic ranges within individual songs. Despite this, both observational methods contain certain issues and limitations that need to be addressed.

Because of the nonexperimental design of this study, the changes in measurements such as micro-outcomes and fidelity cannot be directly credited to the musical intervention. Cozby and Bates (2012) describes two main problems of making causal statements of a nonexperimental design: "(1) It can be difficult to determine the direction of cause and effect and (2) researchers face the third-variable problem – that is, extraneous variables may be causing an observed relationship" (p. 78). For instance, the increased singing range of the

third participant has not necessarily happened *because* of his participation in the musical intervention but may be caused by something that is unknown to the researcher. The three cases that have been studied in this project can be compared to each other, but effects of the intervention cannot be established because of the lack of a control group comparison.

Systematic and naturalistic observations contain some methodological limitations that the reader should be aware of. For naturalistic observations, there are issues of researcher participation in the setting, as well as concealment of the objectives of the study. (Cozby & Bates, 2012, p. 116-117). Notably, the participants gave informed consent to their participation in the project, and to give this they were made aware of the purposes of the study, and this knowledge of the objectives of the study may have influenced their behaviors. Also, the researcher participated in the therapeutic setting as the therapist, and this has important methodological implications. This may influence the researcher's objectivity in the descriptions of the cases. This makes naturalistic observations unequipped to study hypotheses under controlled conditions, although they may provide unique insights into complex social settings (p. 118).

Cozby & Bates (2012) describe four main issues of systematic observations (p. 119-120). The first issue concerns the use of equipment. In this project, the findings are dependent on the quality of the audio recordings. Values of the participants' singing dynamics, for instance, are dependent on being possible to be properly coded by the researcher. The next issue is reactivity, meaning the possibility that the presence of the researcher may influence the behaviors of the study participants, as is also an issue already described regarding issues in naturalistic observations. Another research issue of systematic observations is the reliability of the measurements. In this study, the values of the recordings are coded by only one researcher, and this may influence the reliability of the findings.

The last research issue is sampling and refers to the samples of behaviors taken over time. In this study, the samples of behaviors are taken from three participants over four sessions. More participants would provide a better understanding of the relationships between the variables, while more sessions would provide a better understanding of how the variables change over time. However, this also requires more resources to accomplish, as more time is needed to provide more sessions for more participants. For instance, no dramatic changes in vocal range and singing dynamics were observed. This may be because four sessions are too few to clearly see significant changes in the clients singing abilities.

In view of reliability, the dual role of being the therapist as well as the researcher may need some further discussions, because the systematic observations are made by the same person who provided the therapy in the sessions. This begs the question if the values gathered from the systematic observations are reliable, since the researcher may have an incentive towards reporting good results of the therapeutic intervention. As the provider of the therapeutic intervention, the researcher is also in control of what happens within the sessions, and thus may influence the outcome, as it is difficult to provide clear conclusions about the relationships of the variables from this dataset.

4.3 An evaluation of the MT protocol

There are several different ways of implementing MT as a treatment, intervention or aid. Music therapists work in a lot of different areas, such as hospitals, schools, psychiatric institutions, nursing homes, and so on. This is because MT can be flexible, and there are several ways of tailoring the therapy to fit the needs of an individual. By standardizing a MT intervention, some of this flexibility is lost. The implementation of a singing intervention may exclude the possibilities within other music therapeutic methods, such as instrument playing. Choral singing groups imply a certain kind of music that may not be preferred by every client, and the act of singing in the presence of others may be experienced as intimate and awkward for some clients. By using the previously described template for the singing training intervention (Table 2.1), it is possible to develop a similar template for a music intervention with a different area of focus, for example by playing an orchestral instrument instead of singing, and then rehearsing an orchestral piece together with others instead of singing in a choral group.

