THE ACCUMULATIVE EFFECTS OF MUSIC THERAPY
ON DEMENTIA-RELATED SPEECH DEFICITS
IN A SUB-ACUTE HOSPITAL SETTING

Loretta A Quinn
Registered Music Therapist
RNDiv1, AMusA, PostGradDipMT, MMusMT

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Produced on Archival Quality Paper
DECLARATION

This is to certify that:

I. The thesis comprises only my original work, completed while I was a postgraduate student enrolled in the Faculty of Music at The University of Melbourne. This thesis contains no material that has been accepted for the award of any other degree or diploma at any other university or institution.

II. To the best of my knowledge and belief, this thesis contains no material previously written or published by another person except where due reference is made in the text.

III. The thesis is less than 80,000 words in length, exclusive of tables, figures, references and appendices.

Signed:

Loretta A Quinn
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ABSTRACT

A single blinded randomised control trial was conducted to determine the accumulative effects of Music Therapy on dementia-related speech deficits. The hypotheses to be tested whether a programme of MT will result in greater improvement in dementia-related spontaneous speech deficits (in particular naming), than a programme of DT and 2) whether a programme of either MT or DT will result in a reduction in dementia-related spontaneous speech deficits (in particular naming) compared to a non intervention (control) group.

Fifty-one participants with moderate to severe dementia, were randomised into 3 groups, one being the control group, the other two groups receiving either Music Therapy (MT) or Diversional Therapy (DT) (referred to as Recreational Therapy in the USA).

The 45 to 60 minute Music Therapy and Diversional Therapy sessions were run concurrently every Monday, Wednesday and Friday morning for 3 weeks by the author, a Registered Music Therapist or a Diversional Therapist. The Music Therapy sessions consisted of MT techniques previously used in Music Therapy dementia-related language studies, which included singing familiar songs, word cueing, instrument playing, music and reminiscence and music and movement. The Diversional Therapy activities were based on cognitive activities, physical stimulation and creative expression through arts and crafts activities.

Data was collected at baseline and within 48 hours of the final session by the chief investigator and the research assistant. Data was generated by the following validated and standardised tools for the field of dementia: the Boston Naming Test Short Form (Mack, Freed, Williams, & Henderson, 1992), the Animal Naming Test (Spreen & Strauss, 1998), the Mini Mental State Examination (Folstein, Folstein, & McHugh, 1975), Geriatric Depression Scale, short version (Sheikh, 1986; Yesavage et al., 1983) and the Digit Span Test (Hunsley, Hanson, & Parker, 1988).

Using a one-way repeated ANOVA the changes in the scores of the MT group were compared to the DT group (hypothesis 1), and score changes in both the MT and DT
group were compared to the non-intervention (NI) group (hypothesis 2). Results of the one way repeated ANOVA did not support the two hypotheses. Changes in the scores of the secondary outcome measures using a one way repeated ANOVA also did not support the two hypotheses.

Possible reasons for the null hypotheses are discussed including the research design, choice of research tools, and the challenges faced when conducting research studies within the dementia population. This study, with its large participant numbers and stringent research design significantly contributes to MT research literature. This study is also the first of its kind to define the MT technique of “word cueing”. Recommendations for future MT and dementia-related language deficits are discussed.
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANOVA</td>
<td>Analysis Of Variance</td>
</tr>
<tr>
<td>ANT</td>
<td>Animal Naming Test</td>
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<tr>
<td>BPSD</td>
<td>Behavioural And Psychological Symptoms Of Dementia</td>
</tr>
<tr>
<td>BNT</td>
<td>Boston Naming Test</td>
</tr>
<tr>
<td>BNTSF</td>
<td>Boston Naming Test Short Form</td>
</tr>
<tr>
<td>CI</td>
<td>Chief Investigator</td>
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<tr>
<td>COWA</td>
<td>Controlled Oral Word Association</td>
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<tr>
<td>DAT</td>
<td>Dementia of the Alzheimer’s Type</td>
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<tr>
<td>DLB</td>
<td>Dementia With Lewy Bodies</td>
</tr>
<tr>
<td>DST</td>
<td>Digit Span Test</td>
</tr>
<tr>
<td>DT</td>
<td>Diversional Therapy</td>
</tr>
<tr>
<td>EEG</td>
<td>Electroencephalograph</td>
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<tr>
<td>FTD</td>
<td>Frontal Temporal Lobe Dementia</td>
</tr>
<tr>
<td>GDS</td>
<td>Geriatric Depression Scale</td>
</tr>
<tr>
<td>ITT</td>
<td>Intention To Treat</td>
</tr>
<tr>
<td>MD</td>
<td>Mixed Dementia</td>
</tr>
<tr>
<td>MITT</td>
<td>Modified Intention To Treat</td>
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<tr>
<td>MMSE</td>
<td>Mini Mental State Examination</td>
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<tr>
<td>MT</td>
<td>Music Therapy</td>
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<tr>
<td>NARI</td>
<td>National Ageing Research Institute</td>
</tr>
<tr>
<td>NI</td>
<td>Non Intervention</td>
</tr>
<tr>
<td>NOK</td>
<td>Next Of Kin</td>
</tr>
<tr>
<td>RA</td>
<td>Research Assistant</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised Control Trial</td>
</tr>
<tr>
<td>RPC</td>
<td>Royal Park Campus</td>
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<tr>
<td>SGH</td>
<td>St George’s Health</td>
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<tr>
<td>VaD</td>
<td>Vascular Dementia</td>
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CHAPTER 1

INTRODUCTION AND REVIEW OF LITERATURE

Since completing my Masters of Music Therapy (Research) in 2003, which indicated that Music Therapy (MT) improved spontaneous speech for people with dementia, I have always wanted to pursue further research involving Music Therapy’s effect on dementia-related language deficits. In my MT work since the completion of my Masters in 2003, I have continuously witnessed people with dementia who are challenged in the areas of expressive language, have improved spontaneous speech during MT sessions. Not only did I want to pursue further research in this area, but I wanted to ensure I contributed to the MT research area with a quantitative study that met the recommendations of Vink, Birks, Bruinsma and Scholten in their 2007 Cochrane review of MT studies in the field of dementia.

I have been given the invaluable opportunity of fulfilling my research wish at the University Of Melbourne Faculty Of Music and the National Ageing Research Institute (NARI). This study was embedded in another study, which looked at the effects of MT on the cognitive function of people with dementia, using electro-encephalograph (EEG) measures, namely the P300.

This chapter reviews the literature on language deficits associated with different types of dementia, the causes of the language deficits, treatments and interventions. The first section introduces the reader to a thorough description of dementia, its causes, treatments, and a detailed description of the language deficits associated with the different types of dementia. The second section will focus on the function of memory loss (the most common symptom of dementia) in relation to language deficits.

The final section will focus on interventions used in the treatment of dementia including diversional therapy (DT) and music therapy (MT).
1.1 Dementia

1.1.1 Definition

Dementia has been defined as “…an acquired and persistent impairment of intellectual faculties, affecting several cognitive domains, that is sufficiently severe to impair competence in daily living, occupation, or social interaction” (Grabowski & Damasio, 2004). Dementia can be defined as a syndrome, i.e. made up of a group of concurrent symptoms of a disease (Hopper & Bayles, 2001; World Health Organisation, 1993). In order for a person to be diagnosed with the dementia syndrome, s/he must have deterioration in memory and at least one other cognitive function that is severe enough to interfere with his/her activities of daily living (Hopper & Bayles, 2001). A deficit in just one of the following - memory impairment, language or visual-spatial abilities – does not justify a diagnosis of dementia (Grabowski & Damasio, 2004).

1.1.2 Subtypes of dementia and their diagnostic criteria

Historically, dementia has been seen as a global, degenerative syndrome, with a set of memory and intellect deficits (Berrios, 2005; Snowden, 1999). However it is now recognised that there are many specific dementias (or dementia subtypes) with distinct deficits and patterns of change (Grabowski & Damasio, 2004; Snowden, 1999; Waldemar et al., 2007). The most common subtypes are: dementia of the Alzheimer’s type (DAT), Vascular dementia (VaD), Dementia with Lewy Bodies (DLB), the Frontotemporal lobe dementia’s (FTD) and mixed dementia (MD) (De Leeuw & Van Gijn, 2003; Eastley & Wilcock, 2005; Jellinger & Attems, 2007). Less frequently seen dementia subtypes include Parkinsonian dementia, Korsakoff’s dementia and Creutzfeldt Jakob Disease (Dubois et al., 2007; Waldemar et al., 2007).

A correct diagnosis of dementia is the most critical factor, to ensure accurate identification of the specific degenerative dementia disorder. With the correct diagnosis, the appropriate treatment processes can be put in place (Almkvist &
Winblad, 1999; Ballard & Bannister, 2005; Grabowski & Damasio, 2004; Waldemar et al., 2007). It is widely agreed that dementia is a clinical term, not a pathological term. In other words, with some exceptions, there is no definitive biological marker for the degenerative dementias, and diagnosis is made in terms of a battery of tests and a clinical examination (Grabowski & Damasio, 2004; Hopper & Bayles, 2001; Minati, Edginton, Bruzzone, & Giaccone, 2009; Muller-Spahn & Hock, 1999).

There are three widely used sets of criteria for the diagnosis of the different dementias (Aevarsson & Skoog, 2000; Ballard & Bannister, 2005; Minati et al., 2009; Muller-Spahn & Hock, 1999; Waldemar et al., 2007). These are 1) the International Classification of Diseases 10th revision (ICD 10 criteria) (World Health Organisation, 1993), 2) the Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM IV-TR) (Diagnostic and statistical Manual of Mental Disorders, 2000) and 3) the National Institute of Neurological and Communicative Disorders and Stroke – Alzheimer’s Disease and Related Disorders Association Work Group Criteria (NINCDS-ADRDA criteria) (McKhann et al., 1984). According to Minati et al., (2009), the NINCDS-ADRDA criteria (McKhann et al., 1984) is the most frequently referred to criteria. Additionally a diagnosis of DAT must exclude any other possible causes for dementia, for example cerebrovascular disease, or evidence of a systemic disease such as hypothyroidism, alcohol or drug abuse (Forstl, 2005; Muller-Spahn & Hock, 1999; Waldemar et al., 2007; World Health Organisation, 1992).

Such diagnostic criteria not only plays an important role in determining accurate and consistent diagnosis of dementia but can also assist physicians and specialists in determining when a person does not have dementia (Almkvist & Winblad, 1999; Ballard & Bannister, 2005; Muller-Spahn & Hock, 1999). The stage or severity of dementia is also assessed by cognitive tests such as the Mini Mental State Examination (MMSE) (Folstein et al., 1975) or the Global Deterioration Scale (GDS), (Reisberg, Ferris, de Leon, & Crook, 1982) and classed as mild, moderate or severe stage of dementia.
1.1.3 Assessment of dementia

As there is no single biological marker for the degenerative dementias (Grabowski & Damasio, 2004; Muller-Spahn & Hock, 1999; Waldemar et al., 2007), an evaluation of the type and level of dementia is therefore needed to ensure the person with dementia receives an accurate diagnosis (Snowden, 1999; Waldemar et al., 2007) and appropriate pharmacological and non-pharmacological care (Morris, Mohs, Rogers, Fillenbaum, & Heyman, 1988). Assessments are also vital to ensure appropriate and accurate assistance for carers and professional staff if the person is living in a residential facility (Brodaty, 1996).

The assessment of a person with dementia is detailed, thorough and multifaceted, including the assessment of the following areas: medical past history, cognitive functions, physical examination, neurological examination, ADL’s, co-morbidities, blood tests, neuroimaging and cerebrospinal fluid (CSF) analysis (Minati et al., 2009; Waldemar et al., 2007). Areas of assessment that are directly related to this study will be discussed in more detail below, including medical past history, neurological and physical examination, cognitive, behavioural and psychological assessment.

1.1.3.1 Medical past history

Information collected as part of the medical history of a person with dementia includes mode of onset of the ‘abnormal symptoms’ and pattern of progression, co-morbidities, family history of dementia and educational history (Grabowski & Damasio, 2004; Waldemar et al., 2007). People with advanced dementia can have difficulty reporting accurately on various aspects of their social, emotional, occupational and medical histories, so it is important that this information is also obtained from a family member who knows the person well (Eastley & Wilcock, 2005; Grabowski & Damasio, 2004). Grabowski and Damasio report both overestimation and underestimation of the person’s own cognitive impairment being commonplace, when obtaining medical past histories from the person with dementia.
1.1.3.2 Neurological and physical examination

General neurological and physical examination should be performed to exclude any diseases that can be mistaken for dementia. However, neurological symptoms specific to particular dementias, for example DLB which can display Parkinsonian symptoms, must be identified (McKeith, 2005; McKeith et al., 2005; Salmon et al., 1996).

1.1.3.3 Cognitive assessment

The diagnosis of dementia relies heavily on the detailed assessment of cognitive deficits (Dubois et al., 2007; Grabowski & Damasio, 2004; Waldemar et al., 2007). There have been numerous groups of dementia specialists who have carefully chosen validated and standardised tools for each of the cognitive areas, to form a battery of tools. The use of this collection of tools ensures the accurate assessment of the cognitive areas to assist with the diagnosis of dementia (Dubois et al., 2007; McKhann et al., 1984; Morris et al., 1988). Two frequently used cognitive assessment tools are the Clinical Dementia Rating Scale (CDR) (Morris, 1997) and the Mini Mental State Examination (MMSE) (Folstein et al., 1975).

1.1.3.4 Behavioural and psychological assessment

Detailed and accurate assessment of behavioural and psychological symptoms of dementia (BPSD), are important as the presence of specific behavioural and psychological symptoms can contribute to a specific dementia diagnosis. For example, visual hallucinations are a specific symptom of Dementia with Lewy Bodies (DLB) (McKeith, 2005; McKeith et al., 2005); personality changes and/or disinhibition may indicate Fronto Temporal Lobe Dementia (FTD) (Hodges, 2001). Suitable scales include the BEHAVE-AD (Reisberg et al., 1987) and the Neuropsychiatric Inventory (NPI) (Cummings et al., 1994).

Within an assessment of dementia, determining the presence or absence of depression is vital as part of the overall diagnostic process. Depression can exist alongside other symptoms of dementia (Eastley & Wilcock, 2005; Starkstein, 2005)
with symptoms including unhappiness, inactivity, withdrawal and loss of interest in life. However it would be easy to confuse symptoms of depression with some similar symptoms of dementia such as apathy, which according to Waldemar et al., (2007), is the most common neuropsychiatric feature of DAT. Tools to assess depression include the Cornell Scale for Depression in Dementia (CSDD) (Alexopoulos, Abrams, Young, & Shamoin, 1988) and the Geriatric Depression Scale (GDS) (Yesavage et al., 1983).

Despite the wide range of diagnostic criteria, formalised and validated assessment and screening tools for the dementia subtypes and the specialised staff available to provide the assessments, there appears to be a low rate of an actual dementia diagnosis (Waldemar et al., 2007). A study in the UK (O'Connor et al., 1988) revealed that GPs recognised only 58% of the dementia cases and psychiatrists recognised only 20%. A qualitative study of GPs’ experiences in diagnosing dementia in Australia study was conducted by Hansen, Hughes Routley and Robinson in 2009. This study found that GPs are unlikely to diagnose dementia early unless there are any benefits for the patient, such as dementia specific services and are skeptical about the benefits of dementia medications. The general feedback also indicated that as the dementia symptoms can be of a complex nature, they like to observe the client over a long period of time, and even so, some symptoms are difficult to pick up in an appointment with the GP.

1.1.4 Epidemiology

People are living longer and maintaining better health into old age than ever before (Bayles et al., 2005; Statistics, 2004; United States Census Bureau, 2004). However with old age being the primary risk factor for dementia (Almkvist & Winblad, 1999; Muller-Spahn & Hock, 1999), the number of dementia cases has significantly increased. Wimo et al.,’s 2003 study of the incidence of dementia world-wide estimated that in 2000, the percentage of people with dementia living in Asia (which includes Australia) represented 46.5% (11.87 million) of the total world sample and Europe had the second highest percentage of 29.1% (7.43 million). Wimo et al.,
anticipated that by the year 2050, the number of people with dementia living in Asia will increase by 646% to 84 million, but the numbers in the European countries will have a slower increase of 167% to 20 million.

In Australia alone in 2009, there were 245,400 people with dementia with the number expected to rise to 1.13 million by 2050 unless there is a medical breakthrough (Economics, 2009). The Australian Bureau of Statistics (ABS) in a 2005 report had estimated a 327% increase in the prevalence of dementia between 2000 and 2050, with a total population increase of only 40%. Access Economics (2009) predict that Australia’s 4.1 million people over the age of 60 will increase by 144.3% to approx 10.0 million by 2050, an increase 2.4 times greater than the population growth of people below the age of 60. With the higher population growth rates in the 60 plus age group and the major risk factor for dementia being age, it is predicted that the demand for dementia care services will increase significantly by 2050. The year 2010 was significant as it marked the first of the baby-boomer generation turning 65. By the year 2020 it is predicted there will be around 75,000 baby boomers with dementia in Australia (Economics, 2009). The prevalence of dementia in the Australian Indigenous population (2.7% of Australia’s population) is substantially higher (12.4%) than for non-Indigenous Australians (2.4%) (Smith et al., 2008). It is interesting to note that in Smith’s 2008 study life expectancy of the population was 17 years less than non-indigenous Australians, and yet the rate of dementia is much higher.

There are the significant financial costs associated with dementia. In 2005, studies reported the total dementia-related health cost in Europe was 55 billion euros per year, with the majority of costs spent on providing institutional care (Andlin-Sobocki, Jonsson, Wittchen, & Olesen, 2005; Jonsson & Berr, 2005). Wimo, Winblad and Jonsson (2007) calculated in 2005 that the worldwide dementia population of 29.3 million cost of US$315.4 billion. Expenditure on dementia in Australia is expected to rise from $3.85 billion in 2002-03 (4.5% of total health and aged care spending) to $17.84 billion in 2032-33 (7.2% of the total).
The cases of dementia in the Asia Pacific region (of which Australia is a part) is also predicted to increase from 13.7 million in 2005 to 64.6 million by 2050 (Economics, 2006). The Asia Pacific region includes such countries as China, Chinese Taipei, India, Hong Kong, Indonesia, Malaysia, Singapore, Philippines, South Korea, Sri Lanka, Pakistan and Thailand. Factors other than an ageing population that will exacerbate the social and economic impact of dementia in these regions include the trends away from extended families and towards nuclear families. This will result in care of dementia relying more on a mix of formal and informal care giving (Economics, 2006).

1.1.5 Etiology

There are a number of possible causes of dementia, including neurodegenerative diseases, vascular diseases, endocrine disorders, vitamin deficiencies, systemic disease, neurological disorders and infection (Eastley & Wilcock, 2005). The most commonly diagnosed cause of irreversible dementia is dementia of the Alzheimer’s type (DAT) (Grabowski & Damasio, 2004; Hopper & Bayles, 2001; Muller-Spahn & Hock, 1999; Tomoeda, 2001). However, a high percentage of people with DAT have also been found to have vascular pathology (Kalari, 2000), suggesting that there may be a combination of causes of dementia for e.g. ageing (DAT) and vascular disease (VaD).

Frontotemporal lobe dementia (FTD), although less common than DAT and Dementia with Lewy Body (DLB), is the second most common cause of dementia after DAT in the middle-age population (Neary et al., 1998; Scarmeas, 2004). Other conditions that are closely linked with dementia include hydrocephalus, alcoholism, psychiatric disorders, Huntington’s disease and Parkinson’s disease (Eastley & Wilcock, 2005; Tomoeda, 2001).

Studies have shown that there are some conditions that can cause symptoms of dementia that when resolved, provide the potential for the dementia to be reversed (Eastley & Wilcock, 2005). Such conditions include depression, normal pressure...
hydrocephalus, alcohol dependence syndrome, metabolic diseases and delirium (Grabowski & Damasio, 2004; Hejl, Hogh, & Waldemar, 2002).

1.1.6 Risk Factors

The most common risk factor for dementia is age (Jorm, 2005; Minati, Edginton, Bruzzone, & Giaccone, 2009; Muller-Spahn & Hock, 1999; Waldemar et al., 2007). The risk factors will vary in importance depending on the type of dementia. For example, the main risk factors for Vascular Dementia (VaD) are associated with decreased blood supply to the brain which can be caused by hypertension, diabetes mellitus, smoking, coronary artery disease and high cholesterol (De Leeuw & Van Gijn, 2003; Jorm, 2005; Roman, 2005). Other factors that increase the risk of developing dementia include Down Syndrome, familial factors (having a family history of dementia prior to 60 years) or having the E4 (apoE4) gene (De Leeuw & Van Gijn, 2003; Jorm, 2003; Muller-Spahn & Hock, 1999; Roman, 2005).

1.1.7 Dementia of the Alzheimer’s type (DAT)

DAT is the most common form of dementia accounting for 50-60% of all cases (Grabowski & Damasio, 2004; Muller-Spahn & Hock, 1999; Waldemar et al., 2007). A diagnosis of DAT would be based on one of the three sets of criteria widely used for example the NINCDS-ADRDA (McKhann et al., 1984). Additionally a diagnosis of DAT must exclude any other possible causes for dementia, for example cerebrovascular disease, or evidence of a systemic disease such as hypothyroidism, alcohol or drug abuse (Forstl, 2005; Muller-Spahn & Hock, 1999; Waldemar et al., 2007; World Health Organisation, 1992).

DAT is characterised by the presence of neurofibrillary tangles and neuritic plaques that are widely and sequentially distributed across virtually the whole brain including temporal and frontal lobes, the hippocampus and adjacent areas, sparing only the sensory cortices until the very last stages of the disease (Braak et al., 1999; Lovestone, 1995; Masters, 2005). The more dense the presence of plaques and tangles the more cognitive impairment related to the function of that particular part
of the brain (Lovestone, 1995; Masters, 2005). Neurofibrillary tangles are a key to the pathological lesions in DAT and correlate well with observed cognitive impairments (Masters, 2005). Braak et al.,(1999) describe the initial neuropathological process of dementia as beginning with cytoskeletal alterations in the brain neurons, which result from the formation of an abnormal tau protein in a few susceptible types of neurons. These cells are then described at being at the “pre-tangle” phase (Braak et al., 1999; Braak, Bohl, & Reintjes, 1996). The abnormal cells as they gather become “snarled and dilated” (Braak et al., 1999) and the neurofibrillary tangle formation begins. The neurofibrillary tangles (NFT’s) most likely lose their function long before they actually die (Braak et al., 1999; Masters, 2005). Depositions of amyloid are however, among the first changes seen in the brain, and do not correspond with neuritic plaques (Braak & Braak, 1991). Deposits of amyloid have been seen in autopsied brains of people with and without dementia as seen in studies by Braak & Braak (1996; 1991). The type of amyloid plaque in the DAT brains is seen to be unique, and specific to that type of dementia as compared to the plaque in the brains without dementia symptoms (Nelson, Braak, & Markesbery, 2009). However, it is not clearly understood how much the accumulation of the β-amyloid protein has on the dementia related cognitive deficits (Braak et al., 1999; Nelissen et al., 2007).

1.1.7.1 Language deficits of DAT

A review of recent literature by Moorhouse (2005) supports the theory that language deficits associated with DAT are hierarchial, that is the language deficits become more pronounced as the DAT progresses, as measured by the Global Deterioration Scale (GDS) (Reisberg et al., 1982) (Table 1). People with DAT are usually fluent until middle to late stages of the disease, when difficulty with naming (anomia) occurs, alongside paraphasic errors (using words in wrong and senseless combinations) and semantic jargon. Global aphasia usually occurs in advanced stages of DAT (Appell, Kertesz, & Fishman, 1982; Cummings et al., 1994; Fisher, Tierney, Rourke, & Szalai, 2004).
However, another opinion is that language deficits in DAT are common, regardless of the severity of the disease (Appell et al., 1982; Cummings, Benson, Hill, & Read, 1985). These authors state that the language deficits of dementia are not necessarily related to the severity of dementia, they believe language deficits of dementia are not hierarchial as stated by Moorhouse (2005). For example a person may have a moderate level of dementia, but have very few language deficits, or may have severe language deficits with a mild level of dementia.

Numerous studies have compared the language deficits of DAT clients to other dementia subtypes such as FTD, LBD and VaD (see Table 1 below). A study by Blair et al., (2007) tracking the longitudinal language deficits of 105 people with DAT, 20 with FTD and 10 with SD with 12 months between testing, found the DAT group had and overall higher level of deficits in all areas of language, including spontaneous speech fluency, word recognition, sentence completion, responsive speech and praxis measures. However, in a review of 27 studies of neuropsychological tests comparing DAT and VaD, Looi and Sachdev (1999) did not find any significant difference in language deficits between DAT and VaD group.
Table 1: Language deficits related to the stages of DAT

<table>
<thead>
<tr>
<th>Early/mild (Global Deterioration Scale) (3-4) Dementia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deficits</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>Wordfinding</td>
<td>Bourgeois (2002)</td>
</tr>
<tr>
<td>Lengthy communication</td>
<td>Haak (2002)</td>
</tr>
<tr>
<td>Comprehension of lengthy sentences</td>
<td>Bayles et al., (1992)</td>
</tr>
<tr>
<td>Ability to generate written passages</td>
<td>“”</td>
</tr>
<tr>
<td><strong>Intact</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>Oral reading</td>
<td>Bayles et al., (1992)</td>
</tr>
<tr>
<td>Reading comprehension</td>
<td>“”</td>
</tr>
<tr>
<td>Spelling</td>
<td>“”</td>
</tr>
<tr>
<td>Writing</td>
<td>“”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Middle/Moderate (GDS 5) Dementia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deficits</strong></td>
<td><strong>References</strong></td>
</tr>
<tr>
<td>Decreased word content</td>
<td>Haak (2002)</td>
</tr>
<tr>
<td>Words are less concise</td>
<td>Bayles &amp; Tomoeda (1995)</td>
</tr>
<tr>
<td>Word repetition commences</td>
<td>Clarke (1995)</td>
</tr>
<tr>
<td>Difficulty changing topic</td>
<td>Haak (2002)</td>
</tr>
<tr>
<td>Often excessive or withdrawn speech</td>
<td>“”</td>
</tr>
<tr>
<td>Loss of abstract interpretation</td>
<td>“”</td>
</tr>
<tr>
<td>Decrease in expression of complex grammar</td>
<td>“”</td>
</tr>
<tr>
<td>Reading comprehension reduced to single words</td>
<td>“”</td>
</tr>
<tr>
<td>Can write usually only single words</td>
<td>“”</td>
</tr>
<tr>
<td><strong>Intact</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>Comprehension of (at least) one stage command</td>
<td>Haak (2002), Fried-Oken et al., (2000)</td>
</tr>
<tr>
<td>Reading out aloud</td>
<td>Haak (2002)</td>
</tr>
<tr>
<td>The mechanics of writing</td>
<td>“”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Late/Severe (GDS 6-7) Dementia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deficits</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>Comprehension of spoken/written language</td>
<td>Bayles &amp; Tomoeda, (1995); Blair et al.,(2007)</td>
</tr>
<tr>
<td>Decreased ability to initiate speech</td>
<td>Clark (1995)</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>“”</td>
</tr>
<tr>
<td>Adherence to speaker/listener conversational roles</td>
<td>“”</td>
</tr>
<tr>
<td><strong>Intact</strong></td>
<td><strong>Reference</strong></td>
</tr>
<tr>
<td>Use of occasional real words</td>
<td>Bayles &amp; Tomoeda (1995)</td>
</tr>
<tr>
<td>Simple grammar</td>
<td>“”</td>
</tr>
<tr>
<td>Intonation</td>
<td>“”</td>
</tr>
<tr>
<td>Use of automatic and social phrases</td>
<td>Haak (2002)</td>
</tr>
<tr>
<td>Some conceptual knowledge</td>
<td>Fried-Oken et al., (2000)</td>
</tr>
</tbody>
</table>
1.1.7.2 Other symptoms (of DAT)

1.1.7.2.1 Memory Deficits

Memory deficits are one of the earliest symptoms of DAT (Almkvist & Winblad, 1999; Braak et al., 1999; Minati et al., 2009; Waldemar et al., 2007). Deficits are seen particularly in short-term or working memory, which is the system responsible for activating and retrieving information, holding information in the consciousness and for maintaining attention (Bawdily, 1991; Hopper & Bayles, 2001). Long-term memory can be divided into episodic and semantic subtypes (Chertkow & Bub, 1990; Hopper & Bayles, 2001; Waldemar et al., 2007). Episodic memory is the individual’s ability to recall autobiographical information, which has been stored in a temporal/spacial context (Hopper & Bayles, 2001; Minati et al., 2009). Chertkow and Bub (1990) define semantic memory as containing “...the permanent representation of our knowledge of concepts, or words and their meanings and in essence our knowledge of the world.” (p. 397). As the dementia progresses there is damage to the semantic memory. Semantic deficits are displayed in areas of confrontation naming, difficulty accessing meanings of words quickly and the inability to retrieve words (Chertkow & Bub, 1990; Hopper & Bayles, 2001). As will be discussed in more detail further on in this chapter, damage of semantic memory can directly affect language ability. Although DAT is well known to cause deficits in memory, interestingly, a study by Dick, Nielson, Beth, Shankle and Cotman (1995) indicated an improvement in memory over time, whereby 12 people with DAT displayed the ability to learn new fine motor skills and were able to retain those skills for approximately a month.

1.1.7.2.2 Perceptual deficits

Perceptual deficits are common in many of the dementias including DAT (Bourgeois, 2002; Haak, 2002). Such deficits include difficulty with object recognition, particularly when one object is superimposed on another. They also have difficulty copying line drawings (Haak, 2002; Snowden, 1999). According to Snowdon (1999) the brain regions chiefly involved in perceptual skills are the occipital, parietal and temporal cortex. Perceptual deficits can certainly impede communication as objects
are misinterpreted and misrepresented, resulting in anxiety and confusion for the person with dementia. Bourgeois (2002) recommends an emphasis on enhancing sensory stimuli in order to activate the person’s visual, auditory and tactile sensory pathways to decrease confusion and enhance orientation and communication. There is also a likelihood that the person may recognise the object, but due to language deficits, may be unable to name it (Snowden, 2005).

1.1.7.2.3 Spatial deficit

This deficit occurs as a result of damage to the parietal lobes (Snowden, 1999) and includes difficulty localising and appreciating space between objects, people and spatial neglect in horizontal space. Spatial dysfunctions may be misinterpreted as motor dysfunctions (Snowden, 2005). Verbal deficits may impede performance in spatial tasks, for example in a dot counting exercise a person with dementia may be able to locate all of the dots in his/her vision, but have difficulty recalling how many dots there were on the screen (language deficit) (Snowden, 2005).

1.1.7.2.4 Motor deficits

Motor deficits are generally unremarkable in DAT in the early stages (Waldemar et al., 2007). However, as the disease progresses, there is a loss of motor performance, and a higher risk of falls or consequence of falling and therefore a loss of independence (Huger et al., 2009). As the DAT progresses, the walking velocity decreases along with shortened steps, increasing the risk of falls (Van Iersel, Hoefsloot, Muneke, Bloem, & Olde Rikkert, 2004).

1.1.7.2.5 Executive deficits

Executive functions/skills include planning, organising, discrimination, abstraction, conceptual flexibility, self-control, sustaining, selective attention and switching of attention (Neary, 2005; Roman, 2005; Snowden, 1999; Waldemar et al., 2007). Numerous executive functions overlap with language and memory functions and are thus linked to language deficits, including decreased verbal fluency with speech reduction, echolalia, decreased concentration span, retrieval deficits and in some cases, disinhibition and uncontrolled behaviours (Hopper & Bayles, 2001; Neary,
2005; Roman, 2005; Snowden, 1999; Waldemar et al., 2007). Such symptoms may be insignificant in some dementias but may contribute to the diagnosis of other dementias such as frontotemporal dementia (FTD) (Hodges, 2001; Neary et al., 1998).

1.1.8 Vascular Dementia

Vascular dementia (VaD) is considered the second most common neurodegenerative dementia after DAT (De Leeuw & Van Gijn, 2003; Grabowski & Damasio, 2004; Snowden, 1999). Cerebrovascular disease (CVD) and ischaemic brain injury are the main causes of VaD (Grabowski & Damasio, 2004; Snowden, 1999), that is lack of blood supply to the brain. VaD is generally characterised by an acute onset (usually within 3 months of a stroke, De Leeuw & Van Gijn, 2003) with a continually changing intensity of symptoms, and a stepwise decline in cognitive function. These characteristics are found in the context of evidence of cerebrovascular disease (De Leeuw & Van Gijn, 2003; Grabowski & Damasio, 2004; Mathias & Burke, 2009; Roman, 2005). As opposed to an acute onset of symptoms with VaD, Binswanger’s disease, a form of multi-infarct dementia, is associated with damage to a significant amount of white matter and has a usually gradual onset of dementia symptoms with a slow progression (Rosenberg, 2009).

Some studies have found similar lesions in the brains of both DAT clients and clients with VaD (Jellinger & Attems, 2007; Snowden, 1999). Similar to DAT, a diagnosis of VaD is dependent on both clinical assessment and neuroimaging and people with VaD tend to have more damage to the executive functions such as planning, speed of mental processing and performance on unstructured tasks (Desmond, 2004; Grabowski & Damasio, 2004).

In order for a person to be diagnosed with VaD there must be cognitive impairment (decline in memory and at least two other intellectual domains) severe enough to interfere with the person’s activities of daily living (ADL’s) (De Leeuw & Van Gijn, 2003). There also must be evidence of cerebrovascular disease (CVD) which has had
a direct impact in the cognitive decline including lesions as evidenced on brain imaging (CT or MRI) (De Leeuw & Van Gijn, 2003; Roman, 2005; Rosenberg, 2009).

1.1.8.1 Language deficits (of VaD)

Although there are some language deficits, it has been argued that the primary language functions tend to be preserved in VaD (Desmond, 2004). Nonetheless, there are greater deficits in verbal fluency than in DAT, possibly due to damage to areas of the frontal lobe (Desmond, 2004). However, a study comparing language deficits of 13 and 10 people with DAT and VaD respectively found both groups had similar language deficits (Vuorinen, Laine, & Rinne, 2000). Interestingly, a study by Almkvist (1994) found that clients with DAT had poorer word finding skills but were better at verbal fluency than clients with VaD.

1.1.8.2 Other symptoms (of VaD)

The most common behavioural features of VaD are depression, delusions and apathy according to McKeith and Cummings (2005). De Leeuw and Van Gijn (2004) describe symptoms of VaD in more detail, (depending on the area of brain damaged due to cerebrovascular disease), such as memory impairment, dyspraxia, severe amnesia and apathy associated with infarcts in the anterior cerebral artery. Occlusion to the right middle cerebral artery may cause behavioural abnormalities such as psychosis and cognitive decline; with occlusions to the posterior cerebral artery presenting with psychomotor agitation, visual hallucinations and other visual disturbances (De Leeuw & Van Gijn, 2004).

1.1.9 Dementia with Lewy Bodies

Dementia with Lewy bodies (DLB) is a neuropathologic degenerative condition that is characterised by subcortical and diffusely distributed neocortical Lewy bodies with little or no associated DAT (Salmon et al., 1996). However, recent diagnostic recommendations (McKeith et al., 2005) have taken into account studies that have discovered some DAT cases that also meet Lewy body criteria, but without the DLB clinical syndrome. Mixed DAT and DLB diagnosis is not uncommon (Jellinger & Attems, 2007).
1.1.9.1 Language deficits of DLB

Language deficits associated with DLB appear to be in the areas of verbal fluency for category and letters (McKeith et al., 2005; Salmon et al., 1996) for example the ability to recall names of objects in groups or categories, such as animals, fruit or objects beginning with a particular letter such as “S”.

1.1.9.2 Other symptoms of DLB

Features of DLB for the most part distinguish it clearly from DAT. Fluctuations in cognitive function, such as mental state and alertness (for example excessive daytime drowsiness), visual hallucinations and motor Parkinsonian features which develop in 25-50% of people with DLB (McKeith et al., 2005; Salmon et al., 1996) and are key elements of DLB. In fact the diagnostic criteria for DLB were revised in 2005 to include a minimum of two of the following three core features: 1) fluctuating cognition with pronounced variations in attention and alertness, 2) recurrent well formed and detailed visual hallucinations and 3) spontaneous features of Parkinsonism (McKeith et al., 2005). Similar features of both DAT and DLB include progressive cognitive decline and memory deficits (McKeith et al., 2005; Salmon et al., 1996).

1.1.9.3 Motor deficits

Mild motor dysfunctions can be a key part of the DLB diagnosis. These include dysarthria (disturbance in articulation of words), dysphagia (difficulty in swallowing) and myoclonus (twitching of a muscle group) (Moorhouse, 2005; Salmon et al., 1996; Snowden, 1999; Tomoeda, 2001; Waldemar et al., 2007). Consequently such motor deficits can play a significant role in the language performance of clients with DLB.

1.1.10 Frontotemporal Dementia (FTD)

Frontotemporal lobar degeneration (FTD) affects either the frontal or temporal lobe or, in some cases both (Neary et al., 1998). FTD is not as prevalent as DAT, VaD and DLB, accounting for less than 10% of presenting cases (Neary et al., 1998; Scarmeas, 2004). This dementia usually occurs at ages <65 (Diehl et al., 2005). Three clinical
features of language deficits manifest with FTD, and these are discussed in further
detail below: 1) progressive non-fluent aphasia (PA) otherwise known as primary
progressive aphasia (PPA) (Diehl et al., 2005; Mesulam et al., 2008; Neary, 2005;
Neary et al., 1998; Scarmeas, 2004; Sreepadma et al., 2002); 2) semantic dementia
(SD) which is characterised by severe naming and word comprehension impairment
in the context of speech output and 3) profound alterations in the person’s
personality and signs of ritualised-type behaviours (Hodges, 2001).

1.1.10.1 Language deficits (of FTD)

One of the three primary features of FTD is progressive non-fluent aphasia (PA)
(Diehl et al., 2005; Mesulam et al., 2008; Scarmeas, 2004). PA mainly affects the area
of expressive language, for example speech production, phonology, grammar and
word retrieval with speech output decreasing, leading to eventual mutism (Hodges,
2001; Neary et al., 1998). There may be excessive speech during the disinhibition
phase (Hodges, 2001; Neary et al., 1998).

Primary progressive aphasia (PPA) is considered a distinct entity from DAT (Mesulam,
Grossman, Hillis, Kertesz, & Weintraub, 2003; Mesulam et al., 2008; Sreepadma et
al., 2002). In contrast to clients with DAT who present with symptoms such as short
term memory loss, apathy and repeating questions, people with PPA present initially
with the onset of word-finding difficulties, abnormal speech patterns and significant
spelling errors (McKhann et al., 2001; Mesulam, Grossman, Hillis, Kertesz, &
Weintraub, 2003; Mesulam et al., 2008). According to Mesulam et al., (2003) the
single most common sign of PPA is anomia, the inability to retrieve the right word in
corveration or to name objects as requested by an examiner. Also with PPA, there
is relative preservation of other cognitive domains for at least the first two years
(Mesulam et al., 2003; Sreepadma et al., 2002). In the majority of cases, this
degeneration occurs on the frontotemporal lobe (McKhann et al., 2001; Mesulam et
al., 2008; Sreepadma et al., 2002). PPA deficits can include any aspect of language,
such as word finding, object naming, word fluency and word comprehension
(Mesulam et al., 2003; Mesulam et al., 2008; Sreepadma et al., 2002). In contrast to
DAT, the social skills such as reasoning and explicit memory of the person with PPA
typically remain intact, at least for the first two years (Mesulam et al., 2003) despite the continual decline in the areas of language (Mesulam et al., 2003; Sreepadma et al., 2002).

Another diagnostic feature of FTD is semantic dementia syndrome (SD), a form of progressive aphasia, characterised by severe naming and word comprehension impairment in the context of speech output (Hodges, 2001; McKhann et al., 2001; Neary et al., 1998). The person also has difficulty recognising the meaning of objects (agnosia). The ability to read and write regular words however is relatively preserved (Hodges, 2001; Neary, 2005; Neary et al., 1998). SD has been referred to as a type of progressive aphasia (PA). However, SD is seen as a different entity to PA, as although there is impaired language comprehension (that can occur in PA), there is preserved fluency in SD, not seen in PA (or otherwise known as PPA) (McKhann et al., 2001; Sreepadma et al., 2002).

Semantic dementia (SD) has been recognised as another type or form of FTD because of its pathological and clinical similarity (McKhann et al., 2001; Neary et al., 1998). SD clients present with comprehension and naming deficits, semantic paraphasias, and circumlocutory responses in the context of normal fluency. Mesulum (2003) describes specific symptoms of SD as “...a combination of impaired word comprehension and impaired recognition (agnosia) of faces and objects” (p. 1536).

The FTD clients that present with language deficits usually develop behavioural changes over time (Kertesz, McMonagle, Blair, Davidson, & Munoz, 2005).

1.1.10.2 Other symptoms

One of three diagnostic features of FTD is profound alterations in the personality and ritualistic-type behaviours (Hodges, 2001; Kertesz et al., 2005) of either apathy or social disinhibition and distractibility (Neary et al., 1998b). Apathy is a very common symptom with deficits also in areas of planning, organisation and other areas of executive functioning similar to other dementias (Kertesz et al., 2005).
1.1.11 Mixed Dementia

The term “mixed dementia” (MD) refers to a combination of DAT and any of the other degenerative dementia disorders, the prevalence of which is still unknown (Jellinger & Attems, 2007). However according to other literature, MD refers to combination of DAT and VaD (Zekry, Hauw, & Gold, 2002). The clinical diagnosis of MD is difficult (Ballard & Bannister, 2005; Corey-Bloom, Galasko, Hofstetter, Jackson, & Thal, 1993) with its existence as a separate diagnostic entity being questioned by some (Jellinger & Attems, 2007). Up until recently, studies have generally focused on pure dementia subtypes, such as DAT, FTD, VaD etc, rather than MD (Zekry et al., 2002). However the study by Corey-Bloom et al., (1993) found significant commonalities with data of MD (n=430) as compared to possible DAT (n=279) and probable DAT (n=928). They found cardiovascular disease (p<0.001) and hypertension (p<0.001) but not diabetes were more common in the MD group, though hypertension was frequent in all 3 groups. Interestingly, a history of general anesthesia was significantly more common in the MD group (p<0.001) than in the other two groups. This group also had a significant higher incidence of depressed mood (p<0.001) and history of depression (p<0.01). It is important to note however, that the non MD groups were either probable or possible DAT, and so a large percentage of the clients would be returning for follow up assessments. Another later study by Bowler et al., (1996) found the neuropsychological symptoms of MD to be more closely related to VaD than DAT.

1.1.11.1 Language Deficits of MD

Despite the issues highlighted previously of a specific clinical diagnosis for MD there appears to be general consensus that there is some overlap of vascular pathology and DAT pathogenesis resulting in MD (Ballard & Bannister, 2005; Jellinger & Attems, 2007; Zekry et al., 2002). At this stage, according to Jellinger and Attems (2007) and Starkstein and Almeida (2003), there are no generally accepted and validated clinical and neuropathological guidelines for the diagnosis of MD, which would include a description of the language deficits of MD.
1.1.11.2 Other symptoms

Some studies have indicated specific symptoms that have been more prevalent in MD as compared to non MD groups. Bowler et al., (1993) found gait disorders more common in the MD group. But, with the absence of a current clinical diagnosis criteria for MD, as stated in 1.1.11, it is difficult to define specific symptoms associated with the dementia subtype.

1.1.12 Behavioural and Psychological Symptoms of Dementia (BPSD)

The most consistent Behavioural and Psychological Symptoms of Dementia (BPSD) are depression, agitation, visual hallucinations, wandering and aggression (Teri & Logsdon, 2000; Turner, 2005). Such symptoms are often cited as being the main reason for primary carers of people with dementia not being able to cope, commonly leading to the person being institutionalised (Brodaty, 1996; Teri & Logsdon, 2000).