Singing is something that is important for many of us. Throughout our lives we sing together in different contexts. This makes singing more accessible to people than instrument playing, which makes it possible to include more people in a singing training intervention protocol, despite differences in musical backgrounds. Singing training is a way to make participation in musical activities more accessible to people, despite the disabilities caused by the neurodegenerative disease. In this sense, the musical intervention has become a way of making music available to clients. Here music is not merely understood as songs or musical products, but also as participation in musical contexts. However, this does not mean that people with AD are dependent on a music therapist to have access to music, and participation

in musical contexts, but a music therapist may be able to facilitate participation in musical contexts in new ways, such as the implementation of singing training sessions, as well as organizing choral rehearsals.

By standardizing the singing training intervention, it is possible to properly evaluate the effectiveness of it. Loosely defined interventions are more difficult to assess in comparison to more clearly defined interventions, as different interpretations of the interventions may result in different forms of implementation among different therapists. Clearly defining the musical intervention also makes it easier to communicate the intervention to other health care professionals, clients or relatives of clients.

Another strength of the MT protocol lies in the possibility of providing home-based interventions for people with dementia. In this way it is possible to provide the intervention to people who may be independent enough to not be living at home instead of a nursing home, but who may at the same time struggle to get to sessions provided in another location. In view of the discussion on musical availability, home-based music intervention sessions seem to be a way of facilitating client participation in a musical context, as people with AD may be dependent on other people, such as friends or relatives, to be able to attend sessions at a fixed location. Although this may also impact their ability to attend the choir rehearsals, this may be addressed by making the choir rehearsals happen at a regular place and time. Cooperation with carers and relatives is necessary to make the choir rehearsals available. After all, the clients that find it difficult to meet for sessions at a fixed location, may be the ones who are at most risk to become isolated.

Since musical availability also implies availability to musical contexts, the locations of the musical interventions are important to understand properly. Notably, two participants in this thesis received the intervention at a music therapy room in a local nursing home facility, while one participant received the intervention at his home. There are advantages and disadvantages of providing the music intervention at a fixed location, as well as providing the intervention at a client's home. Providing home-based music intervention sessions is time consuming for the therapist and might affect the ability to provide more sessions for other clients within sessions at a fixed location. There is a need for proper funding to implement such music intervention protocols for people in early stages of AD. Stability in terms of implementing regular cultural programs, such as a choral singing group, is a prerequisite for successful implementation of such protocols. Since music has the potential to evoke strong

emotional responses (Koeslch, 2014), it also has the potential to be a powerful tool in regulating emotional responses, as well as dealing with mood disorders. At the same time, music may also be a way of facilitating difficult emotions. Properly trained personnel to provide the singing training sessions are necessary. Music therapists are an ideal profession for implementing such cultural programs and singing training sessions, as they can function both as musicians and music teachers, as well as health care professionals.

There are possibilities of implementing the intervention in other context such as nursing homes and also include healthy older adults, to reduce the risk of dementia onset for people who may be at risk, as well as also include people in later stages of AD or other dementias. One of the benefits with a singing training intervention is that singing is something that most people can do, sometimes even despite severe deficits in speech production (Leo et al., 2018; Thaut & McIntosh, 2014). In Providing a singing training intervention is something that can be an accessible way for most people to partake in musical activities, as no prior knowledge of music is needed for participation. The abilities that the clients may acquire through such an intervention may carry over to other contexts as well, as these abilities can be valuable to others as well and can be used to enrich their local communities, for instance by organizing concerts with the choir.

The choir rehearsals are also a way that carers and relatives can take part in the intervention, providing a social context where they can be together in enjoyable pastime. In this way people with dementia can spend time with their carers in a context wherein they are not reduced to a "recipient of care", and where they can make use of their musical resources, abilities and competence in working together with others towards a common goal. Although this thesis has mostly been covering the individual sessions of the intervention, the importance of the choir should not be underestimated, and future research may be done to provide a better understanding of the role of the choir within a MT protocol like this.