1.1.12.1 Depression

Depression can exist as a symptom of the dementia syndrome (Brodaty, 1996; Starkstein, 2005; Starkstein, Jorge, Mizrahi, & Robinson, 2005; Teri & Logsdon, 2000), or it can exist alone manifesting symptoms of cognitive impairment which can be reversible if the depression itself can be treated (Eastley & Wilcock, 2005). In fact Heil et al., (2002) in their study of 1000 patients at a memory clinic, found depression to be the most common potentially reversible cause of cognitive symptoms in elderly people. Symptoms that can contribute to the diagnosis of depression include unhappiness, withdrawal, inactivity, fatigue, expressions of guilt and worthlessness, tearfulness and loss of interest in activities that the person once participated in (Starkstein, 2005). However this study indicated that people who had cognitive impairment resulting from depression were at a higher risk of developing dementia in the future.

Symptoms of depression can appear similar to some symptoms of cognitive impairment, therefore depression and cognitive impairment can be misinterpreted or misdiagnosed (Eastley & Wilcock, 2005; Starkstein, 2005; Starkstein et al., 2005). For example depression can affect a person’s performance on a simple cognitive test
affecting their concentration span (as does cognitive impairment) and so the person replies to an assessment question in a cognitive test “I don’t know” to a simple question e.g. “What is your birthday?” It is therefore important for thorough assessments to be carried out to determine an accurate diagnosis of depression or dementia.

It is very common for depression to co-exist with symptoms of dementia (Eastley & Wilcock, 2005; Starkstein, 2005). A study of 670 patients with DAT (Starkstein et al., 2005) found 26% had significant levels of depression. The results are consistent with the average rate of co-morbid depressive illnesses reported in people with dementia (Eastley & Wilcock, 2005). However, it is important to keep in mind that some symptoms of dementia such as apathy and poor concentration span are not necessarily a direct result of depression. As Teri et al., (2000) explain, cognitive impairment affects a person’s ability to engage in enjoyable hobbies/activities and affects the memory. So these symptoms can be seen as a sign of depression when they are a direct result of cognitive impairment. Thus there may be more than one reason why a person with dementia sits in a chair, appearing disinterested in the world around them. Regardless of whether the depression is the initial cause of cognitive symptoms or a result of the dementia syndrome, language function can be affected (Hopper & Bayles, 2001; Tomoeda, 2001).

1.1.12.2 Behavioural symptoms

Behavioural symptoms associated with dementia are very common (Teri & Logsdon, 2000; Turner, 2005; Waldemar et al., 2007). Agitation and disruptive behaviours include irritability, restlessness, physical and verbal aggression, resisting necessary assistance, pacing and wandering. Agitation affects between 70% and 90% of people with dementia (Teri & Logsdon, 2000; Turner, 2005). Such behaviours impede the person with dementia from engaging in meaningful therapeutic and rehabilitative activity. People with symptoms of agitation have a higher risk of distractibility when participating in therapeutic interventions (such as diversional therapy and music therapy) and agitation can impede correct assessment in language tests, such as the
To assist the primary carer in coping and to improve the person with dementia’s quality of life, it is imperative that the psychological and behavioural symptoms are accurately assessed and treated. Treatment involves non-pharmacological interventions including diversional, music, behavioural and cognitive therapies (Snowden, 2003; Turner, 2005) and pharmacological therapy (LoGiudice, Flynn, & Ames, 2005; Snowden, 2005; Snowden, 2003; Waldemar et al., 2007).

1.1.12.3 Activities of Daily Living (ADLs)

In order for a diagnosis of dementia to be made, cognitive impairment as a result of the dementia must interfere with the person’s activities of daily living (Snowden, 1999; Waldemar et al., 2007; World Health Organisation, 1992). Activities of daily living include feeding, bathing, grooming, dressing, activities associated with bowel/bladder/toilet use, transfers (from bed to chair and back), mobility (on level surfaces) and use of stairs, as assessed by the Barthel Index, (BI) (Mahoney & Barthel, 1965). The person’s deficit in this area has a direct impact on the workload of the primary carer (Brodaty, 1996; Eastley & Wilcock, 2005; Snowden, 1999; Waldemar et al., 2007).

1.1.13 Treatments of Dementia

Current treatments for dementia are discussed below in two categories: pharmacological and non-pharmacological.

1.1.13.1 Pharmacological Treatments

Current pharmacological treatment is centred around anti-cholinesterase drugs Donepezil, Tacrine, Rivastigmine and Galantamine however studies indicate their effectiveness in decreasing the symptoms of dementia is minimal (Birks, 2006; Ringman & Cummings, 2006). A study of 24 participants with Binswangers dementia receiving a 24 week course of Donepezil, showed an improvement in cognitive function and immediate verbal recall (Kwon et al., 2009). A study by Moretti, Torre,
Rodolfo, Cazzato and Pizzolato (2008) found a 14-month treatment of Rivastigmine for participants with VaD to be effective in reducing scores in aggression and depression. However, there was no effect in areas of language or cognition. Studies of the anti-cholinesterase drug Galantamine have shown a decrease in the rate of progression of cognitive impairment with some secondary effect on BPSD, but again, no evidence of any improvement in areas of language (Erkinjuntti et al., 2002; Feldman et al., 2001).

Memantine which came onto the market in 2003, is one of a different category of drugs (Ringman & Cummings, 2006). Memantine has shown to provide moderate symptomatic relief from primary functions in moderate to severe levels of FTD, DLB and Parkinsons’ disease (Reisberg et al., 2003). This N-methyl-D-Aspartate (NMDA) receptor blocker results in an increased activation of the neurotransmitter glutamate, promoting cognition (Lippa, 2006; Reisberg et al., 2003). Memantine when taken with Donepezil has shown positive signs of efficacy in the treatment of moderate to severe DAT (Lippa, 2006; Ringman & Cummings, 2006; Waldemar et al., 2007). In Australia however, Memantine is unsubsidised so few patients can afford it financially (LoGiudice, Flynn, & Ames, 2005).

In Australia, anti-psychotic drugs were restricted to clients with a diagnosis of schizophrenia until 2005 when low-dose Risperidone was subsidised for use for patients for behavioural disturbances associated with the dementias (LoGiudice et al., 2005). However evidence suggests that Risperidone can increase the risk of strokes (National Pharmaceutical Society, 2005; Shah, 2006). In fact according to Shah (2006) the UK Committee of Safety of Medicines (CSM) in 2004 recommended against Risperidone usage with dementia due to cerebrovascular risks. Instead, the CSM recommended non-pharmacological treatments as first line treatment. Similar to the UK, administration of Risperidone in Australia is recommended as second line for BPDS. However, a meta-analysis of articles published between 1966 and July 2004 by Sink, Holden and Yaffe (2005) found Risperidone and Olanzapine to be the most effective of the anti-psychotic pharmacological agents, in managing neuropsychiatric symptoms of dementia. In contrast, Schneider, Dagerman and Insel (2005) in reviewing the risk of death with anti-psychotic drugs, found a small risk of
death for dementia clients taking such drugs compared with placebo groups, a risk which must be considered. Non-pharmacological treatments which will be discussed in more detail further in this chapter, are recommended as first line treatments because of the concern of cerebrovascular side effects (National Pharmaceutical Society, 2005).

There have been recent studies using alternative oral treatments (non-pharmaceuticals). Gingko biloba is a plant extract used in Chinese herbal medicine for numerous conditions. It is known however to have an anti-inflammatory and “platelet inhibiting” action (Ringman & Cummings, 2006). Already approved in Germany for the treatment of dementia, the effects of gingko biloba are currently being researched for people with VaD (Ringman & Cummings, 2006). A recent study found 59 people with DAT who had been using gingko biloba for approximately 2.5 years had a significant decrease in the plasma levels of amyloid beta (Aβ) 42 as compared to the cumulative group of non-users (Blasko et al., 2008). As discussed in 1.1.5, this plaque has been connected to DAT (Nelson et al., 2009).

Although anti-cholinesterase drugs are currently the main drugs of choice for DAT, they do not appear to be the answer to decreasing the financial, social and emotional burden of dementia. They are recommended for mild to moderate DAT, but when both their adverse effects and cost effectiveness are weighed up against their therapeutic outcomes, they are not seen as cost effective (Ringman & Cummings, 2006). These drugs can only be prescribed to someone who has been formally diagnosed with DAT.

In summary although some progress has been made in the pharmacological treatments of dementia in recent years, their overall benefits are limited. This lack of efficacy has encouraged the use of non-pharmacological approaches in the treatment of dementia of which will now be discussed in more detail.

1.1.13.2 Non Pharmacological Treatments

The principal aim of non-pharmacological therapies is to decrease the severity of symptoms associated with dementia and to maximise the abilities spared by this
syndrome (Cohen-Mansfield, 2005; Grasel, Wiltfang, & Kornhuber, 2003). Over recent years, there has been an increase in the use of non-pharmacological therapeutic interventions to address the symptoms people suffer as a result of dementia. These include art therapy, diversional therapy, dance and movement therapy, milieu therapy (living environments specifically designed to decrease dementia symptoms), pet therapy, doll therapy, reminiscence, validation (Feil, 1992) and music therapy (Brotons & Koger, 2000; Buchanan, Christenson, Ostrom, & Hofman, 2007; Cohen-Mansfield, 2005; Grasel et al., 2003; Turner, 2005). Studies by Cohen-Mansfield and Werner (1997) and Werner, Cohen-Mansfield, Fischer and Segal (2000) have found the introduction of videotapes of family members addressing the person with dementia and videos simulating the loved one’s presence to have a positive effect of decreasing the agitation on the person with dementia.

Despite the lack of empirical evidence in support of these non-pharmacological interventions (Grasel et al., 2003; Turner, 2005) they are being recommended and accepted as adjuncts to pharmacological measures (National Pharmaceutical Society, 2005; Shah, 2006). In administering conventional, or atypical antipsychotic drugs to decrease the severity of aggression associated with dementia, studies have indicated that not only do these drugs have little desired effect, but that they carry a significant risk of stroke, increase in cognitive decline and increase risk of death (Schneider, Dagerman, & Insel, 2005; Shah, 2006; Sink, Holden, & Yaffe, 2005)

1.1.13.3 Diversional Therapy

Diversional therapy (DT) is an intervention widely implemented throughout the aged care industry. DT professionals aim to optimise the leisure involvement and experience of people with dementia with the primary goal being to facilitate the process of empowerment and enable participants to make choices to meet their lifestyle needs and experiences (Diversional Therapy Association of Australia, 2007). DT programs are individually and carefully planned, co-ordinated and facilitated with the goal to support, challenge and enhance the psychological, social emotional spiritual, cognitive and physical well-being of individuals (Diversional Therapy Association of Australia, 2007). Randall (2005) describes the belief that participation
in meaningful leisure is essential to the well-being of those living in residential settings or attending day centres with particular reference to DT. Activities which are incorporated into DT programmes for people with dementia depend on their existing physical and cognitive ability and can include: craft activities, music activities, reminiscence, pet therapy, games such as bingo, gardening, exercises and travel including visiting the local zoo (Harvey, 2005; Randall, 2005; Sobel, 2001). The importance of providing DT or leisure activities for people in the aged care industry is highlighted by Australian government legislation, which requires that such lifestyle and leisure activities be planned, implemented and evaluated for each individual, including those residents who have dementia (See Appendix) (Department, 2008). In the USA, each nursing home by law has to have an Activity Director, of which the following occupations can be employed: occupational therapists (OT’s), certified occupational therapy assistant (COTA) or a certified therapeutic recreation specialist (CTRS) (Beuttner & Legg, 2011). Diversional therapists are referred to as Recreational therapists in the USA.

In a study by Gigliotti and Jarrett (2005), observational data containing the responses of people with dementia were compared when participating in either horticultural therapy (HT) or DT. DT activities facilitated higher levels of pleasure (t=-3.85, p=.000) and lower levels of interest (t=2.90, p=.009) than the HT activities. Participants did not demonstrate significant differences in active and passive engagement during the two types of activities. A study by Sobel (2001) found 50 subjects with DAT who participated in cognitive stimulation (Bingo) compared to daily 20 minutes of physical activity enhanced performance on the Boston Naming Test (BNT) (Kaplan et al., 2001a). Prior to either of the interventions, the participants scored a mean of 10.68 on the BNT. After participating in Bingo twice in approximately 10 days with pre and post BNT scores, their post BNT scores increased by 2.63 (p,.0001) indicating a 33.9% increase on the BNT. After the exercise intervention there was no increase in the BNT scores, with an improvement of only 0.73 points. Interestingly, other studies have indicated physical exercise leads to improvements in cognitive function in people with DAT (Burgener, Yang, Gilbert, & Marsh-Yant, 2008; Christofoletti et al., 2008; Kwak, Um, Son, & Kim, 2008; Palleschi et al., 1996).

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DT has been used in studies to decrease aggressive behaviours caused by dementia. Whall, Black, Groh et al., (1997) in their study of 31 individuals with dementia had one group assigned to usual bathing control group, and the other to a group where a diversion or distraction base intervention was implemented. This included animal sounds, large bright pictures corresponding to the sounds and offering food. Staff were also instructed to converse with the client about the sounds, pictures and other interventions if they responded positively to them. Aggressive behaviours were measured using the Cohen-Mansfield Agitated Inventory (Cohen-Mansfield, 1996). Although results indicated a positive effect over time, they were not statistically significant. A study by Holmberg (1997) found that a structured walking program for 11 severely demented individuals living in a dementia unit had a 30% reduction in aggressive acts on days when the walking program was implemented. Sival, Vingerhoets, Haffmans, Jansen and Hazelhoff (1997) implemented group activities to manage aggression in 3 individuals with severe dementia. Social, musical and physical activities were implemented twice a week for 4 weeks with mixed results: some aggressive behaviours increased during treatment, and there was some reduction in behaviours during the 4-week post-intervention follow up.

DT studies have pointed towards positive effects on dementia symptoms. However the methodological quality of the studies can be questioned with small sample sizes (Holmberg, 1997; Sival, Vingerhoets, Haffmans, Jansen, & Hazelhoff, 1997) and the absence of non-intervention groups (Sobel, 2001; Whall et al., 1997). Further research in this non-pharmacological intervention for people with dementia is needed.

1.1.14 The brain reserve hypothesis (a possible reason for positive effects of MT on language symptoms of dementia)

The link between brain reserve and the severity of dementia continues to attract interest and debate. The concept of brain reserve, which developed in the 1990s, refers to the ability of the brain to tolerate the pathology of age and disease-related changes without obvious clinical evidence (Fratiglioni & Hui-Xin, 2007; Valenzuela &
The greater the reserve, the more severe pathological changes are needed to cause clinically functional impairment (Fratiglioni & Hui-Xin, 2007).

There are also suggestions that other structural and functional compensations could buffer the effects of dementia. For example, the theory of “cognitive reserve”, where the innate intelligence as well as aspects of life experience may supply reserve in the form of a set of skills or repertoire can assist some people to cope with dementia better than others by using pre-existing experience and/or information (Stern, 2006).

Valanzuela and Sachdev (2006) performed a systematic quantitative review of the medical literature regarding the association between brain reserve and incidence of dementia. They combined studies in which brain-reserve indicators such as education, occupation, pre-morbid IQ and mentally stimulating leisure activity had been used for prediction of incident dementia. Overall data based on over 29,000 individuals was integrated and a high level of consistency was found, with high brain reserve being associated with an approximate 50% reduction in the incidence of dementia.

Another type of brain reserve hypothesis is that of neural reserve, which refers to redundancies within the neural system which may provide an extra cellular supply to replace the brain cells damaged by dementia (Fratiglioni & Hui-Xin, 2007). The Snowdon (1996) study investigating 93 nuns found that a lower linguistic ability at an early age correlated with lower cognitive scores in later life and a higher risk of developing DAT in later life. This reduced reserve capacity may have made them more vulnerable later in life to the consequences of the neuropathology of DAT. This theory of brain reserve may be a contributor to the proposed positive effect of the non-pharmacological interventions on symptoms of dementia that will be discussed further in this chapter.

A review of Music Therapy, the primary non-pharmacological intervention researched in this study will be presented further on in this chapter.
1.2 Language

1.2.1 Definition

Language incorporates speech, comprehension, reading and writing (Bayles & Tomoeda, 1995; Bourgeois, 2002; Hopper & Bayles, 2001).

“Language allows the communication and elaboration of thoughts and experiences by means of culturally defined, arbitrary symbols known as words. The neurologic basis of language is controlled by a network of neocortical areas centred in the perisylvian regions of the left hemisphere of the brain.” (Mesulam et al., 2003).

People with dementia experience language deficits either as a direct result of cognitive impairment that affects memory span or damage to the areas of the brain that form the primary ‘tools’ of language for example phonology, the production of the sounds in language (Bayles & Tomoeda, 1995; Bourgeois, 2002; Haak, 2002; Hopper & Bayles, 2001; Snowden, 1999). A language deficit is not usually the symptom of dementia that leads to a diagnostic assessment. Short-term memory loss is usually the first symptom that leads to investigation (Bourgeois, 2002; Hopper & Bayles, 2001). However as the cognitive impairment increases, so too do the language deficits (Bayles & Tomoeda, 1995; Bayles, Tomoeda, & Trosset, 1992; Haak, 2002; Snowden, 1999).

Contact with other people is an integral part of human experience, with both verbal and non-verbal communication crucial to our inter-personal relationships (Bourgeois, 2002; Haak, 2002). Communication is (p.133) “…the medium through which humans relate to each other in meaningful ways.”(Bourgeois, 2002). Communication can be described as having four functions: 1) expressing wants and needs; 2) exchanging information; 3) maintaining social etiquette and 4) social closeness (Bourgeois, 2002). The loss of verbal communication, that is language, the most common form of communication with others, can result in “isolation and deprivation of people”(Haak, 2002). Retaining a person’s communication skills in
particular verbal skills is vital to their social and physical health (Haak, 2002; Spilkin, 2003; Tomoeda, 2001).

1.2.2 Anatomy and physiology of language parts of the brain

Wernicke’s area is a region in the temporal-parietal lobe of the cerebrum which plays the role of understanding oral language (Harpaz, Levkovitz, & Lavidor, 2009; Tanner, 2007). Originally, Wernicke in 1874 (cited in Harpaz et al., 2009) argued that language was mainly in the left hemisphere of the brain which is till the case today (Harpaz et al., 2009).

Based on the work of Pierre Paul Broca in (1865), the left hemisphere was identified as the area of the brain where speech was thought to be produced. This area was subsequently termed “Broca’s area.” However with further studies and improvement in brain imaging technology, it is now known that speech and language processes involve discrete regions of Broca’s area (Dronkers, 1996; Dronkers, Plaisant, Iba-Zizen, & Cabanis, 2007) and interacts with other areas for language comprehension (Friederici & Kotz, 2003).

1.2.3 Connecting the music and language areas of the brain

Is there a connection between the music and the language part of the brain? Research in this area is still debatable. Peretz, Gagnon, Hebert and Macoir (2004) argue that when it comes to brain damage, music processing is spared because it is “computationally less complex” or more primitive than language. However, there are cases of amusia without aphasia (Peretz, Belleville, & Fontaine, 1997), where due to brain surgery a woman could no longer recognise music or even carry a tune, but was fully functional in language, memory and intelligence. Conversely, there is a reported case of the composer Shebalin who suffered a stroke with aphasia but without amusia (Luria, Tsvetkova, & Futer, 1965), who subsequently composed 14 chorales, 2 sonatas, plus many other works and taught music until his death despite having no speech.
There is a common theory that people who cannot speak due to damage to the left side of the brain can sing (Smith, 1986; Yamadori, Osumi, Masuhara, & Okubo, 1977). The explanation according to Cadalbert, Landis, Regard and Graves (1994) is that there are two cerebral pathways to word articulation: the left hemisphere and through the right hemisphere via singing. Jeffries, Fritz and Baum’s (2003) study gives some support to this theory. Normal participants were scanned while speaking or singing words to a familiar song. Results showed an increase in activity in the left hemisphere during speaking relative to singing, and an increase in activity in the right hemisphere during singing when compared to speaking. However the singing involved the lyrics, whereas in the control condition lyrics were not included. In contrast, Hebert, Racette, Gagnon and Peretz’ 2003 study found no evidence that singing promoted word intelligibility.

Another study that linked singing to improvements in language investigated the factors that contributed to the decrease in stuttering during singing (Healey, Mallard III, & Adams, 1976). Eight male stutterers were asked to in Step 1: read out aloud a set of familiar lyrics then sing them. In Step 2 they were then asked to read out aloud a set of unfamiliar lyrics, then asked to sing these lyrics to the conventional tune of the same song. Results from the audiotapes showed that there was significant decrease in stuttering in Step 1 as compared to Step 2. Although these results indicate a clear connection between singing and a decrease in stuttering, results also indicate a clear connection between a decrease in stuttering and a familiarity with the lyrics.

1.2.4 Language deficits in dementia

Language deficits for people with dementia pose significant challenges to communication. Misunderstanding particularly in the early stages of dementia is an early signifier of language dysfunction. For example, a person may use clear but inaccurate words or statements as a result of memory impairment (Hopper & Bayles, 2001). It is at this stage that the person is misunderstood, misinterpreted and often taken literally (Bourgeois, 2002). Sometimes it is not until the person starts to have
difficulty pronouncing the actual words that the carer realises that something might be wrong and seeks professional help (Bourgeois, 2002; Haak, 2002).

The progression of language decline in dementia has been described as hierarchical (Emery, 2000; Hopper & Bayles, 2001) that is, the language abilities related to higher cognitive abilities deteriorate first, leaving the more basic language functions relatively intact. However, Bourgeois (2002) has highlighted that some language abilities such as the use of correct syntax, rely on higher cognitive functions and are relatively spared up until the moderate stage of dementia. Language deficits tend to be specific and different for each dementia subgroup as discussed previously.

Language deficits cause breakdown in communication between the person with dementia and their carers/family, causing stress, frustration and anxiety (Bourgeois, 2002; Brodaty, 1996; Haak, 2002). In the residential aged care setting, a breakdown in communication between the resident and staff can significantly increase resident stress.

1.2.4.1 Causes of language deficits in dementia

1.2.4.1.2 Physical/Educational

Snowdon, Kemper, Mortimer, Greiner, Wekstein and Markesbery (1996) studied 93 religious nuns who made handwritten autobiographies upon entering the order. The researchers explored the relationship between linguistic ability in early life and cognitive function, and neuropathologically confirmed DAT in late life. This study suggests that low linguistic ability was a strong predictor for cognitive deficits and DAT in later life.

A person with dementia can experience co-morbid factors that impede their maximum language capacity such as hearing loss, visual impairment, low pre-morbid educational level and cultural barriers as well as deficits in perceptual tasks (Hopper & Bayles, 2001; Moorhouse, 2005).
1.2.5 Language deficits and memory loss

Over the past decade, there have been conflicting ideas as to what role memory loss plays in language deficits for people with dementia (Henry, Crawford, & Phillips, 2004; Moorhouse, 2005), but a consistent factor is that memory (in particular semantic and working memory) plays a key role in language ability. In order to have functional language, memory ability must be in working order (Bourgeois, 2002; Hopper & Bayles, 2001; Hopper, Bayles, & Tomoeda, 1998). The connection between memory loss and language deficits associated with dementia (of various types) will now be discussed in more detail.

Memory, defined by Hopper and Tomoeda (1997) refers to “…stored representations and the processes of encoding, consolidation and retrieval through which knowledge is acquired and manipulated” (cited in Hopper and Bayles, 2001). Short-term, or working memory enables us “…to form intentions, hold incoming stimuli in consciousness, rehearse received input, activate and access stored knowledge, interpret stimuli, monitor expression and plan action.” (Bayles, 2003, p. 210). Working memory accesses sensory information from the environment and information from the long-term memory (Bayles, 2003; Belleville, Peretz, & Malenfant, 1996; Hopper & Bayles, 2001). Damage to working memory in people with DAT results in language deficits such as decreased concentration span and in particular limited ability to search and retrieve stored linguistic information (Bayles, 2003). Studies have confirmed that people with DAT maintain linguistic knowledge throughout most of dementia disease course, and that it is the difficulty retrieving this information which causes the language deficits (Bayles, Tomoeda, Cruz, & Mahendra, 2000; Bayles, Tomoeda, Kaszniak, & Trosset, 1991; Bayles et al., 1992).

However, some studies suggest that dementia causes the breakdown of semantic knowledge (or linguistic knowledge) which in turn causes the language deficits, rather than the retrieval process. For example people with DAT perform poorly on category fluency tasks compared to letter fluency tasks (loss of knowledge rather than a retrieval problem) (Fisher et al., 2004; Hodges, Salmon, & Butters, 1992).
Long-term memory is categorised into three types 1) semantic 2) lexical and 3) episodic memories (Chertkow & Bub, 1990; Hopper & Bayles, 2001).

1) Semantic memory memory can be defined as memory containing “the permanent representation of our knowledge of concepts, of words and their meanings and in essence our knowledge of the world” (Chertkow & Bub, 1990). Semantic memory functions to recognise objects, retrieve their labels and gain access to the meaning of words during reading. It includes the mechanisms by which our knowledge is retrieved and converted into words for speaking at a rapid pace (Chertkow & Bub, 1990). Lubinski (1995) describes semantic memory as comprising general knowledge, rules and procedures that are highly overlearned and essentially context-free, for example the alphabet and rules of arithmetic.

2) Lexical memory, (a component of long-term memory) is the knowledge for actual words (Hopper & Bayles, 2001) used in everyday language and communication.

3) Episodic memory refers to the autobiographical memory, i.e. the storing of information or events that remain very similar to the context in which they were originally stored e.g. last week’s football scores (Hopper & Bayles, 2001; Lubinski, 1995).

As discussed in this chapter, dementia and its subtypes result in language deficits causing great anxiety to both the person with dementia, family and carers. Dementia causes interruption to the semantic and working memory, which play a key role in language ability. Music Therapy in relation to its role and effect on language deficits associated with dementia will now be discussed in detail.
1.3 Music Therapy

1.3.1 Definition (and goals)

The goals of music therapy (MT) for the person with dementia are centred on the symptomatic deficits resulting from dementia and include: reducing social withdrawal/isolation, reducing BPDS, decreasing symptoms associated with depression, improving self-esteem and maintaining mental and physical abilities (Ledger, 2005). MT is defined as “…an allied health profession practiced throughout Australia and in more than 40 countries around the world. It is the planned and creative use of music to attain and maintain health and well-being and may address physical, psychological, emotional, cognitive and social needs of individuals within a therapeutic relationship.” (Australian Music Therapy Association, 2006). In the aged care field, the definition of MT is similar to the one stated previously, with emphasis on meeting physical and emotional needs of the person (Ledger, 2005).

1.3.2 General background

The MT methods used in aged care (including people with dementia) shown to be effective in studies, include listening to long-term familiar songs (Clair, 1996; Gerdner, 2000; Gerdner & Swanson, 1993; Pollack & Namazi, 1992), singing (Brotons & Koger, 2000; Clair, 1996; Smith, 1986), instrument playing (Clair & Bernstein, 1990b; Clair, Bernstein, & Johnson, 1995), dancing, movement to music (Brotons & Pickett-Cooper, 1996; Van de Winckel, Feys, De Weerdt, & Dom, 2004) and reminiscing using music (Ashida, 2000). MT studies have also indicated effectiveness in decreasing aggressive behaviours resulting from dementia (Clark, Lipe, & Bilbrey, 1998; Svansdottir & Snaedal, 2006).

Studies have shown that certain MT methods are more effective than others as the level of dementia progresses (Clair, 1996; Svansdottir & Snaedal, 2006). For example, when the person may be unable to speak due to moderate to severe dementia, they may still be able to move rhythmically to music. If unable to move spontaneously,
they will readily move if someone takes their hands and moves rhythmically with them (Clair & Bernstein, 1990b; Clair et al., 1995). As dementia progresses, the person loses the ability to read (Haak, 2002). When this occurs, singing songs using printed lyrics (which may have been used when the client’s dementia level was mild), is no longer appropriate. However it is possible to use the singing of familiar songs, that is, songs that were well learnt in the person’s earlier life, where reading lyrics is not required (Prickett, 2000; Whitcomb, 1994).

MT is a non-pharmacological treatment that has been shown to decrease agitation (Brotons & Pickett-Cooper, 1996; Gerdner, 2000; Guetin et al., 2009; Ledger & Baker, 2007; Svansdottir & Snaedal, 2006), depression (Ashida, 2000; Brotons & Koger, 2000; Holmes, Knights, Dean, Hodkinson, & Hopkins, 2006), improve memory (Prickett & Moore, 1991) and decrease social isolation (Lord & Garner, 1993; Pollack & Namazi, 1992). A study by Gregory (2002) found that 20 people with cognitive impairment (from stroke, depression, DAT and dementia) maintained attention listening to music across a 3.5 minute structured listening activity designed specifically for that elderly population. MT has been shown to significantly decrease BPSD’s of dementia in a group of 59 participants in residential facilities with moderate to severe dementia (MMSE 11/30), indicated by the significant decrease in the global NPI score after week 8 (p=0.003) (mid treatment) and week 16 (p<0.0001) (end of treatment) (Raglio et al., 2008). Interestingly, there appeared to still be an effect of MT over time on the BPSD’s 4 weeks post intervention according to the NPI (p=0.007). This study excluded any person with dementia who had just commenced any psychotropic medications. However, it would have been interesting for the study to mention the number of participants who were already taking psychotropic medications. Another study (Choi, Soo Lee, Cheong, & Lee, 2009) indicated MT decreased agitation associated with dementia also using data generated from the NPI (Cummings et al., 1994) as did the study by Raglio et al., (2008).

As discussed MT has shown to have positive effects on many symptoms of dementia. However, the majority of these studies have been designed to focus on the short-term effect of MT and not the long-term effect, with no data collection at a significant time following the cessation of the MT intervention. However there have
been studies looking at the effect of MT on people with dementia over a significant period of time. Ledger and Baker’s (2007) study found MT decreased levels of agitation immediately after the sessions but this effect was not maintained over a 12 month period. Over a period of 2 years, Takahashi and Matsushita (2006) found an increase in the systolic blood pressure of the control group of people with dementia (n=14) (p=<.05), but there were no significant differences in the salivary cortisol levels of the control or the intervention group (n=18).

Research studies have indicated that songs of early adult years are the most effective for people with dementia (Bartlett & Snelus, 1980; Clair, 1996; Gerdner, 2000; Hueichuan & Chang, 2005; Moore, Staum, & Brotons, 1992) than music in the later years of their life. Other studies have shown that the music most listened to by people over the age of 60 is also music of their early adult years (Bartlett & Snelus, 1980; Moore et al., 1992). Results from MT studies have indicated that using songs from a person’s long-term memory are more therapeutically effective than using non-familiar music (Gerdner, 2000). In Gerdner’s (2000) study comparing individualised music and relaxation music, she found that the most common music chosen by the person with dementia or the family member was music retained in long-term memory such as Glen Miller, Perry Como and Patsy Cline and this music was more successful at decreasing agitated behaviours than classical relaxation music.

An important aspect of MT is the provision of planned music played live by the therapist for a therapeutic purpose, as opposed to using pre-recorded music. The majority of research studies in the field of MT and dementia have incorporated live familiar music as opposed to pre-recorded music (Cevasco & Grant, 2006; Clair & Bernstein, 1990a; Groene, 2001; Holmes et al., 2006; Moore et al., 1992; Pollack & Namazi, 1992; Quinn, 2003; Whitcomb, 1994). The advantages of playing live music are that: 1) the key of the song can be altered to suit the pitch of the person/s with dementia (Prickett & Moore, 1991) and 2) the tempo of the song/s can also be altered if the person with dementia is having difficulty articulating the words due to the speed of the song (Moore et al., 1992). Studies have also shown live interactive familiar music to have a more immediate and more engaging effect on people with
dementia than pre-recorded familiar music (Brotons & Pickett-Cooper, 1996; Cevasco & Grant, 2006).

Another important part of the MT process is assessing the ongoing therapeutic intervention to see if the participant’s responses increase/decrease or stay the same over time (Clair, Mathews, & Kosloski, 2005). It is also important to know if the songs and MT techniques used are effective, or if certain MT techniques are more effective than others depending on the type and level of dementia. Such assessments ensure that the participants are receiving the best quality of MT session possible (Clair et al., 2005).

In capturing the effect of MT, some studies have utilised physiological indexes with results indicating a positive effect of MT. Takahashi and Matsushita (2006) observed the change in salivary cortisol levels at the first and second year of weekly MT sessions. The results in the cortisol level slightly increased in the non MT group over the 2 years, but slightly decreased in the MT group over the same time period indicating that the stress levels were decreased in the MT group. A study in 1999 found there was a significant increase in serum melatonin levels (indicating a more relaxed state) after MT sessions at the 6 week follow up stage in 20 male inpatients with AD (Kumar et al., 1999). Suzuki, Kanamori, Watanabe, Nagasana et al., (2004) measured salivary chromogranin A (CgA), (a measurement of psychological stress, not physical stress), finding levels of CgA decreased significantly (p=0.048) in the 10 elderly participants with dementia in response to MT, indicating a decrease in psychological stress. Ridder (2003) found that singing significantly decreased the heart rate (HR) of a person with advanced stages of FTD who participated in 20 daily individual MT sessions that lasted 20 to 30 minutes. The HR was measured daily for 30 minutes the week before MT and then again four weeks with MT. The results found that the client’s HR decreased significantly (p<0.001) after a month with individual MT. Similar results were documented in 5 out of the 6 cases of Ridder’s 2003 study. Although the current study does not collect physiological data, the study in which it is embedded measures the participants’ EEG waves to determine if MT and DT improve the dementia related cognitive deficits. With cognitive deficits directly connected to memory deficits which result in language difficulties (Emery,
2000; Hopper & Bayles, 2001) the results of the study in which this study is embedded will be interesting.

MT studies have shown a positive effect on cognition with people with dementia in areas of preservation of musical skills (Beatty et al., 1988; Crystal, Grober, & Masur, 1989), improving their concentration span (Clair & Bernstein, 1990b) and to improve language deficits, as will be discussed in further detail below. Interestingly, Lipe, York and Jensen (2007) looked at assessing music cognition in non-trained musicians using the Residual Music Skills Test (RMST) (York, 1994) and the Music-Based Evaluation of Cognitive Functioning (MBECF) (Lipe, 1995) and correlating the scores with the cognitive assessment tool the MMSE (Folstein et al., 1975) with 50 people with dementia. All three tools were found to have a strong relation with each other. A study by Bruer, Spitznagel and Cloninger (2007) found MT significantly improved by 2 points on the MMSE (Folstein et al., 1975) scores immediately after the MT intervention (for 8 weeks) in 17 people with formal diagnoses of dementia, with an average improvement of 3.69 points (p<.01) on the MMSE (Folstein et al., 1975) the morning after the intervention (p<.001) compared to the control group. However by the following week, there was no cognitive difference between the MT and the control groups, indicating that the MT effect on the cognition had receded by the time the MMSE was performed a week post intervention (Bruer, Spitznagel, & Cloninger, 2007).

1.3.3 Music Therapy and language deficits

MT has shown to have a positive effect on aspects of language. One such study (Brotons & Koger, 2000) indicated a significant improvement (p=<.01) in the speech content and fluency subscales of the Western Aphasic Battery (WAB) speech subscale for 20 participants with dementia. Another study (Van de Winckel et al., 2004) demonstrated an improvement in a subscale of speech fluency in response to music. This RCT involved 15 clients with moderate to severe dementia receiving 30 minute daily exercise and music sessions for 3 months. Positive results in the area of speech fluency were obtained from the ‘fluency’ subscale of the Amsterdam
A study by Cohen (1993) examined the effect of singing and rhythmic (verbal) instructions on the rate of speech and verbal intelligibility on neurologically impaired people (n=32) with diagnoses including Cerebral Vascular Accident (CVA), multiple sclerosis (MS), cerebral palsy and Parkinson’s disease. The singing instruction intervention included breathing exercises, vocal exercises and group singing of familiar songs. The rhythmic interventions included rhythmic imitation, vowel production, functional sentences and mono/polysyllabic word formation. Although there were no subjects with dementia in this study, it is noted that there was a significant improvement of verbal intelligence in the “singing” group (F= 4.43, p=.022), with a decrease in verbal intelligibility for both the rhythm and the control group. The verbal intelligibility scores were based upon a picture description task (Cohen, 1993). Data was collected pre and post the 9 week intervention, looking at the accumulative effect of these interventions.

Another related study (Pollack & Namazi, 1992) found a 24% increase (p<.001) in social interaction (verbal and non-verbal interaction between fellow residents and staff) in eight male residents with moderate to severe dementia following six
individual MT sessions. Data was collected by the MT 15 minutes immediately prior to and after each session, by observing each of the 8 participant’s behaviours. The tool used, as described the researchers, was a 26-item behavioural checklist based on the social and non-social behaviours observed by the 8 participants with dementia. No references were given for the checklist, so it is presumed that Pollack and Namazi created the checklist for the specific purposes of the study. Results indicated a significant increase in verbal feedback during the MT sessions, with participants expressing pleasure during the session with increased eye contact. There was also an increase in social behaviours immediately after the sessions (20%-22%), and a decrease in non-social behaviours immediately after the sessions (14%). Despite the positive results, it must be noted that the MT had dual roles as clinician and researcher, collecting the pre and post data for analysis and results. The rigour of the study therefore is in question.

Positive effects on dementia related language deficits emerged from the study by Groene II (2001). This study showed that group behaviour among persons with dementia (n=8) was significantly different before and after familiar song singing, which was presented in four randomly assigned styles. There was significantly more reading of lyrics, attention to songs, compliments given after the songs and applauding after complex live accompaniment compared to simple live accompaniment. Groene II (2001) speculates that the extra rhythm in the complex accompaniment may have contributed to these results.

Quinn’s 2003 study consisted of 12 weekly individual MT sessions with people (n=7) with dementia in the home setting, with the carer present in the room. Data was collected by an aged care nurse specialist who was not aware of any of the possible effects of MT on dementia MT, pre week 1, mid way at week 6 and post sessions at week 12. Participant data was collected using the dementia Quality of Life tool (dQoL), (Brod, Stewart, Sands, & Walton, 1999), the MMSE (Folstein et al., 1975) and the GDS (Yesavage et al., 1983). Data from the carer was collected from a ‘carer questionnaire’ and ‘carer log book’, both designed by Quinn (2003) to generate feedback from the carers on how the MT sessions affected them, and what effects the MT sessions had on the participants in the areas of cognition, mood, behaviours
and communication. The quantitative data showed little effect of MT on the dQoL (Brod et al., 1999) of the participants. However, the qualitative data from the carer questionnaire indicated an improvement in the participant’s spontaneous speech during and immediately after each of the MT sessions. According to all 6 carers who completed this question, all six clients’ spontaneous speech was more lucid and they initiated more orientated conversation by the end of the 12th MT session.

As dementia progresses, so do the language deficits such as speech and thus difficulty in naming people and objects (Bourgeois, 2002; Haak, 2002). Therefore Carruth’s (1997) study is an important one in addressing the effects of MT on language subtypes such as naming. Fourteen individual sessions were carried out, the first seven being without music, and the last seven with music (singing of familiar songs, with new words). At the beginning of each session, a photo of a staff member that the participant was familiar with was presented to them and they were given certain time periods to name the person. Scoring was based on how many time intervals they could correctly name the person in the photo, for example 5 seconds, 10 seconds, and 20 seconds, to minutes, to one day. The percentage of correct responses was determined by dividing the number of correct responses by the total number of responses for each subject on each time interval. Due to the small sample size (n=7) data was not analysed. Instead, average percentages suggested that MT was more beneficial for 4 of the 7 participants in retrieving the names of the staff members.

As seen above, consistent positive effects of MT methods on dementia related language deficits have been demonstrated in areas of both speech content and fluency (Brotons & Koger, 2000), speech fluency (Quinn, 2003; Van de Winckel et al., 2004), naming (Carruth, 1997), social engagement (Groene, 2001; Pollack & Namazi, 1992; Suzuki et al., 2004) and overall language improvements (Smith, 1986). However there are methodological weaknesses in these studies, such as the use of only subscales of validated language and cognitive tools (Brotons & Koger, 2000; Smith, 1986; Van de Winckel et al., 2004), the process of randomisation (Van de Winckel et al., 2004) and the absence of a control group (Brotons & Koger, 2000; Carruth, 1997; Quinn, 2003; Smith, 1986; Smith et al., 2008; Suzuki et al., 2004). It is
therefore the aim of the current study determine if MT interventions can improve dementia related language deficits in an RCT study using complete and validated language tools.

Specific MT methods have been used in studies focused on the effects of language deficits resulting from dementia. These methods will now be discussed in more detail. In Smith’s (1986) study, each client was greeted individually in the group setting. After each familiar song selected by the researcher, the participants were asked questions that pertained to the song lyrics or circumstances they described, thus encouraged to engage in conversational speech. At least one song from each life stage was used so that each participant related to at least one song, thus being able to engage in spontaneous speech. Music, movement and clapping were also supported. Hand clapping and swaying in time to the music was encouraged and modeled by the assistant. The sessions ended with the same song “Let me call you sweetheart” and “He’s got the whole world” and “good-bye” to each subject individually. Each person thanked and goodbye said individually.

Similar to Smith’s 1986 study, the study by Brotons and Koger (2000) had a focus on spontaneous speech in response to reminiscence to familiar songs, facilitated by the experimenter. Songs were chosen from topics such as animals, flowers and spring. Songs were sung with guitar accompaniment. The studies by Pollack and Namazi (1992) and Suzuki et al.,(2004) focused on improving the social interaction of people who had moderate to severe levels of dementia. The MT methods used in both studies, such as reminiscence, did not encourage as much verbal input from the participants as the previous two studies (Brotons & Koger, 2000; Smith, 1986), instead included music and movement, singing, vocalising, whistling, dancing and playing hand percussion instruments or piano. The results of Pollack and Namazi’s study indicated that MT improved the non-verbal social interaction (gesture, touch, smile and humming) of people with moderate to severe dementia within a group setting. Suzuki et al.’s 2004 study indicated a significant improvement in verbal fluency (p=0.012).
Quinn’s 2003 study contained 12 weekly individual sessions that had a focus on verbal interaction between the participants and the researcher in the MT methods similar to other studies previously mentioned (Brotons & Koger, 2000; Pollack & Namazi, 1992; Smith, 1986). The study by Van de Winckel et al., (2004) showed an increase in cognitive function \( p=0.0001 \) and verbal fluency \( p=<0.05 \) in participants with dementia \( n=25 \) using an intervention of music and exercise for three months with no focus on triggering spontaneous language. Thus there are studies with and without verbal stimulation that have had positive effect on verbal fluency.

Despite limited statistical evidence for the effect of MT on language deficits and communication of people with dementia, MT associations report that MT has had positive effects in the areas of communication (Association, 2007a; Association, 2007b). In America in 2007, geriatric facilities were second (15%) to children’s settings (18%) in employing the highest number of music therapists (American Music Therapy Association, 2007). Such data is not currently available in Australia.

### 1.3.4 Music Therapy Research Designs

There are various ways to look at evidence from research studies of MT and dementia. As with other non-pharmacological interventions to date, the methodological quality of the studies has been claimed to be poor (Vink, Birks, Bruinsma, & Scholten, 2007). It is important to keep in mind however that despite the small sample sizes, the majority of the MT studies have claimed very positive effects and have recommended similar studies on a larger scale to obtain statistically viable results. In other words, such studies can be looked at as ‘benchmarks’ for future studies with more improved research designs, based on their recommendations. In their review of MT literature in dementia Sherratt, Thornton and Hatton (2004), in acknowledging the methodological weaknesses of recent MT studies in dementia, compliment the wide range of MT applications.