This intervention protocol has the potential of addressing some of the WHO (2018) goals described in chapter 1.2.1, as this intervention can be used to reduce dementia risk and provide treatment, care and support, as well as providing support for carers and the closest relatives of the person with the disease. However, there seems to be a need for flexibility within the music intervention protocol to be able to provide for clients who are unable to leave their home to attend sessions.

4.4 Implications for future research

Rolvsjord et al. (2005) argues that a fixed therapy protocol in some contexts can be at risk of losing its therapeutic integrity within interpersonal and contextual approaches to therapy, and instead suggests manuals defining therapeutic principles which can be applied flexibly. Geretsegger et al. (2015) is an example of how common characteristics of improvisational approaches in music therapy can be used to develop treatment guidelines for working with children with autism spectrum disorder. Similar research approaches may be necessary to define characteristics of this singing training intervention for people in early stages of AD. In this way the intervention can be standardized while remaining flexible.

The current body of literature suggests that musical interventions for people with dementia may help reduce symptoms related to isolation, and mood disorders. (Aalbers et al., 2017; Unadkat et al., 2017). This may have important economic implications for society, as the world population of people above the age of 60 is steadily increasing (UN, 2017). Musical interventions preventing social isolation and mood disorders may reduce the need for medications, while simultaneously improving the quality of life for people with early onset dementia (Camic et al., 2013; Cohen et al., 2006). It is possible that properly implemented musical interventions may slow down a gradual decline in abilities necessary to live independently, however, more research with more robust experimental designs are needed before conclusions can be made.

Both the individual singing training sessions and the choir rehearsals are important in this intervention. Although this thesis has mostly been covering the individual sessions of the intervention, the importance of the choir should not be underestimated, and future research may be done to provide a better understanding of the role of the choir within a MT protocol like this. Field notes and observational methods within the choir context of the intervention, may be used to provide more insights into this. Interviews with participants, their carers and relatives, and the choir leaders and other music therapists working with the singing intervention may provide valuable insights to the future development and understanding of the protocol.

As the disease progresses, music may become more and more unavailable to people with AD. As more functions necessary to manage daily tasks decline, there is an increased need for additional aid when living at home. People with AD living at home may become increasingly

dependent on home-based nursing or help from relatives or friends, and there is a need for more research on how to make music more accessible to them. In this sense, a relevant topic of discussion is how music therapists can help make music accessible to clients, also when the client is not taking part in a music therapeutic context. In the singing intervention described in this master's thesis (Table 2.1) this is done by providing the participants with audio recordings of the choir songs, as a way of letting the participants practice daily on their own, despite a music therapist not being present every day. USB memory sticks containing the choir songs as MP3-files were given to the participants so they could play the songs from their computers. This is an example of how technology is utilized to make the music available to the participants. Apps and music programs such as Spotify may also have important implications for how music can be made available for people with AD living at home. Experiences from music therapeutic practice are needed to investigate different ways of utilizing this technology for this purpose.

4.5 Conclusion

The participants described as cases in this thesis received the same standardized singing training intervention. The first and second participant came to a nursing home to receive the intervention, while the third participant received the intervention at home. The intervention can be understood on a biological, psychological and social level, as singing training may facilitate structural reorganization of brain areas associated with cognitive functions and language (Satoh et al, 2015; Thaut, 2010), prevent and treat the onset of psychological symptoms of dementia such as depression (Aalbers et al., 2017), and may facilitate intersubjective experiences and participation in recreational activities with other people, and thus improve quality of life (Camic et al., 2013; Cohen et al., 2006). A very slight improvement in vocal range was observed in two out of three participants over four singing training sessions. The investigation of fidelity revealed that the intervention can be structured in different ways to address individual needs of the participants, suggesting a need for more flexibility within the singing training intervention.

Singing training has the potential to be one way of providing psychosocial care for people in early stages of AD and may also be an effective non-pharmacological intervention. At the same time singing trainging is a recreational activity for people who may find themselves more isolated as the AD progresses and may allow for the participation of carers and loved

ones in individual sessions, and in choir rehearsals. More research is needed to further develop and evaluate the singing training intervention by integrating multiple perspectives from people with AD, relatives of people with AD, carers and music therapists providing individual sessions and leading choir rehearsals.