The other aspect that needs to be addressed is the difficulty of recruiting and maintaining significant numbers of people with dementia to maintain a viable
quantitative MT study. The dementia population suffers not only from an incurable syndrome, but from one that is continually progressive, causing an increase in severity of the symptoms such as cognitive impairment, language deficits and BPDS’s (Grabowski & Damasio, 2004; Waldemar et al., 2007). Therefore researchers in this field are continuously faced with a population of potentially unstable symptoms (with the majority having other co-morbidities). That is where studies using a mixed methods approach, that is a combination of quantitative and qualitative data have become increasingly useful in the field of MT research in dementia, as they can capture both numerical and descriptive data. Studies such as Quinn (2003) and Ridder (2009) have incorporated both quantitative and qualitative data. Both quantitative and qualitative research each have their roles in the field of MT, each capturing data that the other may not be able to.

Another important aspect to consider in the field of MT dementia research is the increasing demand for MT researchers to provide an evidence based medicine framework (EBM), that is, stepwise levels of evidence as follows:

Level 1: Evidence obtained from a systematic review, or meta-analysis of all randomised control trials.

Level 2: Evidence obtained from at least one well designed randomised control trial.

Level 3: This level is broader, but refers to studies that have used comparative methods, but don’t have to be properly designed randomised control trials.

Level 4: Evidence obtained from case studies, either post-test only, or both pre and post test (Edwards, 2002).

These recommendations prioritise RCTs as the most important form of a body of evidence. However, the RCTs looking at the effect of MT on the symptoms of dementia have been hampered by small number sizes, as they are faced with substantial challenges in recruitment, maintaining participants until final data collection, and blinding assessors to condition when research is conducted in small facilities for people with dementia. This is where qualitative dementia research can play an important role in providing evidence, where small number sizes are not a key issue. It is hoped that there is an increased demand for MTs to provide a
combination of qualitative and quantitative research as evidence of MT effects on dementia related symptoms in the medical industry, rather than RCT studies alone as described by Edwards (2002).

It is also important to acknowledge that researching the effects of MT interventions on people with dementia is very difficult, by nature of the continual increasing severity of the dementia symptoms such as cognitive deficits (Grabowski & Damasio, 2004; Waldemar et al., 2007). Because of the deteriorating nature of dementia, it is often difficult to “maintain” participants in studies. Due to their deteriorating health, they may withdraw from the study or are admitted to an acute facility (Quinn, 2003). Many studies reported difficulty in obtaining sufficient participants in their studies, due to symptoms of dementia for example client ineligibility and the participants’ ailing health (Ashida, 2000; Brotons & Koger, 2000; Pollack & Namazi, 1992; Quinn, 2003). As highlighted by Quinn, (2003) lack of sufficient recruiting time is another factor that can influence the number of participants able to be recruited and can impact on the length of time available to provide the intervention.

1.3.5 Summary

Dementia can have a devastating effect on a person’s speech, as it progresses. With pharmacological interventions showing little effect on dementia deficits, MT studies have indicated that MT can improve verbal fluency, social interaction, verbal intelligence and face/name recall. However the data generated from these studies have been from language subscales rather than validated tools totally designed for language assessment. There is currently no study that looks at the effect of MT on speech deficits of people with dementia using a complete validated tool that is designed just to assess speech, in particular naming. This leads the author to the following two hypotheses that are the basis of the current study:
Hypothesis 1: A programme of MT will result in greater improvement in dementia-related spontaneous speech deficits (in particular naming), than a program of DT in patients in a sub-acute hospital setting.

Hypothesis 2: A programme of either MT or DT will result in a reduction in dementia-related spontaneous speech deficits (in particular naming) compared to a NI (control) group.
CHAPTER 2

METHOD

This chapter describes the research design, its rationale and process of research conduct, followed by a description of participants, clinical settings and apparatus is provided. The next section describes the MT intervention, including the MT protocol that comprised seven steps. In order to evaluate the results outcome measurements and outcome variables are explained. Lastly, information regarding the statistical methods used in the analysis of data of the study is provided.

2.1 Research Design

This single blind randomised controlled study was embedded within a larger study conducted at the National Ageing Research Institute (NARI) in Parkville, Melbourne, titled “Evaluating the therapeutic effects of MT interventions on hospitalised people with dementia.”

The larger study recorded electroencephalographic (EEG) data along with neuropsychological, cognitive, psychological and behavioural data. The language specific tools for the current study were implemented six months into the data collection phase of the larger study. However, this study had access to all data from the commencement of the data collection phase, with exception of the EEG data, which was the specific focus of that particular study. Both this and the larger study were undertaken using the same resources. Consistent with the goals and design of the study, the data recorded were quantitative to enable statistical analysis.

Hypotheses:

Hypothesis 1. A programme of MT will result in greater improvement in dementia-related spontaneous speech deficits (in particular naming), than a program of DT in patients in a sub-acute hospital setting.
Hypothesis 2. A programme of either MT or DT will result in a reduction in dementia-related spontaneous speech deficits (in particular naming) compared to a NI (control) group.

2.2 Context for the study

This study was carried out simultaneously in two sub-acute dementia specific rehabilitation hospital settings in Melbourne, each connected to a major public hospital. The following is a description of the two major hospitals, the sub-acute hospital settings and the specific dementia wards respectively.

2.2.1 The Royal Melbourne Hospital

The Royal Melbourne Hospital (RMH) is one of Australia’s leading public teaching hospitals, operating across two campuses, the city campus and the Royal Park Campus, both in Parkville, approximately 2 kilometres from each other. The RMH city campus provides specialist, general medical and surgical services, including cardiac, neurology and oncology, as well as providing a major trauma service and Victorian Infectious Diseases Service. The RMH is affiliated with many leading teaching Universities, including the University of Melbourne, La Trobe University and Royal Melbourne Institute of Technology University (RMH, 2009).

The RMH Royal Park Campus (RPC) provides sub-acute care for the Royal Melbourne Hospital, including aged care, rehabilitation, ambulatory care (medical care given to people who are not ambulatory on an outpatient basis), residential and community services. RPC provides specialist services to inpatients, outpatient community outreach programs and residential care. People are admitted to the RPC from the RMH, other acute hospitals or directly from the community, after they have been assessed as requiring further treatment in an aged care or rehabilitation facility. The RPC contains many services, including pain management services, a continence clinic, falls and balance clinic, wound management clinic, cognitive, dementia and memory service (CDAMS), neurology rehabilitation clinic, amputee clinic and geriatric evaluation services. RPC has strong links with major teaching and research
institutions including the University of Melbourne, La Trobe University, Kangan Technical and Further Education (TAFE) and NARI.

The AC1 ward of the Royal Park Campus is a 16 bed dementia specialty rehabilitation unit from which the majority of the recruitments from RPC occurred. The majority of clients are admitted to this ward from the RMH city campus with issues such as deterioration of dementia (for reassessment), falls for investigation, urinary tract infections (UTI’s), delirium and increase in difficult behaviours associated with dementia. Some of the admissions to the AC1 ward occur directly from home or an aged care facility, due to staff or family not coping with the increase in difficult behaviours associated with dementia such as wandering, verbal and/or physical aggressiveness. The average stay on this ward is 10 weeks. With the provision of nursing, medical and allied health staff on the ward, the person with dementia's optimum physical and cognitive health is reached, and where necessary, appropriate permanent accommodation is found in consultation with family/next of kin (RMH, 2009).

With the increasing prevalence of dementia, wards AC2 and AC3 at RPC accommodate the overflow of dementia patients from AC1 ward. When this occurs, these wards are secured as needed, with the patients receiving the same medical and allied services as the patients on AC1 ward. These patients on the AC2 and AC3 ward were included in the recruiting process for this study, with each ward containing 24 beds.

2.2.2 St Vincent’s Hospital

St Vincent’s public hospital is part of Australia’s largest not-for-profit health services, St Vincent’s Health Australia. St Vincent’s Melbourne provides acute medical and surgical services, emergency and critical care, aged care, diagnostics, rehabilitation, allied health, mental health, palliative care and residential care. St Vincent’s is one of the leading teaching, research and tertiary health services (SVHM, 2009).
St Vincent’s hospital has two other campuses, Caritas Christi for people who are palliative and St Georges Health Service (SGH). SGH located in Kew is approximately six kilometres from the St Vincent’s city campus. SGH provides a comprehensive aged care service including inpatient care, evaluation and management, residential aged care, rehabilitation, acute psychiatry as well as a broad range of community based assessment and treatment services.

The Ellerslie Unit in SGH is a 26 bed dementia specialty unit. The admissions intake to this ward is very similar to the AC1 ward, with the majority of admissions occurring from St Vincent’s hospital, with some originating from the community setting. The average stay for clients in the Ellerslie Unit is approximately 10 weeks. Similar to the AC1 ward, the purpose of this ward is to assess and evaluate the client’s mental, medical, social, emotional and physical state in relation to their dementia, to determine the most appropriate permanent accommodation for them. These clients also receive allied health services with the aim to improve their physical and emotional state to a maximum level to promote quality of life (SVHM, 2009).

2.2.3 The National Ageing Research Institute (NARI)

The study was undertaken at NARI. Established in 1977, NARI is an independent not-for-profit research institute and affiliated with Melbourne Health and The University of Melbourne. NARI is situated on the Royal Park Campus of the Royal Melbourne Hospital (See Appendix 1). NARI currently employs over fifty staff and at any one time manages between 20 to 30 research projects from public, preventative and clinical health perspectives. The research projects range from large competitive government projects to commissioned and self-initiated research. NARI’s funding is mainly derived from competitive government and other grants, and also receives a small amount of infrastructure funding from the Victorian Department of Health Service (DHS). NARI publishes in many national and international journals. This organisation also provides education and training to both workers in the ageing field and to students at an undergraduate and post graduate level (NARI, 2010 ).
Data for this study was collected on the wards or in a NARI research laboratory (See Appendix 1).

2.3 Research ethics

The larger study and the current study were approved conjointly by two research ethics committees: Mental Health Research and Ethics Committee, of the Melbourne Health Network and St Vincent’s Health Human Research Ethics Committee (see Appendix 2 for copies). Data were managed and stored in accord with procedures mandated by Melbourne Health, St Vincent’s and Monash University Ethics committees (See Appendix 2). A further amendment notifying both committees that the language tools would be added to the list of tools administered to the participants was approved for the current study (see Appendix 3).

2.4 Research Costs

The study was study funded by a grant from the J.O. and J.R. Wicking Trust to the National Ageing Research Institute. The author was jointly funded by a stipend from NARI and a Scholarship from “TIME for dementia”, the Victorian and Tasmanian Dementia Training Study Centre for Health Professionals (See Appendix 4).

2.5 Research staff

The staff consisted of a chief investigator (CI), a 0.06 EFT research assistant (RA) a MT (the author) and two DTs (one at each dementia unit). Professional interpreters were engaged via hospital protocols as required during data collection. The CI and the RA who undertook data collection were blinded to the interventions received by the participants.
2.6 Consent
Consent was obtained according to the protocols specified by the two ethics committees. Before the researchers approached potential participants, medical staff informed patients and their next of kin (NOK) that the study was being undertaken and referred the research staff to those who had agreed to be approached by the researchers for the purpose of providing full information about the study and inviting their participation. Potential participants and their NOK were provided with Participant Information and Consent documents (see Appendix 5) and a plain language statement (see Appendix 6). Researchers ensured that the information was understood and were available to clarify details and to answer questions about all aspects of the study. As people with cognitive impairment are not deemed to be competent to give informed consent, in all cases NOK consent was required. In all cases, verbal consent of the participants was sought to ensure that participants were in agreement with NOK decisions.

2.7 Data collection
Baseline and post-intervention data was collected in hard copy then converted into electronic data using the Statistical Package for the Social Sciences program Version 17 (SPSS, 2008). All hard copies of data were given an ID number and placed in chronological order in a locked filing cabinet in the supervisor’s office as per ethics requirement (See Appendix 2). All data at every stage was stored electronically in the SPSS programme in secure separate offices occupied by the author and the author’s supervisor and the research assistant. Only these three people mentioned had secure electronic passwords to access this program.
2.8 Inclusion and Exclusion Criteria

2.8.1 Inclusion criteria

Participants were required to have a current diagnosis of dementia (of any type) and had to be 60 years and over. People of any cultural background were included if the above criteria were met.

2.8.2 Exclusion criteria

Participants who suffered from acute medical conditions such as delirium, pneumonia (or other acute infections) were excluded from the recruiting process. Other exclusion criteria included primary psychiatric conditions such as schizophrenia. People who suffered from Cerebral Vascular Accidents (CVAs), otherwise known as strokes, were also excluded if they were unable to complete the tools due to deficits such as speech deficits. As this study involved the use of hearing and a degree of visual acuity using the BNTSF (Kaplan et al., 2001a) people with severe visual and hearing impairments were also excluded.

2.9 Randomisation

The participants at both recruiting facilities were randomised according to stratified randomisation procedure (Urbaniak & Plous, 2008), to ensure that both the experimental groups and the control group were broadly homogeneous with respect to cognitive status. Participants were initially assessed using the Mini Mental State Examination (MMSE) (Folstein et al., 1975). They were then stratified on the basis of severity of cognitive impairment (mild to moderate – MMSE > 17 or moderate to severe – MMSE < 16) before being randomly assigned to groups using the computer generated unique number sets (Urbaniak & Plous, 2008). It was noted that while there were other potential stratification factors (for example age, gender, diagnosis), the use of more factors would have rapidly become unfeasible. Because the cognitive status of the participants had some prognostic relevance it was decided to use the cognitive measure as the sole stratification factor.
2.10 Management of the MT and DT groups within an RCT trial

The nurse’s diary on the ward was used to indicate when researchers required patients for participation for both data collection procedures and for the tri-weekly MT and DT sessions. This ensured that participants were ready and available at appointed times and avoided clashes with other treatment procedures such as physiotherapy and occupational therapy. The CI and RA were notified of participants for data collection by the author, and were instructed not to view the diary, to ensure they remained blinded to the intervention group each participant was allocated to.

2.11 Clinical Setting

2.11.1 The MT setting

The MT sessions were held in either three places on the AC1 ward, 1) the staff meeting room, 2) a 3 bed vacant room or 3) the activities room of which was also used as the residents’ dining room (see Appendix 7). The MT consulted with the DT prior to each session to ensure that both the MT and DT sessions which were conducted simultaneously were not in earshot of each other, so that the DT group could not hear the music from the MT group. The MT was then conducted in one of the three places chosen, depending on where the DT group was being held. Participants from AC2 and AC3 were transported to and from the AC1 ward in wheelchairs by orderlies (transport staff).

The MT sessions in the Ellerslie unit were held in a small activities room of which had one entry point only. This room had one small window of which looked onto the hallway of the unit (see Appendix 8). The author was also able to use the general living area for sessions if required, for example if the participant felt too claustrophobic in the allocated room (see Appendix 8).
2.11.2 The DT setting

In the AC1 ward, the DT sessions were held in the activities area (which contained the piano) of the AC1 Ward of which was adjacent to the bedrooms (see Appendix 7). Some sessions were also held on the closed outdoor balcony, which contained an outdoor garden and an area for painting (see Appendix 7) or the 3 bed vacant room, if the MT was running a session using the piano. The AC1 ward also had a separate hallway of which extended the length of the ward, which the DT would use, when walking activities were utilised in the group (see Appendix 7).

In the Ellerslie unit DT sessions were held in a specific activities room adjacent to the room where the MT sessions were held. The DT held the sessions at the opposite end of the activities room if a MT session was being conducted to ensure that the DT participant could not hear the music from the MT session (see Appendix 8).

2.12 Apparatus

2.12.1 MT sessions

The following equipment was used in the MT sessions:

- acoustic steel string guitar
- djembe drum (14” x 28”) and drum sticks
- small hand drum, 30cm x 8cm
- Panasonic RX-ES22 portable CD player
- printed lyrics of familiar tunes in clear plastic pockets in book binders
- book compiled by the researcher of set of MT techniques and a song collection for each technique (see Appendix 9)
- small percussion instruments such as shakers, tambourine, hand bells
- coloured pictures on record covers and CD’s of well-known singers (Appendix 10)
- piano sheet music

2.12.2 DT sessions

The following equipment was used in the DT sessions:
- pot plants, small watering can
- various Jigsaw puzzles, current newspapers, pictures and picture books for ‘reminiscence’ activities, containing images of historic well-known events, sceneries from countries connected to the participants etc.
- plastic balls, balloons and ribbons used in exercise activities
- paper, arts and crafts materials, including paper flowers, dried lavender,
- knitting and crochet needles, wool.
- basic cooking equipment.
2.13 The MT Intervention

The MT interventions were conducted by the author, a registered music therapist (RMT) on Mondays, Wednesdays and Fridays from 10:30 to 11:30 am coinciding with the DT sessions.

2.13.1 Content and procedures of MT sessions

As this study was focused on measuring the effect of MT on speech deficits associated with dementia, the MT techniques were based on previous studies that had indicated a positive effect on speech or language deficits as a result of particular MT techniques (Brotons & Koger, 2000; Groene, 2001; Pollack & Namazi, 1992; Quinn, 2003; Smith, 1986).

The MT sessions included:

Step 1 – Introduction

Step 2 – Singing familiar songs

Step 3 - Word Cueing

Step 4 – Instrument Playing

Step 5 – Music and Reminiscence (using pre-recorded music and pictures)

Step 6 – Music and Movement

Step 7 – Goodbye

Each session adhered to the following protocol:
2.13.1.1 Step 1. Introduction

Participants were seated in a half circle, either in wheelchairs or in comfortable chairs facing the therapist who introduced herself, greeted each participant individually asking them to introduce themselves to the group.

2.13.1.2 Step 2. Singing familiar songs

The MT began by singing particular familiar songs in the set list (see Appendix 9) but encouraged the participants to suggest or sing any other songs to the MT. The focus in this step was live music, as it has been shown to be more effective with people with dementia than pre-recorded music (Clair & Bernstein, 1990b; Holmes et al., 2006). Songs familiar to participants included “Hello, hello who’s your lady friend?”, “Jolly good company” and “Lambeth Walk” (see Appendix 11). For Italian participants the song “Reginella Campagnola” known as “The Woodpecker’s Song” in English was often used (See Appendix 11). For Greek speakers, the Greek version of the song “Never on a Sunday” and/or “The Wedding song” was chosen. All of these songs were chosen because they have a 4/4 upbeat rhythm and are very familiar tunes for the Greek participants. The songs were often repeated to provide the participants more opportunity to familiarise themselves with the songs (Brotons & Koger, 2000; Pollack & Namazi, 1992).

The MT took care to ensure that the songs were familiar to all participants in the group (Clair, 1996; Gerdner, 2000; Moore et al., 1992). The MT also chose the keys of the songs very carefully to ensure that all of the participants could sing along comfortably to the songs. Although there is the theory that people having difficulty with speech have less difficulty when singing (Hebert, Racette, Gagnon, & Peretz, 2003; Peretz, Gagnon, Hebert, & Macoir, 2004) there is evidence to suggest otherwise (Peretz et al., 1997). Dementia however, although known to affect specific cognitive domains (Grabowski & Damasio, 2004) is not a disease specific to the left or right side of the brain (Braak et al., 1999; De Leeuw & Van Gijn, 2003; Waldemar et al., 2007). The MT took great care to ensure that the tempo of the song was suitable for all the group members to sing along to (Moore et al., 1992; Quinn, 2003).
Despite the songs chosen for the MT sessions being very familiar to the participants, depending on the level of the dementia, they can struggle with word finding (Bayles et al., 1992; Bourgeois, 2002). To assist with this deficit, the author gave each participant the choice of using large print lyrics to the songs. However, it is to be noted that as dementia progresses, the ability to read is also affected (Bayles et al., 1992; Haak, 2002). For this reason, the songs were chosen for their lyric simplicity and significant familiarity to the participants. The slower tempo of the songs performed by the MT when required also allowed the participants extra time to follow the lyrics and sing the words (Moore et al., 1992).

2.13.1.3 Step 3 Word Cueing

The procedure for the word cueing task was as follows: the author began to sing a song (for example “Walking my baby back home”), stopping at the last line and asking the group “What comes next?” to which they would all sing the line “Walking my baby back home.” The author would verbally congratulate the group and keep singing the song until the exact same line arrived, stopping again, cueing the group to recall the lyrics. When the author stopped and cued the group, she allowed them significant time to sing/say the line. If the group had trouble recalling the words of the cued line, the author would sing the first part of the cued line, then the group completed the cued line. The author chose this technique to improve speech skills but to also improve the participant’s confidence as they focused on a very familiar line rather than the whole song. The author could not find this particular “Word cueing” technique mentioned in the MT language studies (Groene, 2001; Pollack & Namazi, 1992; Smith, 1986; Van de Winckel et al., 2004).

2.13.1.4 Step 4 Instrument playing

In this activity the author placed percussion instruments on the floor and held the smaller ones in her hands in the centre of the group. She then gave them simple names e.g. big drum, small drum, shakers, bells and tambourine, and asked the participants to point to or name which one they wanted to play. Participants that
were not able to complete this request were offered two instruments and asked to choose between them.

The author then sang and played an instrument to which the group followed by playing their instruments. The author then asked participants about what was enjoyed in playing the instrument. The author then invited the participants to pass their instrument to the person next to them. The aim of this activity was to increase socialisation (Bourgeois, 2002; Pollack & Namazi, 1992) and for the participants to experience a different instrument. The author then sang, accompanied herself on guitar, while tapping her foot on a drum situated on the floor under her foot. In previous studies on the effect of MT on language deficits, instrument playing was not included (Groene, 2001; Quinn, 2003; Smith, 1986; Van de Winckel et al., 2004). However in the study by Pollack and Namazi (1992), instrument playing was one of the MT techniques, increasing social interaction both in and immediately after the group. It is noted however that in this particular study (Pollack & Namazi, 1992) the participants received individual sessions, whereas the sessions in the current study were always in a group setting.

2.13.1.5 Step 5 Music and reminiscence (using pre-recorded music and pictures)

Studies have indicated that musically cued discussion (Smith, 1986) and discussion cued with music and pictures (Brotons & Koger, 2000) may improve dementia language deficits. Based on these studies the author included stimulated discussion using pictures of well-known singers and their signature songs. Such singers included Bing Crosby, Vera Lynne, the Andrew Sisters, Claudio Villa (Italian), Luciano Pavarotti (Italian), Stelios Katzantzidis (Greek) and George Dalaris (Greek) (see Appendix 11).

Each participant was given a choice of at least two pictures from which to choose a singer they recognised and liked (see Appendix 10). The song associated with that singer was then played on the CD player. The participant was then asked questions connected to the participant’s verbal responses and/or questions connected to the song/lyrics to stimulate conversation. During the next step of this technique, the author invited other members of the group to contribute to any memories they had connected to the song to encourage socialisation and thus communication
(Bourgeois, 2002; Pollack & Namazi, 1992). The same process was repeated with each group member.

2.13.1.6 Step 6 Music and movement

As described previously (in Chapter 1) music and movement was effective in decreasing dementia language deficits such as naming (Carruth, 1997), social interaction (Pollack & Namazi, 1992) and speech fluency (Van de Winckel et al., 2004). The author therefore included music and movement techniques in the MT sessions as follows:

The author used mimicking to encourage the participants to engage in particular movements to songs used. For example, rowing actions with the arms were encouraged during the song “Row, row, row”, arms to be held up in the air for the lyrics “well I did” in the song “Did you ever see a dream walking?” and arms to be held up in the air while singing “Oiy” in the song “Lambeth Walk”. Participants were then given the option to dance either with the author or on their own to particular songs such as “In the mood” by Glen Miller, “C’e la luna mezz’o mare” recently rerecorded by Patrizio Buanne (Italian), or “The wedding song” (English translation) by Stelios Kazantzidis (Greek). To encourage socialisation as in the previous MT techniques, the author encouraged the participants to hold each other’s hands in a group circle, moving their arms to the beat of the music. The residents were encouraged to clap their hands and tap their feet during this activity.

2.13.1.7 Step 7 Goodbye

The session finished with song singing similar to Step 1, using songs from the “Song Ending list” prepared by the author (see Appendix 9). The author thanked each participant individually for attending the MT session, addressing each of them by their first name.

2.13.2 The group process

MT provided in a group setting as opposed to individual sessions was essential to this study. If the situation arose that there was only one participant in the MT research
group, the MT invited other residents on the ward to participate in the group. Other residents on the ward who were not going to be admitted to the study, or who had already completed the study were invited to attend the sessions, to form a group if needed.

If a situation arose that a participant became disruptive during a MT session due to symptoms of dementia, thus interrupting the session for the other participants, the MT invited the participant to choose a song that was his/her favourite for the MT activity that was currently being engaged in. If the agitation did not decrease, the client was given the choice to leave the session. The nursing staff was notified, with the MT then documenting the participant's behaviour in the nursing notes and in the research data notes. The participant was then approached routinely to attend the next scheduled MT session. The most common disruptive behaviour was agitation, for example a participant requesting repeatedly to go home and/or to call their loved one to come and get them to take them home, or to speak to them.

### 2.14 DT Intervention

The DT interventions were conducted by DTs employed at both the AC1 Ward and the Ellerslie Unit. The sessions took place to coincide with similar times of the MT sessions.

#### 2.14.1 Content and procedures of the DT Intervention

The goals of the DT sessions were to stimulate language/communication through activities that met the participant’s cognitive, social and emotional needs. Specific activities were chosen from the following list to suit the interest of the participant, to encourage maximum participation and communication.

#### 2.14.1.1 Cognitive activities

Cognitive stimulation was provided using card games such as ‘Uno’, ‘Help your neighbour’, and games including jigsaw puzzles, board games such as dominoes, Chinese checkers, ‘sixes’ and ‘Bingo’ both the number and picture variety. The
clients were also invited to look at pictures with themes such as animals, scenery, flowers, cares etc. The activity “Armchair travel” involved looking at pictures of travel destinations and reflecting on the participants’ previous travel destinations and places they would like to visit.

2.14.1.2 Physical Stimulation Activities

Physical stimulation involved various games to encourage body movement, such as the use of large and small balloons, quoits, hookey, floor and tabletop ‘bobs’, floor and wall target games, chair based exercises, creative movement using scarves, ribbons and hoops, gardening, woodwork, painting and cooking.

2.14.1.3 Arts and crafts activities

Making theme based decorations; making lavender into lavender bags; paper flower making; knitting, paper crafts, mosaics, painting and drawing.

The aim was to offer each participant at least two activities described above in “criteria for the DT Intervention” in each session to encourage participation. To keep the DT intervention similar to the MT intervention, the DTs encouraged social interaction and verbalisation amongst the group.

2.14.2 The DT group process

Similar to the MT group, it was a requirement of the study that the DT intervention was administered in a group setting, as opposed to individualised sessions. If the DT only had one participant in the research study, she would invite another client to participate in the therapy from the ward, who was not a part of the study or unlikely to be a participant, or who had completed the study.

If a situation arose that a participant became disruptive during a DT session due to symptoms of dementia thus interrupting the session for the other participants, the participant was given the choice of other activities to participate in, within the DT group setting. If the participant remained agitated, the participant was given the choice to either leave the group or choose another DT activity. The DT then
documented the participant’s behaviour in the nursing progress notes, notifying the staff, and then did not approach the participant until the next planned research session.

2.15 The NI Group

Once the baseline data was collected, both the MT and the DT ensured that they had no engagement with the NI group of participants. If these participants appeared to ‘gravitate’ towards either of the DT or the MT groups, an allied health staff member or nursing staff member would gently pre-occupy them with activities in another area of the ward. As the sessions were held at 10:30 a.m. on weekdays, there was often many other Occupational Therapy (OT) or physiotherapy (PT) activities being conducted on the ward that all residents of the wards (including the research participants) would be involved in.

2.16 The Research Process

As described in Table 2 below, data was collected within 48 hours of the first session and the final session (session 9, Week 3).

Table 2: The Research Process

<table>
<thead>
<tr>
<th>Within 48 hours of Session 1, Week 1</th>
<th>MT, DT or NI (9 sessions)</th>
<th>Within 48 hours post Session 9, Week 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blinded researcher collects data from the following tools: MMSE (Folstein et al., 1975) GDS-15 (Sheikh, 1986) BNTSF (Mack et al., 1992) ANT (Spreen &amp; Strauss, 1998) DST (Hunsley et al., 1988)</td>
<td>MT or DT or NI Week 1, 2 and 3, Mon, Wed, Fri 1030 to 1130am Total of 9 sessions</td>
<td>Blinded researcher collects data from the following tools: MMSE (Folstein et al., 1975) GDS-15 (Sheikh, 1986) BNTSF (Mack et al., 1992) ANT (Spreen &amp; Strauss, 1998) DST (Hunsley et al., 1988)</td>
</tr>
</tbody>
</table>
2.17 Outcome Variables

Corresponding to the two primary outcome measurements and four secondary outcome measurements, four dependent outcome variables were made for the purpose of this study, one primary dependent outcome variable and 3 secondary dependent outcome variables. The primary dependent outcome variable is speech, in particular naming (data generated from BNTSF (Mack et al., 1992), ANT (Spren & Strauss, 1998)). The 3 secondary dependent outcome variables are:

- Working memory (or short-term memory) (data generated from DST (Hunsley et al., 1988)
- Cognition - data generated from the MMSE (Folstein et al., 1975)
- Depression - data generated from the GDS- 15 (Sheikh, 1986)

A definition of each outcome variable and its rational for data analysis are explained as follows.

2.17.1 Spontaneous speech

Spontaneous speech refers to the ability of the participant to be able to recognise objects (both every day and not so common objects) and in a short period of time be able to put a name to that object. Difficulty naming objects is part of a speech deficit (Bayles et al., 2000; Hopper, Bayles, & Tomoeda, 1998).

The rationale for choosing this variable is that speech is a vital part of our communication, and is affected as dementia progresses causing confusion and anxiety (Emery, 2000; Hopper & Bayles, 2001). Previous studies of small groups of participants have indicated that MT can improve subscales of language including speech content, speech fluency, an improvement in face/name recall and improved social interaction (Brotons & Koger, 2000; Pollack & Namazi, 1992; Smith, 1986; Van de Winckel et al., 2004).
2.17.2 Working memory

Working memory, is the ability of the participants to activate and retrieve information from the short-term and long-term memory, and also being able to maintain attention on the activity at hand (Bayles, 2003). Damage to the working memory results in the inability to hold recent information in the consciousness, and the inability to retrieve information from the long-term memory for “in the moment” language use (Baddeley, Bressi, Della Sala, Logie, & Spinnler, 1991; Hopper & Bayles, 2001).

2.17.3 Cognition

As cognitive impairment increases due to dementia, so too does the language impairment (Bayles et al., 1992; Haak, 2002; Hopper & Bayles, 2001; Snowden, 1999). For the purpose of this study, cognition was measured to determine the severity of dementia in relation to the specific language functions.

2.17.4 Depression

Depression includes the symptoms of unhappiness, withdrawal, inactivity, fatigue, expressions of guilt and worthless, tearfulness and loss of interest in activities that the participant once participated in (Starkstein, 2005). Symptoms of depression can mimic cognitive impairment (Eastley & Wilcock, 2005; Hejl et al., 2002) thus interfere with a person’s performance on tests such as the BNTSF (Mack et al., 1992) the ANT (Spreen & Strauss, 1998) and the other tests chosen in this study.

In order to address the hypotheses of this study, data was generated from multiple standardised and validated tools. These tools are discussed below.
2.18 Primary outcome measures

2.18.1 The Boston Naming Test

This study generated quantitative data from a complete language tool, the Boston Naming Test, (BNT) (Kaplan et al., 2001a), short form (SF) (Mack et al., 1992) as opposed to studies of which subscales of language tools were used (Brotons & Koger, 2000) and language subscales of cognitive assessment tools (Smith, 1986; Van de Winckel et al., 2004). The BNTSF (Mack et al., 1992) is a 15-item visual naming test assessing both spontaneous speech and semantic memory skills (Hopper et al., 1998). The 15 items consist of black and white three dimensional drawings commencing with names of pictures most frequently used for example house, comb and toothbrush to names of pictures less frequently used such as unicorn, tripod and sphinx. The 10 to 15 minute test is used to assess language function or assess changes in language over time in subjects with dementia (Kaplan et al., 2001a; Mack et al., 1992). The BNTSF has been derived from the BNT validated 60-item test (Kaplan et al., 2001a; Williams, Mack, & Henderson, 1989). The BNTSF (Mack et al., 1992) has been validated with people with dementia (Fastenau, Denburg, & Mauer, 1998).

The BNTSF (Mack et al., 1992) has been selected as a part of the battery of tests to assess changes in speech deficits due to dementia as a result of MT in the current study. The BNTSF (Fastenau et al., 1998; Mack et al., 1992) is widely used in clinical neuropsychology (Graves, Bezeau, Fogarty, & Blair, 2004) and is time efficient which is essential for people with dementia participating in research. This short form of the BNT (Mack et al., 1992) in addition to its clinical efficacy, has demonstrated validity and reliability as a research tool for people with dementia (Diehl et al., 2005; Fisher et al., 2004).

Based on the BNTSF’s validity, reliability, the quick administering of the short 15 item form and its successful history of being administered with people with dementia, this tool was chosen as the primary outcome measure for this study.
2.18.1.1 The administration and scoring of the BNTSF (Mack et al., 1992)

The BNTSF (Fastenau et al., 1998; Mack et al., 1992) was administered and scored according to the tool’s protocol (Calero, Arnedo, Navarro, Ruiz-Pedrosa, & Carnero, 2002; Kaplan et al., 2001a; Mack et al., 1992). The participant was initially shown each picture and asked to name it. The participant was allowed up to 20 seconds to respond, unless the participant indicated that s/he did not know the word before the 20 seconds had passed. If the answer was correct, the participant scored a point, which was recorded in the BNT record booklet (Kaplan, Goodglass, & Weintraub, 2001b).

2.18.1.1.2 Stimulus cues

If the subject gives a response that may be a misperception of the picture, s/he was supplied with the stimulus cue, which was printed in brackets under the response line for each item in the BNT record book. The participant was again allowed up to 20 seconds to name the picture after being provided the stimulus cue. If s/he succeeded, a tick was placed in the “stimulus cue” column of the BNT record booklet (as above). **Score:** Each item that was correct following the stimulus cue was allocated point for a correct response. If the participant spontaneously corrected him/herself within the 20 second time frame for this and the stages below, a point was given for the correct answer (Mack et al., 1992).

2.18.1.1.3 Phonemic cues

The phonemic cue, that is the provision of the beginning sound of the picture, was provided if the participant failed to give a correct response to the stimulus cues. **Score:** If the response to the phonemic cue was correct, a tick was placed in the “phonemic cue” column in the BNT record book as above and one point allocated for a correct response, 0 for an incorrect response (Mack et al., 1992).

2.18.1.1.4 Multiple choice

After completing the BNTSF (Mack et al., 1992) the RA then returned to the first item that was not named correctly after a phonemic cue and presented the multiple choice form of that item. Each of the four printed choices was read aloud, while
pointing to the correct answer. The participant was asked to point to or repeat the one s/he thought was correct. The participant’s choice was recorded under the “multiple choice” column in the BNT record booklet. The RA then proceeded in turn to each item that was not named in the original administration and presented the multiple choice card in the same way. **Score:** There is no score for correct answers on the multiple choice questions (Mack et al., 1992).

### 2.18.1.2 The effect of education on the performance of BNTSF (Fastenau et al., 1998; Mack et al., 1992)

Numerous studies have found higher educational levels to influence a positive performance on the BNT in older adults without cognitive impairment (Neils et al., 1995; Welch, Doineau, Johnson, & King, 1996; Worrall, Yiu, Hickson, & Barnett, 1995). Hawkins and Bender (2002) in their review of studies of performance of the BNT in relation to vocabulary and education, found some discrepancies in relation to the separation of the different education levels within the ’12 years and less group’. Also, the authors found in their review, that the BNT did not discriminate well at the above-average to superior levels of education, with the larger differences in results found between scores of subjects with an 8th grade and 12th grade education, than those with a 12th grade and above education (Hawkins & Bender, 2002; Hawkins et al., 1993). Other studies on the other hand have not shown any correlation between education and performance on the BNT (Farmer, 1990; Fastenau et al., 1998).

### 2.18.2 The Animal Naming Test (ANT) (Spreen & Strauss, 1998)

The Animal Naming Test (ANT) (Spreen & Strauss, 1998) is one of the Controlled Oral Word Association (COWA) tests (Spreen & Strauss, 1998). This test evaluates the spontaneous production of words in a given category (for example animals, vegetables, or fruit) within a set time period, such as 60 seconds (Spreen & Strauss, 1998). The ANT (Spreen & Strauss, 1998) along with the BNTSF (Mack et al., 1992) has been used successfully in recent studies of people with dementia as part of a battery of tests to assess the level of dementia (Connor, Seward, Bauer, Golden, & Salmon, 2005; Mok, Lam, & Chiu, 2004).
There are other COWA tests such as the Letter Fluency test (Spreen & Strauss, 1998) which measures the production of individual words under restricted conditions and time limits, such as in 60 seconds, recall as many words as you can beginning with the letter “S”. Recent studies have shown that both the category and letter fluency tests can differentiate between the different types of dementias, in particular DAT, primary progressive aphasia (PPA) and semantic dementia (SD) (Marczinski & Kertesz, 2006; Perri et al., 2005).

The ANT involves the utilisation of multiple memory systems (Kalbe et al., 2004) such as attention, working memory, problem solving, imagery, semantic memory and language (word and speech production), therefore according to Hopper and Bayles (2001), this test is extremely sensitive to cognitive impairment and to intervention-related changes in cognitive status.

Based on the literature indicating the successful role of the ANT in assessing word and speech production, its reliability and validity, its quick administration and its combination in many studies with the BNT, this tool was used alongside the BNTSF (Fastenau et al., 1998; Mack et al., 1992) as one of the primary outcome measures of this study.

2.18.2.1 The administration and scoring of the ANT (Spreen & Strauss, 1998)

The subject was asked to produce as many animal names as possible within 60 seconds. For example, the RA used a stopwatch, ensured the participant was seated comfortably, before giving the following instructions: “I am going to ask you to say many names of animals you can think of in sixty seconds. When I say “GO” I want you to start naming as many animals as you can, and stop when I say STOP”. Names of extinct, imaginary or magic animals were accepted, but not given names of animals such as “Fluffy” or “Jack” the dog. The score was the sum of all correct names of animals stated within the 60 second period (Spreen & Strauss, 1998).
2.19 Secondary outcome measures

2.19.1 The Mini Mental State Examination (MMSE) (Folstein et al., 1975)

Mini Mental State Examination (MMSE) (Folstein et al., 1975) is one of the most widely used, reliable and validated tools employed to assess the cognitive status of older people (Aevarsson & Skoog, 2000; Cossa, Sala, Musicco, Spinnler, & Ubezio, 1999; Flicker, Logiudice, Carlin, & Ames, 1997; Gagnon et al., 1990; Monsch et al., 1995). The MMSE is a simple cognitive screening tool designed to capture information along with other screening instruments to make a diagnosis of dementia (Flicker et al., 1997) The MMSE contains 11 questions covering the categories of orientation, attention, calculation, language, memory and visual-spatial construction, taking approximately 5 to 10 minutes to administer. There are nine items that are related to language that include the following simple written and verbal instructions and naming everyday objects (Cossa et al., 1999; Folstein et al., 1975; Gagnon et al., 1990). The total score is out of 30 with a score of 24 and below, indicating cognitive impairment (Aevarsson & Skoog, 2000; Cossa et al., 1999; Gagnon et al., 1990).

The MMSE (Folstein et al., 1975) had multi-purposes in this study. Groups of participants were randomised to three groups based on the scores of MMSE (as described previously in 2.9). Data from the speech subcategory of the MMSE (name a pencil/watch and repeat the sentence “No ifs etc.”) (Folstein et al., 1975) was also isolated to determine the effects of the interventions on speech deficits associated with dementia.

The MMSE (Folstein et al., 1975) was also used to measure changes in the participants’ cognitive status over the 3 week period of the intervention, to determine for example cognitive decline, in contributing to decreased language performance.
2.19.2 The Geriatric Depression Scale (GDS) (Yesavage et al., 1983)

The Geriatric Depression Scale (GDS) (Sheikh, 1986; Yesavage et al., 1983) is designed to assess the level of depression in the elderly. It is a self-rating scale consisting of 30 “question-type” items. The original 30-item tool (Yesavage et al., 1983) has been validated and found reliable as a short form (15-item) tool for use with people with dementia (Almeida & Almeida, 1999; Korner et al., 2006; Sheikh, 1986).

The GDS-15 (Almeida & Almeida, 1999; Sheikh, 1986) was used in this study to determine if depression was a factor in the cognitive status of participants in this study having dementia (Hejl et al., 2002). GDS-15 data was collected pre and post intervention to determine whether changes in depression over time had affected cognitive and language changes over the same period, which was 3 weeks of the intervention period.

2.19.3 The Digit Span Task (DST) (Hunsley et al., 1988)

The Digit-span task (DST) (Hunsley et al., 1988) is a reliable and validated measure (Belleville et al., 1996). The DST is a measure of short-term and working memory domains using random sequences of digits 1 to 9. Using the DST, the participants repeat a series of digits of increasing length to determine how many digits they can recall after a single presentation. They are then given a series of different digits of increasing length and asked to repeat them backwards. Either the forward or backward tasks are ceased if they get two answers in a row incorrect (Cherry, Buckwalter, & Henderson, 2002). It is when the digits have to be reproduced in reverse order that the working memory is being specifically challenged (Kalbe et al., 2004).

The DST (Hunsley et al., 1988) was chosen for this study, to determine a change in the person’s working memory over the time of the intervention. As previously discussed, working memory contributes to language in numerous ways, including retaining verbal information, whether visually or auditory, and being able to retrieve
and use it when required (Belleville et al., 1996). Data from this test will be correlated with the language tools to determine if an improvement or deterioration in working memory has contributed to person’s speech performance.

2.20 Analysis

2.20.1 Power analysis

Power analysis for repeated measures within-between ANOVA interactions between three experimental groups show that to detect a small to medium effect of the interventions with at least 80% power (alpha=0.05), a total of 42 subjects would be required (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007).

2.20.2 Data analysis

Prior to using ANOVA, data was screened for normal distribution, outliers and missing data as recommended by Tabachnick and Fidell (2007). In this study, the hypotheses seek to determine which intervention is more effective when compared with another one, based on the results of standardised tools. Therefore the analysis used for this type of hypothesis will be the one way repeated measures ANOVA (Pallant, 2007; Tabachnick & Fidell, 2007) to address both hypotheses.

2.21 Modified Intention to treat (MITT)

Modified Intention to Treat (MITT) (Abraha & Montedori, 2010; Gravel, Opartny, & Shapiro, 2007; Polit & Gillespie, 2010) is a form of Intention To Treat (Gravel et al., 2007; Polit & Gillespie, 2010) which is the practice of including all participants to the group to which they were randomised, regardless of what subsequently occurred during the research period. ITT avoids the problems created by omitting dropouts and noncompliant patients, which can negate randomisation, introduce bias and overestimate clinical effectiveness. What defines ITT is that all randomised subjects are analysed (Kruse et al., 2002).
Evidence suggests that participants in studies that adhere to the research protocol tend to do better than those who do not adhere. Therefore excluding non-adherent participants from the analysis leaves those who may be destined to have a better outcome and destroys the unbiased comparison afforded by randomisation (Montori & Guyatt, 2001). In the dementia setting, ITT also reflects reality, where people with dementia are likely to have good and bad days, therefore are not likely to attend MT and DT sessions 100% of the time. In other words to only include data of the current study of participants who attended all nine sessions of either DT or MT would be misleading and would not reflect people with dementia in real life.

There is no set definition of MITT. In a review of 475 RCTs reporting the use of MITT, there were 4 main deviations from ITT reported (Abraha & Montedori, 2010). Abraha and Montedori (2010) believe that the deviations from ITT (defined as MITT) have occurred because of the continuing problem of missing data, and the impracticability of applying the true ITT. This was the experience of the author in the current study dealing with the population of dementia.

ITT would exist if the current study reported data from all clients that were pre-tested than randomized to the study (n=97). However, due to the physical and mental vulnerability of the population in the current study, 46 participants were not available to participate in the post-tests (approximately 50%). So the author chose a MITT approach, whereby all participants that were pre and post tested were included in the study, irrespective of how many sessions they received of DT or MT (some didn’t receive any sessions at all due to BPSDs).