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Appendix

Appendix A – Singing lessons

ALMUTH – Musikkterapi

Musikkterapiøktene skal vare i 45-60 minutter, og kan deles inn i fire deler: Oppvarming, sangtrening, øving på korsanger, og lytting.

Oppvarming (ca 5-10 minutter)

Formålet med oppvarming er å gjøre terapeut og klient klar til å bruke stemmene sine. I tillegg til at dette tilrettelegger for en sunn stemmebruk, kan dette også fungere som en rammeaktivitet som gir økten struktur og forutsigbarhet. Øvelser som brukes i oppvarming kan ha fokus på tøying, pust og stemme.

Tøying – strekke armer i været, rulle på skuldre, rulle på hodet osv.

Pust – puste dypt inn gjennom nesen, holde på luften, og så slippe luften sakte ut igjen.

Stemme – synge skala på «la». Skalaen kan synges oppover og nedover for å varme opp hele registeret.

Sangtrening (ca 15-20 minutter)

Denne delen av økten kan brukes på å synge sanger med det formålet å utvikle klientenes sangtekniske egenskaper. Her kan en bruke sanger som klienten allerede kan, eller lære nye sanger fra bunnen av. Det er opp til terapeuten å avgjøre hva som kan være mest hensiktsmessig å gjøre, og dette kan variere fra klient til klient.

Øving på korsanger (ca 15-20 minutter)

Denne delen av økten skal brukes på å øve på sanger som klienten synger i koret. Hold kontakt med korleder slik at du har oversikt over hvilke sanger de jobber med der. I tillegg til sangteknikk kan man her jobbe med å synge flerstemt, og øve på sine stemmer i korsangene. Her er man også nødt til å ta hensyn til klientenes sangferdigheter og funksjonsnivå. For noen kan det å synge flerstemt være forvirrende og slitsomt, og det er derfor viktig å tilrettelegge på en måte som fungerer bra for hver enkelt klient.

Lytting (ca 5-10 minutter)

Denne delen av økten skal brukes på å lytte til lyttemateriale som klienten velger selv, i tillegg til å lyte til lyttemateriale som hver deltager får utdelt i begynnelsen av prosjektet. Pass på at klienten har mulighet til å lytte til dette materiale på egenhånd også, og oppfordre til å øve med dette hver dag.

Annet

Husk å loggføre musikkterapiøktene. Ting som bør være med i loggføring er: dato, navn på terapeut, oppvarmingsøvelser, sanger, korsanger, og hva som er blitt lyttet til i løpet av økten. Skriv også en oppsummering av økten, og skriv ned hvis det skjedde noe spesielt i løpet av denne. Husk at sensitiv informasjon ikke må inkluderes, og at alle deltagere må være anonymisert.

Hold også kontakt med de andre musikkterapeutene i prosjektet, og ikke vær redd for å spørre om hjelp. De andre musikkterapeutene i prosjektet kan også hjelpe med forslag og inspirasjon til sanger og metodikk som kan brukes i øktene. Dersom du har mulighet er det også en fordel om du har mulighet til å delta på korøvingene, slik at du får med deg hvilke sanger de jobber med der, og også at det blir kontinuitet mellom de individuelle øktene og koret.