This approach is advocated by the Consolidated Standards for Reporting Trials (CONSORT) guidelines (Moher et al., 2010) and is seen to increase the validity of the study (Gravel et al., 2007; Polit & Gillespie, 2010).
2.22 Summary of Method

In summary, this chapter detailed the method of the study, including the MT research design, its underlying rationale and the process of the research method. Following this, a description of the participants, the clinical settings for both the MT and the DT interventions, and the MT equipment were described. The MT intervention, comprising seven steps of the therapy protocol was described with relevant tables and appendix entries. For the purpose of research analysis, outcome measurements and outcome variables were explained, including statistical analysis methods. In the next chapter the results of the study will be presented.
CHAPTER 3

RESULTS

3.1 Modified Intention to treat (MITT)

All participants who were randomised into the study were post-tested irrespective of how many intervention sessions they received, using the MITT approach (Abraha & Montedori, 2010) as discussed in Chapter 2. Table 3.1 shows that only 25% of the MT group and 31.25% of the DT group attended the total 9 intervention sessions.

Table 3.1: MITT by intervention group

<table>
<thead>
<tr>
<th>No of sessions received</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>25%</td>
<td>-</td>
<td>18.75%</td>
<td>43%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12.5%</td>
<td>-</td>
</tr>
<tr>
<td>DT</td>
<td>31.25%</td>
<td>6.25%</td>
<td>31.25%</td>
<td>18.75%</td>
<td>6.25%</td>
<td>6.25%</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3.2 The research population cohort

It can be seen in Figure 1 below that the three randomised groups were derived from a large potential cohort of 710 elderly persons with dementia, currently residing in sub-acute hospital care.
Figure 1: Flow diagram for the recruitment, randomization and completed data for the MT, DT and NI groups.
3.2 Data Screening

3.2.1 Missing Data

The screening procedure revealed no pattern for the random missing data, and the following two approaches were used as recommended by Tabachnick and Fidell, (2007). First, some cases were excluded from further analysis, for example a participant who refused to complete both the pre and post DST. Second, the missing values were replaced with an estimate, based on an informed estimate (the value being the median for that particular participant) (Tabachnick & Fidell, 2007).

3.3 Outliers

The screening procedure revealed a small number of outliers scattered throughout the data. These outliers were inconsistent when correlating the participant scores on other tools. Scores were adjusted in accordance with guidelines suggested by Tabachnick and Fidell (2007).

3.4 Participant baseline characteristics

3.4.1 Age by group

MT: 80.06 +/- 6.13
DT: 81.88 +/- 8.03
NI: 80.68 +/- 8.56

3.4.2 Gender

Total: 27 (52.9%) male, 24 (47.1%) female.
Gender by group:
MT: 9 (56.3%) male, 7 (43.8%) female.
DT: 6 (37.5%) male, 10 (62.5%) female.
NI: 12 (63.2%) male, 7 (36.8%) female.

3.4.3 Comorbidities

The comorbidities of the participants included in the analyses include:

- Hearing impairment – slight to moderate level (n=9) (Participants with severe hearing impairment were not included in the study as they were not able to hear the questions asked of them).
- Osteoarthritis (n=11)
- Depression/anxiety (n=9)
- Ischeamic Heart Disease (IHD) (n=14)
- Hypercholesteraemia (n=5)
- Glaucoma (n=4)
- Past history of ethanol abuse (alcohol) (n=2)
- Lymphoma (the disease was stable at the time of research intervention) (n=1)
- Hypertension (n=12)
- Diabetes Type 1 (insulin dependent) (n=3)
- Diabetes Type 2 (Non-insulin dependent) (n=9)
- Fractured radius and ulnar (both bones in the forearm) (n=1) (rehabilitating post fractures)
- Fractured neck of femur (rehabilitating 2 months post fractured hip) (n=1)
- Epilepsy (n=1)
- Parkinson’s disease (n=2)

There were some participants who had a combination of some of the comorbidities described, such as hypertension, arthritis and ischaemic heart disease (n=9).

3.4.4 Cultural Background

The majority of the participants that completed the pre and post-test data were born in Australia (n = 31, 61%). Participants who migrated to Australia from other countries included Italy (n=7, 13%), Greece (n=3, 6%) and one participant from each
of the following countries: Egypt (2%), Vietnam (2%), Ireland (2%), France (2%), England (2%), New Zealand (2%), Holland (2%), Sri Lanka (2%), Malta (2%) and Scotland (2%). Professional interpreters accessed through the hospital interpreters services were engaged for the participants who did not have English as their first language.

3.4.5 Education level

The education level of the 51 participants that completed the study was based on their years of schooling. Within the smaller group who had completed university education, one participant had completed a PhD.

Table 3.2: Educational level of participants as total group

<table>
<thead>
<tr>
<th>Total participant education level</th>
<th>Years of education</th>
<th>N= 51 participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 6 years</td>
<td>14 (+ .455)</td>
</tr>
<tr>
<td></td>
<td>7 – 12 years</td>
<td>30 (+ .497)</td>
</tr>
<tr>
<td></td>
<td>University</td>
<td>7 (+ .342)</td>
</tr>
</tbody>
</table>

As shown in Table 3.2 below, the education levels of the participants were similar across the three groups, which avoided the possibility of a particular group performing better on the BNTSF (REF) due to an educational advantage (Welch et al., 1996; Worrall et al., 1995).

Table 3.3: Years of education per intervention group

<table>
<thead>
<tr>
<th>Years of education</th>
<th>Mean (years)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT (n=16)</td>
<td>9</td>
<td>3.234</td>
</tr>
<tr>
<td>DT (n=16)</td>
<td>13</td>
<td>3.855</td>
</tr>
<tr>
<td>NI (n=19)</td>
<td>10.72</td>
<td>3.643</td>
</tr>
</tbody>
</table>
Table 3.2 shows the mean and standard deviation for the years of education between the three groups. There were no significant differences shown by independent samples (t-test) in levels of education between the 3 groups.

3.5 Dementia diagnosis

Participants in this study had been diagnosed with the following subtypes of dementia: DAT, Mixed Dementia, FTD, VaD, Pick’s Disease, DLB, Dementia (subtype not included) and Korsakoff’s Dementia (see Table 6 below). There were frequent cases where there was not an official diagnosis, instead the terminology “cognitive decline” or “cognitive impairment” was used in the medical history. In these cases, the geriatrician in charge of that client or the Professor of old aged psychiatry in charge of this research study was consulted. In this situation the presence of dementia was either confirmed or denied, however the particular subtype of dementia was unable to be determined due to limited time and assessment resources.

Table 3.4: Dementia diagnosis of participants by intervention group

<table>
<thead>
<tr>
<th>Type of dementia</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Impairment</td>
<td>4</td>
</tr>
<tr>
<td>Dementia</td>
<td>4</td>
</tr>
<tr>
<td>Korsakoff’s Dementia</td>
<td>0</td>
</tr>
<tr>
<td>DAT/VaD</td>
<td>2</td>
</tr>
<tr>
<td>DLB</td>
<td>1</td>
</tr>
<tr>
<td>VaD</td>
<td>3</td>
</tr>
<tr>
<td>DAT</td>
<td>2</td>
</tr>
<tr>
<td>MT</td>
<td>1</td>
</tr>
<tr>
<td>DT</td>
<td>1</td>
</tr>
<tr>
<td>NI</td>
<td>1</td>
</tr>
</tbody>
</table>
3.6 Participant medications

Medications that the participants received are listed in Table 3.4 below.

Table 3.5: Participants’ medications during research intervention (3 weeks)

<table>
<thead>
<tr>
<th>Drug category</th>
<th>No. of participants on the drug pre intervention</th>
<th>No. of participants on the drug post intervention</th>
<th>Change identified by intervention group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antipsychotics</td>
<td>17</td>
<td>18</td>
<td>+1 NI</td>
</tr>
<tr>
<td>Antianxiolytics</td>
<td>11</td>
<td>10</td>
<td>-1 DT</td>
</tr>
<tr>
<td>Anticholinesterases</td>
<td>10</td>
<td>10</td>
<td>0 change</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>12</td>
<td>12</td>
<td>0 change</td>
</tr>
<tr>
<td>Sedatives</td>
<td>4</td>
<td>5</td>
<td>+1 NI</td>
</tr>
<tr>
<td>Anti epileptics</td>
<td>2</td>
<td>2</td>
<td>0 change</td>
</tr>
<tr>
<td>Narcotic analgesics</td>
<td>6</td>
<td>7</td>
<td>+1 MT</td>
</tr>
<tr>
<td>Simple analgesics</td>
<td>14</td>
<td>15</td>
<td>+1 DT</td>
</tr>
<tr>
<td>Movement disorder drugs</td>
<td>4</td>
<td>4</td>
<td>0 change</td>
</tr>
</tbody>
</table>

3.7 Primary outcome measures

3.7.1 Boston Naming Test (short form) BNTSF (Mack et al., 1992).

Baseline to post-intervention change in BNTSF (Mack et al., 1992) scores for the three groups is summarised in Table 3.5 below.

Table 3.6: Change in BNTSF scores

<table>
<thead>
<tr>
<th>Change in BNTSF scores</th>
<th>MT (n=16)</th>
<th>DT (n=16)</th>
<th>NI (n=19)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.50 (1.46)</td>
<td>-.37 (1.02)</td>
<td>.15 (1.39)</td>
</tr>
</tbody>
</table>

A one way ANOVA was used to examine the three groups with respect to change scores on the BNTSF. There were no between-group differences, \( F_{(2,50)} = 1.84, p = 0.17, \eta^2 = 0.07 \). Therefore neither hypothesis was supported.
3.7.2 Animal Naming Test (ANT) (Spreen & Strauss, 1998)

The change in ANT (Spreen & Strauss, 1998) scores is summarised in Table 3.6 below.

**Table 3.6 Change in ANT scores**

<table>
<thead>
<tr>
<th>Change in ANT scores</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MT (n=16)</td>
<td>.81 (2.56)</td>
</tr>
<tr>
<td>DT (n=16)</td>
<td>1.68 (2.70)</td>
</tr>
<tr>
<td>NI (n=19)</td>
<td>.63 (3.00)</td>
</tr>
</tbody>
</table>

A one way ANOVA was used to examine the three groups with respect to change scores on the ANT. There were no between-group differences, \( F(2,50) = 0.69, p = 0.50, \eta^2 = 0.028 \). Therefore neither hypothesis was supported.

3.8 Secondary Outcome Measures

3.8.1 Mini Mental State Examination (MMSE) (Folstein et al., 1975)

The MMSE (Folstein et al., 1975) speech subscale scores are summarised in Table 3.7 below.

**Table 3.7 Change in speech subscale of the MMSE by group**

<table>
<thead>
<tr>
<th>Change in MMSE speech subscale</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MT (n=16)</td>
<td>.03 (.14)</td>
</tr>
<tr>
<td>DT (n=16)</td>
<td>.05 (.22)</td>
</tr>
<tr>
<td>NI (n=19)</td>
<td>.03 (.19)</td>
</tr>
</tbody>
</table>

A one way ANOVA was used to examine the three groups with respect to change scores on the MMSE speech subscale. There were no between-group differences \( F(2,50) = 0.56, p = 0.94, \eta^2 = 0.002 \). Both hypotheses one and two were therefore not supported as seen in Table 3.8 below.
Table 3.8 Change in MMSE total scores

<table>
<thead>
<tr>
<th></th>
<th>Change in MMSE total scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>(n=16) 1.31 (3.45)</td>
</tr>
<tr>
<td>DT</td>
<td>(n=16) .12 (2.65)</td>
</tr>
<tr>
<td>NI</td>
<td>(n=19) .10 (3.19)</td>
</tr>
</tbody>
</table>

A one way ANOVA was used to examine the three groups with respect to change scores on the MMSE. There were no between-group difference ($F_{(2,50)} = 0.80$, $p = 0.45$, $\eta^2 = 0.03$). Both hypotheses one and two were therefore not supported.

3.8.2 Geriatric Depression Scale (GDS-15) (Sheikh, 1986)

The GDS-15 (Sheikh, 1986) scores are summarised below in Table 3.9.

Table 3.9 Change in GDS-15 scores

<table>
<thead>
<tr>
<th></th>
<th>Change in GDS-15 total scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>(n=16) -.06 (2.60)</td>
</tr>
<tr>
<td>DT</td>
<td>(n=16) .09 (2.97)</td>
</tr>
<tr>
<td>NI</td>
<td>(n=19) .92 (2.66)</td>
</tr>
</tbody>
</table>

A one way ANOVA was used to examine the three groups with respect to change scores on the GDS-15 (Sheikh, 1986). There were no between-group differences ($F_{(2,50)} = 0.66$, $p = 0.52$, $\eta^2 = 0.02$). Both hypothesis one and two were therefore not supported.

3.8.3 Digit Span Test (DST) (Hunsley et al., 1988)

Change in DST (Hunsley et al., 1988) scores are summarised below in Table 3.10.

Table 3.10 Change in DST scores

<table>
<thead>
<tr>
<th></th>
<th>Change in DST total scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>(n=16) .00 (1.69)</td>
</tr>
<tr>
<td>DT</td>
<td>(n=16) .06 (2.23)</td>
</tr>
<tr>
<td>NI</td>
<td>(n=19) -.73 (2.94)</td>
</tr>
</tbody>
</table>
A one way ANOVA was used to examine the three groups with respect to change scores on the DST (Hunsley et al., 1988). There were no between-group differences ($F_{(2,49)} = 0.60, p = 0.55, \eta^2 = 0.02$). Both hypothesis one and two were therefore not supported.

### 3.9 Correlations

To determine if there was a relationship between the variables, correlations were performed as in Table 3.11 below.

**Table 3.11 Variable correlations**

<table>
<thead>
<tr>
<th></th>
<th>MMSE total score test 1</th>
<th>GDS total score test 1</th>
<th>DST total score test 1</th>
<th>BNT test 1</th>
<th>ANT test 1</th>
<th>Education level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMSE total score test 1</td>
<td>.122</td>
<td>.723</td>
<td>.634</td>
<td>.627</td>
<td>.182</td>
<td></td>
</tr>
<tr>
<td>GDS total score test 1</td>
<td>.122</td>
<td>.055</td>
<td>.072</td>
<td>.062</td>
<td>.230</td>
<td></td>
</tr>
<tr>
<td>DST total score test 1</td>
<td>.723</td>
<td>.055</td>
<td>.661</td>
<td>.669</td>
<td>.208</td>
<td></td>
</tr>
<tr>
<td>BNT test 1</td>
<td>.634</td>
<td>.072</td>
<td>.661</td>
<td>.741</td>
<td>.142</td>
<td></td>
</tr>
<tr>
<td>ANT test 1</td>
<td>.627</td>
<td>.062</td>
<td>.669</td>
<td>.741</td>
<td>.226</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>.182</td>
<td>.230</td>
<td>.208</td>
<td>.142</td>
<td>.226</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen in the above table 3.11 above, level of education and depression had very little effect on the performance on the BNTSF (Mack et al., 1992) and the ANT (Spreen & Strauss, 1998). Depression levels also had very little effect on the performance. However, correlations between MMSE (Folstein et al., 1975) and both the BNT and the ANT showed a significant relationship between performance on these language tests and cognitive function.
3.10 Summary of results

162 people with varied types of dementia subtypes residing in 2 sub-acute hospital settings were consented into the current study to determine if MT decreased dementia related speech deficits (in particular naming). The study also compared the effects of MT on dementia related symptoms to a DT and NI group. The study resulted in 51 completed sets of data, divided into 3 groups MT (n=16), DT (n=16) and NI (n=19), of which all the groups were relatively even in levels of cognitive function, age, mood and speech levels at baseline. Using a one-way repeated ANOVA the changes in the scores of the MT group were compared to the DT group (hypothesis 1), and score changes in both the MT and DT group were compared to the NI group (hypothesis 2). Results of the one way repeated ANOVA did not support the two hypotheses. Changes in the scores of the secondary outcome measures using a one way repeated ANOVA did not support the two hypotheses. These results will be discussed in the next chapter.
CHAPTER 4

DISCUSSION AND CONCLUSIONS

This chapter discusses the results of the study. First, the hypotheses are discussed and the findings related to the literature. Next, the methodological issues are discussed, in particular the problems associated with recruiting and retention of participants, given their vulnerable physical and mental condition. Next there is a discussion in relation to the therapeutic issues carried out in this study. Finally, the discussion highlights the contribution of this study to clinical practice in MT and makes recommendations for future studies.

4.1 Hypotheses

4.1.1 Hypothesis 1 and 2

This RCT study employed rigorous research methods recommended by Vink et al. (2004) to determine if MT and DT had an accumulative effect on dementia related language deficits over a 3 week period. The results were non significant, thus both hypothesis 1 and hypothesis 2 were not supported.

Firstly, it may be possible that these null results may be accurate, given the stringent research methods applied as recommended by Vink et al., (2004). The BNTSF (Fastenau et al., 1998; Mack et al., 1992) was chosen specifically for this study for its validity and reliability for people with dementia (Diehl et al., 2005; Fisher et al., 2004). The ANT (Spreen & Strauss, 1998) was also chosen for its reliability and validity and it’s frequent use alongside the BNTSF (Fastenau et al., 1998; Mack et al., 1992). It was also chosen for its adaptability to the dementia population (Connor et al., 2005; Mok et al., 2004). Both these tools were also very quick to administer, avoiding the possibility of increased agitation to the participants.

In contrast to the current study however, other MT and dementia related language RCT studies have claimed significant results (Folstein et al., 1975; Suzuki et al., 2004; Van de Winckel et al., 2004). However it must be noted that the significant results
generated were both from subscales of the MMSE (p=0.012) (Suzuki et al., 2004) and the subscale of the Amsterdam Dementia Screening Test 6 (ADS 6) (Lindeboom & Jonker, 1988) p<0.05 (Van de Winckel et al., 2004). The author chose to generate data from a complete tool rather than part of a tool, as recommended by Vink et al. (2007).

Secondly, other recent RCT MT studies that have aimed at meeting Vink et al.’s recommendations and have aimed to explore the longer-term effects of MT similar to the current study, have also had non-significant results similar to the current study. Cooke et al’s 2010 study looked at the effectiveness of live music on quality of life and depression levels of people with dementia, with a cross-over design, incorporated complete validated and standardised tools, with a sample size (n=47) large enough to detect significant differences. The analysis also followed the Intention-To-Treat principle, to avoid overestimation of clinical effectiveness, as did the current study. However Cooke et al.’s overall results yielded a null effect. Similarly, Ledger and Baker’s (2007) RCT MT and dementia study also showed overall non significant results (p=0.432), which set out to determine if MT had accumulative effect on the agitation levels of people with dementia, with 3 monthly data generated from the CMAI long form (Cohen-Mansfield, 1996) from weekly MT intervention for 42 weeks. Given that dementia is a syndrome where it’s symptoms continue to increase in severity over time (Hopper & Bayles, 2001), it can be argued that the possibility of capturing the dementia-related long term effects of MT could be undermined by the continuing deteriorating nature of dementia. However, if this deterioration was a factor in the current study, we would expect a differential result between the MT/DT and the NI (control) group, as this study was looking at the accumulative effect of such interventions over a 3 week period. But the results show there was very little difference between the intervention groups (MT and DT) and the control group (NI). It could then be argued that 3 weeks may not be a significant time period to see an accumulative effect of an intervention such as MT and DT, and also not enough time to see the deteriorating effect of dementia.

MT language studies investigating the immediate effects of MT on dementia related language symptoms have claimed positive results (Brotons & Koger, 2000; Carruth,
1997; Pollack & Namazi, 1992; Smith, 1986). However, the quality of their research design can be questioned, using subscales of validated tools (Brotons & Koger, 2000; Pollack & Namazi, 1992; Smith, 1986) and small numbers of participants (Carruth, 1997) (n=7).

With the quantitative research approach chosen not yielding significant results, another approach would be using mixed methods, where both quantitative and qualitative data is captured for example in part of Quinn’s 2003 study, where MT was seen to be effective according to the qualitative results but non-effective according to the quantitative results. The quantitative approach was chosen for this study due to recommendations for future MT studies by Vink et al.,(2007). The author was also aware of the increasing demand for evidence based medicine (Edwards, 2002). The non significant results of the present study along with results of other recent RCTs (Cooke, Moyle, Shum, Harrison, & Murfield, 2010; Ledger & Baker, 2007) have called for a re-think on what is realistic evidence based practice for MT researchers in the field of dementia. It could be argued that a mixed methods approach could be a more effective research approach, based on studies by Quinn (2003) and Ridder et al., (2009) who captured both qualitative and quantitative data.

It is possible that the participants’ education level may have contributed to the lower performances on the BNTSF (Fastenau et al., 1998; Mack et al., 1992). Hawkins and Bender (2002) found the BNT (Kaplan et al., 2001a) to discriminate the most in education between 8th and 12th grade educations. In the current study, it was very difficult to obtain information about specific years of education directly from the majority of the participants, as their offspring were not aware of their level of education. The descriptive data revealed that both the MT and DT groups had a similar level of education, within the education level that is difficult for the BNT to discriminate. However, in this study, the BNTSF was used to detect change over time as a result of an intervention, so the BNTSF would seem to be an appropriate language tool for this purpose.

The results revealed there was no significant effect on cognitive function on the MT group as compared to the DT and NI groups, indicating therefore that there was no
change in cognitive function to effect change in speech deficits (Bayles et al., 2000; Haak, 2002). It could be argued that the MT intervention assisted in preventing a decrease in cognitive function (as can occur in all people with dementia (Grabowski & Damasio, 2004; Muller-Spahn & Hock, 1999; Waldemar et al., 2007).

The majority of admissions to both the ACI ward and the Ellerslie Unit were for rehabilitation following exacerbated symptoms of dementia due to factors such as infections, falls and psychological illnesses. So it could be expected that there would be the likelihood that the participants would improve physically and cognitively because they were unwell when admitted and were in a rehabilitative hospital setting, in particular the NI (control) group. All of the participants were also receiving continuous medical and allied health services including physical and occupational therapy, and constant interaction with nursing staff. There was no speech therapy received by any of the participants in this study. On the other hand, with dementia being a syndrome of continuous cognitive decline (Grabowski & Damasio, 2004; Waldemar et al., 2007), it could be argued that despite medical and allied health intervention, not all participants with dementia would improve in cognitive and memory function. Interestingly, the results of this study showed very little change between all three groups.