Musikkterapi intervensjoner

Tid: 45-60 min

1)Oppvarming – ca. 10. minutter

Fysisk

a) Begynn med tramping (marsjtakt) – f.eks. Gammel Jegermarsj, Mot i brystet e.l.

b) Strekk/tøy kroppen (plukke epler, ta i gulvet, skyte rygg som katt, deretter motsatt- brystkassen frem) evt. ulike yoga-strekk

c)Løs opp i nakke ved å rulle på skuldrene, først fremover, så bakover-

d)Roing- vugging fra side til side

e) ffff- ssss (kontakt med magen- fokus på luftstrømmen

Pusteøvelser

a) Pust inn nesen, hold igjen (tell til 5) - blås ut gjennom munnen x4 repetisjoner ((tenk at pusten skal gå som en søyle fra magen og opp til ansiktet)
b) Pust inn og løft skuldrene opp mot ørene- hold (tell til 5)- Pust ut x4 repetisjoner
c) Pust inn- løft armene opp- hold (tell til 5)- Pust ut x4 repetisjoner

Sangøvelser

Synge på vokaler- aaaa—oooo- åååååå (oppover og nedover)-

Ha-ha-ha-ha-ha (treklanger- staccato)

Mia o Maria Mia o Maria,

Vem kan segla, (NB: fint med noe variasjon av oppvarmingsøvelser)

2) Synge kanon, harmonier, tostemt– 5-10 minutter

F.eks. Alle fugler små de er, My Bonnie, Jeg gikk en tur på stien,

3)Korsang: - 10-15 min

Månedens sang

4)Lytting: ca. 5-10 min

Mellom sangundervisning og kor vil deltakere få utlevert CD eller MP3 filer (Etter hva de foretrekker) med lydfiler med oppvarmingsøvelser, lekesanger og sangen de skal lære med sin stemme på.

Appendix B – Informed consent

SAMTYKKESKJEMA

«2018/2020 ALMUTH Musikk terapi og Alzheimers prosjektet»

Bakgrunn og hensikt

Dette er et spørsmål til deg om å delta i et forskningsprosjekt som undersøker hvordan hjernen og adferd kan endre seg ved hjelp av musikk eller fysisk aktivitet for personer med en forhøyet risiko for Alzheimer sykdom. Institutt for Biologisk og Medisinsk Psykologi ved Universitetet i Bergen er ansvarlig for studien. Undersøkelsen er knyttet til Alzheimer sykdom i tidlig fase, og derfor spør vi kun personer som kan ha en forhøyet risiko for å utvikle Alzheimer sykdom, om å delta. Dette inkluderer, men er ikke begrenset til, personer med Alzheimer sykdom i tidlig fase og personer med mild kognitiv svikt. Personer med alvorlige hørselsproblemer vil ikke kunne delta. Videre kan du heller ikke delta hvis du er gravid, lider av klaustrofobi, har andre nevrologiske lidelser, metall-implantater i kroppens bløtvev, bor på sykehjem, eller hvis du står på visse typer medisiner.

Hva innebærer din deltakelse?

Studien er delt opp i tre grupper. En gruppe vil få sangundervisning og delta på kor, en annen gruppe vil få fysisk aktivitet og delta på turer, mens den siste gruppen vil ikke tilbys noen aktiviteter. Det er tilfeldig hvilken gruppe du havner i da dette gjøres ved loddtrekning. Intervensjonene vil foregå en gang i uken, samt en gang i måneden med flere av de andre i samme forsøksgruppe. Uavhengig av hvilken gruppe du havner i vil du bli bedt om å gjennomføre en rekke undersøkelser og spørreskjemaer. Disse undersøker kognisjon, språk og mulig sykdomsforløp. Alle deltakere vil også gjennomføre en MR-undersøkelse, hvor vi tar en rekke bilder av hjernen din mens du ligger stille og får høre på musikk og se på bilder. Hele undersøkelsen varer ca. 2 timer, men vil ikke nødvendigvis skje samme dag. Vi er fleksibel og prøver å gjøre det som passer best for deg. De fleste av testene vil tas to ganger; en gang i begynnelsen og en gang etter 12 måneder. Noen av testene vil kun tas i begynnelsen eller kun etter 12 måneder.

Noen deltakere vil også bli spurt om de kan filmes under aktivitetene. Utvalg av deltakere til videoobservasjon vil følge praktiske muligheter og begrensninger. For å forstå hvorfor og hvordan intervensjonen virker (eller ikke virker) er det viktig å analysere gjennomføring av intervensjonen. Dette bidrar til forståelsen av hvordan terapeuten og deltakeren jobber sammen og hvilke endringer som skjer gjennom forløpet. Du kan når som helst reservere deg mot å bli filmet eller be om å få tidligere filmopptak slettet, uten at dette påvirker aktiviteten vi tilbyr deg. Videoopptak lagres kun på en lokal datamaskin uten tilkobling til internett, som er sikret med passord og oppbevares på et låst rom på UiB. Etter prosjektslutt vil videomaterialet bli slettet.

Alle opplysninger om deg vil bli av-identifisert og ditt personvern vil bli ivaretatt (se avsnitt «Hva skjer med informasjonen om deg?»).

Mulige fordeler og ulemper

De ulike delene av studien har ulike ulemper og fordeler – og her er en kort oversikt over dem.

1. Noen av testene vi utfører og testsituasjonen i seg selv kan oppleves ubehagelig. Noen av spørsmålene er enkle, mens andre er vanskelige. Vi forventer ikke at noen skal klare alt. Spørreskjemaene vi benytter kan også føles ubehagelig for noen da vi spør om personlige ting. Imidlertid vil all informasjon beskyttes og ditt personvern vil bli ivaretatt. Disse testene regnes for å være uten risiko.

2. MR-undersøkelsen innebærer at du ligger i en MR-skanner ved Haukeland universitetssykehus. Det finnes en potensiell helse- og sikkerhetsrisiko for enkelte deltakere i MR eksperimentene. Det sterke magnetfeltet til MR-skanneren kan ha ødeleggende effekt for mennesker som har metalldeler i kroppen (f.eks. kirurgiske klips, pacemaker, metallspon). MR-skanneren kan bråke og deltakere må ligge stille i omtrent 40 minutter i et trangt kammer. Dette kan medføre uro og ubehag.

MR-avbildning av hjernen kan avdekke uregelmessigheter som kan kreve ytterligere medisinsk undersøkelse. Det kan føre til funn av hittil ukjente medisinske tilstander, men det kan også gi falske alarmer – f.eks. oppdagelse av en tilsynelatende skadelig tilstand som egentlig er ufarlig. Slike tilfeldige funn, uavhengig om de viser seg å være skadelige eller

ufarlige, kan føre til uro. På den annen side kan eventuelle tilfeldige funn av alvorlige sykdommer som ellers ville vært uoppdaget, føre til tidligere behandling og bedre prognose. Alle MR-bilder vil bli vurdert av en radiolog ved Haukeland universitetssykehus. Bildene vil også bli sett på av en lege ved Haukeland universitetssykehus før forskerne får bilder. Hvis det dukker opp uvanlige funn på MR bildene vil en lege kontakte deg direkte.

Generelt ansees MR som en trygg metode med ingen kjente korte eller langvarige skadelige effekter for nevrologisk friske deltakere.

3. Du bidrar du til forskning og økt kunnskap om hukommelsesproblemer og Alzheimers sykdom.

Hva skjer med informasjonen om deg?

Informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene vil bli behandlet uten navn, fødselsnummer eller andre direkte gjenkjennende opplysninger. En kode knytter deg til dine opplysninger gjennom en navneliste, men denne navnelisten oppbevares alltid adskilt fra dine svar på i studien. Det vil heller ikke være mulig å identifisere deg i resultatene av studien når disse publiseres. Dine opplysninger er med andre ord av-identifisert, og kun autorisert personell knyttet til prosjektet har tilgang til navnelisten som kan knytte deg til personopplysninger. Personopplysningene/deltakerlisten vil slettes når prosjektet er ferdig i 2021, mens innsamlet data lagres med et anonymt referansenummer som ikke lenger kan spores tilbake til deg. Kun prosjektmedarbeidere ved ALMUTH prosjektet på avdelingen for biologisk og medisinsk psykologi har tilgang til data. I løpet av prosjektperioden vil deler av innsamlet materiale imidlertid kunne utveksles med samarbeidende institusjoner (Haukeland universitetssykehus, UNI Research AS). Dette samarbeidet bidrar til å kunne gjennomføre tilleggsanalyse og for å oppnå større grupper og mer relevante funn. Dataene vil eventuelt deles i av-identifisert form og uten navn. Senest fem år etter at prosjektet er avsluttet vil alle kode-nøkler bli slettet, slik at all data er fullstendig av-identifisert.

Frivillig deltakelse

Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Vi understreker også at å trekke seg fra studien ikke vil få noen konsekvenser for deg. Dersom du ønsker å delta, undertegner du samtykkeerklæringen på siste side. Om du nå sier ja til å delta, kan du når som helst trekke tilbake ditt samtykke uten at dette får noen konsekvenser. Dersom du senere ønsker å trekke deg eller har spørsmål om studien, kan du kontakte Birthe Flo (telefon 55 58 62 09 / 46 88 46 92 eller e-post: birthe.flo@uib.no).

Ytterligere informasjon om studien finnes i kapittel A – utdypende forklaring av hva studien innebærer. Ytterligere informasjon om personvern, økonomi og forsikring finnes i kapittel B – Personvern, økonomi og forsikring. Samtykkeerklæring følger etter kapittel B.

Kapittel A- Utdypende forklaring av hva studien innebærer.

Hvilke rettigheter og forpliktelser har du som deltaker? Deltakelse er frivillig og krever samtykke hvor du som deltaker må gjøre deg kjent med dette informasjonsskrivet og undertegner samtykket om dersom du ønsker å delta. Som deltaker i forskningsprosjektet har du ingen forpliktelser, og du kan når som helst trekke deg fra prosjektet uten å oppgi grunn. Du kan også be om at data vi har samlet fra deg slettes og ikke brukes. Det vil ikke ha noen konsekvenser for deg å trekke deg fra prosjektet. Fullfører du prosjektet vil du også få skriftlig tilbakemelding om forskningsprosjektets resultater og konklusjon etter forskningsprosjektet er avsluttet. Prosjektet vil senest være avsluttet 2021.

Kapittel B – Personvern, økonomi og forsikring

Personvern: Opplysninger som registreres om deg er lite person-sensitive, og vil handle om kjønn, alder, høyde og vekt. Resultatene fra MR-undersøkelsen er anonyme og ikke egnet til identifisering. Andre forskere kan få tilgang til de anonymiserte resultatene, spesielt i en analyse-situasjon eller hvis eventuelle resultater fra studien offentliggjøres og bakgrunnsdata etterspørres - men kun autorisert personell med direkte tilknytning til studien vil ha tilgang til navnet ditt. Utlevering av materiale og opplysninger til andre: Hvis du sier ja til å delta i studien, gir du også ditt samtykke til at dine avidentifiserte opplysninger utleveres til andre forskningsmiljøer og institusjoner, f.eks. gjennom formidling av forskningsresultater. Dette kan være land med lover som ikke tilfredsstiller europeisk personvernlovgivning. Men vi

understreker at vi ikke under noen omstendighet vil dele ut opplysninger som kan identifisere deg eller knytte deg til studien.

Rett til innsyn og sletting av opplysninger om deg og sletting av bilder: Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

Finansiering av studien: Studien er finansiert gjennom forskningsmidler fra Norsk Forskningsråd.

Forsikring: Som deltager i studien er du forsikret gjennom Pasientskadeerstatningsloven.

Godkjenning: prosjektet er godkjent av Regional Komite for medisinsk og helsefaglig forskningsetikk, (2018/206)

Samtykke til deltakelse i studien:

Jeg er villig til å delta i studien

(Signert av prosjektdeltaker, dato)

Jeg bekrefter å ha gitt informasjon om studien

(Signert, rolle i studien, dato)