4.2 Main finding in relation to the literature

4.2.1 Non significant effect of MT on dementia-related speech deficits

The aim of this study was to determine if MT could decrease the dementia effects of speech deficits. The results of this study indicated that MT had no significant effect on speech deficits in participants with dementia, based on measures from two validated and reliable language tools, the BNTSF (Fastenau et al., 1998; Mack et al., 1992) and the ANT (Spreen & Strauss, 1998). These non-significant results can be related to the significant findings of other MT and language studies in the literature in regards to the research design and the language tools used. Those studies that have reported significant results (Brotons & Koger, 2000; Groene, 2001; Pollack & Namazi, 1992) did not use complete language tools, such as the current study, and
the research designs did not meet the recommendations by Vink et al., (2007). The current study showed no significant results, despite a rigorous design and moderate effect size for the BNTSF (Fastenau et al., 1998; Mack et al., 1992).

Similar to other MT and dementia studies (Ledger & Baker, 2007; Suzuki et al., 2004; Van de Winckel et al., 2004), this study also aimed to determine the accumulative effect of MT on dementia-related speech deficits collecting data at baseline and after 3 weeks of intervention, as opposed to collecting data immediately after each session similar to other MT and speech studies (Carruth, 1997; Groene, 2001; Pollack & Namazi, 1992; Smith, 1986; Thompson, Moulin, Hayre, & Jones, 2005). It is possible that this study may have yielded more effective results if data was collected immediately pre and post each intervention.

**4.3 Contribution to current MT literature**

**4.3.1 The research design**

Despite the research design of this RCT study adhering to the recommendations by Vink et al., (2007) and the CONSORT guidelines for the reporting of randomised trials (Moher et al., 2010), the non significant results can be seen to indicate that MT is not effective in improving dementia related language deficits, but is effective in improving other dementia related symptoms such as agitation (Brotons & Pickett-Cooper, 1996; Gerdner & Swanson, 1993; Guetin et al., 2009; Ledger & Baker, 2007; Svansdottir & Snaedal, 2006), social isolation (Lord & Garner, 1993; Pollack & Namazi, 1992). However, the evidence of these studies can be questioned due to their methodological quality (Vink et al., 2007).

It is also interesting to note that the majority of MT language and dementia studies did not include a NI (control) group in their study. The majority of studies were designed with the participants as their own control (Groene, 2001; Pollack & Namazi, 1992; Quinn, 2003; Suzuki et al., 2004; Van de Winckel et al., 2004). Other studies exposed the participants to MT and an alternative intervention (Carruth, 1997; Smith, 1986; Thompson et al., 2005). The current study with the inclusion of a NI
(control group) contributes to the current MT language and dementia literature particularly in relation to speech deficits. In comparison to other MT and dementia studies, the study by Raglio et al., (2008) was designed for a NI (control group) (n=30) and a MT group (n=29) with MMSE (Folstein et al., 1975) baseline scores of 11.1 (SD5.5) and 10.7 (SD5.7) respectively. Post intervention there was no improvement in the NI group in any of the data sets, as compared to the NI group in the current study, where there was a slight improvement in the BNTSF (Fastenau et al., 1998; Mack et al., 1992) (see Table 3.6) and ANT (Spreen & Strauss, 1998) (see Table 3.7). However the NI group in Raglio et al.’s 2008 study were more physically and mentally stable than the participants in the current study, as they were residents in aged care facilities and recruited over a 2 year period, compared to the participants of the current study, who were recruited from the transient dementia population of the sub-acute hospital setting. However the current study was specifically designed to evaluate MT in this sub-acute complex setting to access the maximal number of participants possible. It is important to keep in mind that the population in this current study does not accurately represent the ‘real world’.

4.3.2 Number of participants in the study

The current study recruited the largest number of participants both in the MT group (n=16) and in the study total (n=51) (enough to detect a small change in BNTSF) compared to the other MT dementia and language studies. The large sample size indicates the rigour of the study’s findings thereby contributing to current MT and dementia literature. Researchers carrying out MT RCTs in the field of dementia have difficulty in recruiting and retaining sufficient numbers of participants through the final data collection. There is no current MT and dementia RCT study that has claimed sufficient participant numbers to achieve power. It could be argued that this goal is too difficult due to the relentless decline in functioning due to dementia, the BPSD’s that impede that data collection, and the reluctance of family members to give consent.
4.3.3 The use of a complete language tool

The current study is the first of its kind that has incorporated a complete language tool such as the BNTSF (Fastenau et al., 1998; Mack et al., 1992) and the ANT (Spreen & Strauss, 1998) to generate data to determine the effect of MT on dementia-related speech deficits. Previous MT language studies have used language subscales of cognitive tools (Smith, 1986; Suzuki et al., 2004; Van de Winckel et al., 2004) or subscales of an actual language tool (Koger, Chapin, & Brotons, 1999). Although the results generated by the tools used in the current study were non-significant, this study has broken new ground in choosing complete language tools to generate data to assess the effects of MT on dementia-related speech deficits.

4.3.4 MT method “Word cueing”

Within the MT methods, the author defined a technique called “word cueing,” which has not been referred to in previous MT dementia and language studies. The author uses this technique particularly with people with dementia who have difficulty with expressive language, and difficulty in sequencing lyrics in correct order during singing. The aim of word cueing is to set the person an achievable goal of predicted limited words that they can say or sing at a speed that suits them. The participant is then rewarded verbally by the MT, and later is prompted for the next set of words. This MT technique is an important contribution to current MT and dementia literature.

4.3.5 The sub-acute hospital setting

The setting chosen for this study was a sub-acute hospital setting, as opposed to an aged care setting, which was chosen for all the previous MT and language studies (except for Van de Winckel et al.’s (2007)) study which was set in an aged care psychological hospital). It should be noted that the Van de Winckel et al study was conducted by allied health staff, not MTs. The current study therefore is the first in a sub-acute setting.
4.3.6 Choosing DT as an alternative intervention

The current study is the first MT and language study to date that has incorporated DT as an alternative form of intervention in order to compare the effects of MT on dementia-related speech deficits. Previous studies have chosen reading interventions (Brotons & Koger, 2000), wait listed controls (Carruth, 1997; Smith, 1986; Thompson et al., 2005) or the intervention group as their own controls (Pollack & Namazi, 1992).

4.4 Methodological issues

4.4.1 Research design

The current study was a blinded RCT designed to determine if MT could have a positive effect on dementia-related speech deficits. The aim was to adhere to all recommendations of Vink et al., (2007).

4.4.2 Sufficient duration of MT intervention

The author would have liked to extend the intervention time period to at least 4 weeks to increase the dosage for the MT intervention. It is noted however that previous MT intervention time has also been 3 weeks or less (Brotons & Koger, 2000; Pollack & Namazi, 1992; Prickett & Moore, 1991; Smith, 1986) with the MT intervention in the Suzuki et al., (2004) study being 8 weeks. However there were time constraints within the research setting, with the average stay for people on both the Ellerslie unit and the AC1 ward being 4 to 6 weeks, despite the previous 10 to 12 week estimated stay for clients on both wards. Considerable time was needed for the client’s dementia symptoms to stabilise, then obtain consent and collect the pre and post data.

4.4.3 Frequency of MT interventions

The author would have also liked to provide MT (and therefore DT interventions) Monday to Friday for the three week period. However, there were reasons for this
being too difficult to implement. The DTs were not available five days a week. After lengthy discussions with the nursing staff, it was found to be difficult to access the participants every morning, due to their allied health and medical commitments such as physio and occupational therapy.

4.4.4 Follow up data collection post intervention

In order to obtain sufficient numbers and choose a research setting with a high turnover (such as the Ellerslie Unit and the AC1 ward), there was no opportunity to collect follow up data as each participant was discharged to a different environment (e.g. home, or a residential aged care facility). It would be desirable to include follow-up data in future studies, although the time point is limited by the relentless decline of dementia.

4.4.5 Recruitment

In order to obtain maximum numbers for this RCT trial, the setting with a high turnover of people with dementia was chosen, such as the settings of the Ellerslie Unit and the AC1 ward. As seen in Figure 1, Chapter 3, the author was very fortunate to have access to such a high turnover of people with dementia (n=710) from which to recruit for this study. But as can be seen in Figure 1, from a potential pool of 710 people with dementia, 162 met the eligible criteria for this study and signed consent forms. The main challenge posed for moving the total number of these consented clients in the study across to the pre data collection stage was timing. A large number of people who consented to the study were discharged prior to the pre data collection stage (n=65). Another challenge was the time required in obtaining signed consent from the NOK. The author had to make frequent follow up phone calls to many of the NOK requesting the return of the signed consent forms, in order for data collection to commence. The medical staff was very compliant in providing written verbal referrals for this study in a timely manner.
4.4.6 Place of research

4.4.6.1 The Ellerslie Unit

Although the role of this ward was very similar to the AC1 ward, the turnover in this unit was considerably higher than in the AC1 ward. When this ward was chosen for this study, the estimated time of stay for clients was 10 to 12 weeks. However, the author found that the clients recruited to the study from this unit were often discharged prior to the 4 weeks, often cutting the 3 weeks of intervention (or NI) short, to collect post data.

4.4.6.1 The AC1 ward

The turnover of clients in the AC1 dementia specific ward was approximately 4 to 6 weeks, depending on the physical and mental state of the client, and the availability of a bed in a residential aged care facility. There were times when the turnover on this ward was extremely slow, which significantly hampered the recruiting rate of the study. There were also other issues which hampered recruiting such as an outbreak of gastroenteritis on the Ward for 6 weeks, during which there were no admissions to the ward.

Another issue which often arose, was agitation caused between residents with dementia who were residing on the ward. This occurred on the AC1 in particular as it had an open layout (see Appendix 7). There were times when a particular resident on the ward with very difficult BPSDs would aggravate other residents at random times during the day and/or at night. These types of random behaviours could not be controlled. The layout of the Ellerslie Unit was slightly different given that each resident had a private room or a shared room with one other person.
4.4.7 Lack of participant dementia diagnosis

A significant number of participants (25.5%) (See Table 3.4) initially did not have an official diagnosis of dementia. In order for the participants to be eligible for the study, the resident geriatrician on the ward was asked by the author to review the client, to ensure the client met the criteria for the study. It is important to note that this group of participants were still noted as having a diagnosis of “Cognitive Impairment” as seen in Table 3.4. This result is backed up by literature where there tends to be a low rate of dementia diagnosis (Waldemar et al., 2007). Reasons tend to be diverse, but GP’s can tend to miss the symptoms of early dementia (O’Connor et al., 1988) or can be reluctant to diagnose dementia unless they can see the likely benefits of a diagnosis for the client (Hansen, Hughes, Routley, & Robinson, 2008). Interestingly, on speaking to the NOK, the author received frequent feedback that there was also resistance from the participant earlier in the onset of dementia for a visit to the GP for a diagnosis, during the time when the participant had insight into symptoms of short-term memory loss.

4.4.8 Participant compliance to data collection due to symptoms of dementia

The daily BPDSs often led to the participants being unavailable when it came to data collection. The data collection both pre and post was generally planned for late morning when most people with dementia would be at their most alert, unless specified by the medical and nursing staff. However, in all three groups, MT, DT and NI, pre and post data was lost due to participants’ refusal to participate due to BPDSs (see Figure 1). Some of the reasons included “I am waiting for my wife/husband/daughter” or “I have already seen you before..you have already asked me those questions every day for the past month” or simply “I don’t want to”. As the design of the study including the Moderate Intention to Treat (participants who have not completed all the required intervention, but have completed pre and post data), participants who did not complete the final data sets were not included in the study.
4.5 Outcome measurements

4.5.1 The BNTSF (Mack et al., 1992)

The BNTSF (Mack et al., 1992) was found to be of sound choice for the current study, in detecting change in dementia related speech deficits in response to MT and DT. The study reached sufficient effect size (n=51) to determine a reliable result from the BNTSF. This tool was quick to administer (between 10 to 15 minutes), with professional interpreters used for participants of LOTE background. However one significant disadvantage of this test was found for participants who were visually impaired. Such participants were ‘disqualified’ from this test, but were able to complete the ANT, most of the MMSE, GDS and the DST.

Numerous studies have shown a correlation between higher performance on the BNT and higher education levels (Elkadi et al., 2006; Hawkins & Bender, 2002; Welch et al., 1996). The education levels in the groups of the current study were evenly spread out (see Table 3.3). At least 62% of each of the three groups had between 7 and 12 years of education. However, as mentioned previously, the role of the BNTSF (Fastenau et al., 1998; Mack et al., 1992) was to detect change over time in response to a MT and DT intervention, and the participants had sufficient education levels to complete the tool. All three groups each scored a minimum of 6 out of 15 on the BNTSF (Fastenau et al., 1998; Mack et al., 1992) pre and post intervention which indicates satisfactory performance considering this group had moderate to severe dementia (MMSE pre scores approximately 17 – 19) (see Table 3.6).

4.5.2 ANT (Spreen & Strauss, 1998).

Overall, the author found the ANT (Spreen & Strauss, 1998) an appropriate tool to assess changes in dementia related speech deficits in response to MT and DT interventions. This tool was easy and quick to administer, with studies showing that it does not discriminate between different levels of education (Connor et al., 2005; Mok et al., 2004). Professional interpreters were used for participants of LOTE
One of the disadvantages of using this test however, was that considerably large effect size of participants with dementia were required, numbers that were not achievable in this current study. Therefore there is the possibility that the non-significant results of the ANT may have been due to insignificant numbers.

4.5.3 MMSE (Folstein et al., 1975)

The MMSE (Folstein et al., 1975) had three roles in this study: 1) assessing cognitive levels for stratified randomisation into either of the 3 groups; 2) assessing change in cognitive function in response to MT, DT or NI intervention and 3) assessing language function using it’s language subscales (name pencil/watch and repeat sentence “No ifs..”).

The MMSE (Folstein et al., 1975) appeared to be a successful tool in determining cognitive functioning for randomisation into the three groups, as range of base line data (pre intervention) between the groups was very small: DST (Hunsley et al., 1988) 10.79(5.35) to 11.33(3.83) (see Table 3.11); ANT (Spween & Strauss, 1998) 5.73(3.82) to 6.50(4.50) (see Table 3.7) and BNTSF (Fastenau et al., 1998; Mack et al., 1992) 6.37(3.50) to 7.12(4.03) (see Table 3.6).

In the current study, the two naming questions of the MMSE (Folstein et al., 1975) were used to detect changes in naming of which there was no significant post intervention changes (p=0.94). Other MT and dementia studies have used the complete language subscale of the MMSE (Folstein et al., 1975) to detect possible improvements in language in response to MT. In both of these studies (Smith, 1986; Suzuki et al., 2004) data generated from the MMSE language subscale indicated a slight improvement in language Smith (n=12)(p>.05) and a significant improvement in language(n=10) (p=0.012). It could be argued that using data from the total language subscore of the MMSE (Folstein et al., 1975) for this study would have increased the possibility of generating a more reliable result of the effect of MT on language. However as this study was focused particularly on the effect of MT on spontaneous speech deficits (in particular naming) as a result of dementia, the questions directly testing naming and speech were chosen: “Name a pencil and
watch” and “No ifs and buts...”. It would have been interesting to see if MT had a positive effect indicated by the two naming questions in both Smith’s 1986 and Suzuki et al.’s 2004 studies, similar to the current study. However, the MMSE (Folstein et al., 1975) language subscale data was reported as a total score, not separated into distinct language functions in both studies.

4.5.4 GDS-15 (Sheikh, 1986)

The GDS-15 (Sheikh, 1986) was used in this study to determine if symptoms of depression were present, and if such symptoms were likely to affect participants’ performance in other areas such as cognitive function and therefore speech (in particular naming). The DT group having mild levels of depression pre and post intervention, with both the MT and NI groups bordering on mild depression (see table 13) backs up literature that it is very common for depression to co-exist with symptoms of dementia (Eastley & Wilcock, 2005; Starkstein, 2005; Starkstein, Jorge, Mizrahi, & Robinson, 2005).

4.5.5 The Digit Span Task

The DST (Hunsley et al., 1988) was chosen to detect any changes in the participants’ working memory as damage to this area in people with DAT results in language deficits such as decreased concentration span and in particular limited ability to search and retrieve stored linguistic information (Bayles, 2003). This tool was found to be easily administered to the participants of this study.

4.6 Contributions of the current study to clinical practice

With this study not supporting MT improving speech ability in dementia, this study contributes to clinical practice by arguing that MT may be more effective focusing on other variables such as quality of life and creating a sense of purpose for people with dementia through MT techniques such as singing.

Although widely used in MT clinical practice, this is the first MT study that has supported the use of “word cueing” and has clearly explained this MT technique in
individual steps. This technique is very effective for people with dementia as it sets out very simple and thus achievable goals for the participants, who are rewarded with confidence in themselves and their existing verbal abilities.

Numerous MT techniques effective for people with dementia were reinforced as effective in this study. Using music of the person’s earlier years was the most effective in this study (Bartlett & Snelus, 1980; Clair, 1996; Gerdner, 2000; Huei-chuan & Chang, 2005; Moore et al., 1992). As seen in the studies by Prickett (2000) and Whitcomb (1994), even when dementia resulted in difficulty reading lyrics, a lot of participants were able to recall the lyrics from their long term memory. All participants responded positively to music and instrument playing (Ashida, 2000) with instrument playing also a popular MT technique with this dementia population (Clair & Bernstein, 1990b; Clair et al., 1995).

Although statistical evidence is yet to prove the benefits of MT on the devastating effects of dementia, it is important not to disregard the empirical evidence on the benefits of MT in the general community. In the current study, not one carer refused consent because they did not want their loved one to participate in MT. In fact, many carers verbalised their hope that their loved one would be randomised into the MT group, as the potential participant ‘loved music’. A wife of a participant requested a recording of her husband singing, as as she stated “He has never been this happy (in the MT group) since before his dementia diagnosis”. For such a positive response from carers (non medical professionals) based on only empirical MT evidence, I believe there is significant MT and dementia data available, it is our role as researchers to define it and then capture it.
4.7 Recommendations for future studies

4.7.1 Incorporating qualitative research in RCT’s: Mixed Methods in MT and dementia research

Despite this study adhering to recommendations for RCT studies by Vink et al., (2007) it is possible that valuable qualitative data could have been captured through structured observation, and interviews of staff and some informal carers who attended some MT sessions. However the research design of the current study left no opportunity to capture such data. It is recommended that future MT and dementia related studies capture both quantitative and qualitative data (mixed methods) to enhance the possibility of capturing both types of evidence.

4.7.2 Study setting

The ideal setting for a similar study would be in a combination of aged care facilities concurrently where there is no time limit for MT intervention and pre/post data collection, both qualitative and quantitative. Incorporating a number of aged care facilities would ensure access to sufficient number of people with dementia for recruitment, as the turnover in these facilities is very low. However, such a research project would involve considerable money, logistics, MTs, (to run MT sessions at the same time in the different facilities) and research staff.

4.7.3 The DT group

It is recommended that similar to the current study, a non-pharmacological control condition such as DT be incorporated in future MT and dementia RCT studies, (with the music aspect of DT removed). DT is recommended as the control condition as it is a non-pharmacological intervention widely used throughout the aged care industry (Diversional Therapy Association of Australia, 2007). Another reason for choosing DT as the control condition, is that its goals are similar to MT, i.e., to facilitate the process of empowerment and enable participants to make choices to meet their individual needs. Similar to MT, DT care plans are individually and carefully planned
to enhance the psychological, social, emotional, spiritual, cognitive and physical well-being of the individuals. Although DT incorporates music activities (Harvey, 2005; Randall, 2005; Sobel, 2001), the music aspect of DT is easily removed in order for DT to be used as a control condition in a research study.

4.7.4 Frequency of data collection

Due to the progressive nature of dementia, and therefore speech deficits, it is recommended that data be collected pre and post every MT (and DT) intervention either within the 24 hour period or immediately pre and post. Every researcher hopes for MT to have an accumulative or long term effect on symptoms of dementia. There have been MT and dementia studies that have demonstrated long term positive effects of MT on systolic BP (Takahashi & Matsushita, 2006) and studies that have not yet able to prove the long term effect of MT on dementia related agitation (Ledger & Baker, 2007). However, up to date, there are no MT and dementia related language studies that have just focused on the accumulative effect, other than the current study, which only obtained data pre intervention period and post intervention period.

4.7.5 Length of MT intervention period and frequency

It is recommended that the MT intervention period be extended beyond the 3 weeks of the current study to a minimum of 3 interventions per week for 6 weeks (Quinn, 2003; Van de Winckel et al., 2004). It is recommended that MT sessions be conducted once to three times a week, to mimic MT sessions in the residential aged care facilities. In Van de Winckel’s 2004 study, music and exercise interventions were reported to be conducted every day. Even though the intervention in Van de Winckel et al.’s study was music and exercise (not MT), in the author’s experience, very few residential aged care facilities have enough funds to employ Registered MTs to be able to provide daily MT to people with dementia. The author believes that it is important that research designs accurately reflect reality of the environment that the participant’s live in, in order that the results of the research can be accurately
applied to practice. The author felt the length of the MT sessions (approximately 50 minutes) was sufficient for this population.

4.7.6 Frequency of data collection

It is recommended that future MT dementia related language studies incorporate research designs that collect data immediately pre and post each intervention. The purpose of such data collection frequency is to overcome the possibility of deteriorative nature of language deficits associated with the progressive nature of cognitive impairment associated with dementia (Bayles, 2003; Bayles et al., 1992; Haak, 2002; Snowden, 1999, 2005), affecting the positive effect of MT on the data.

The pre data scores can then be correlated to determine if a deterioration in dementia symptoms has occurred and if so, the severity of the decline. This decline can then be correlated with the post MT scores to determine is MT has had an effect despite the deterioration in the dementia symptoms.
REFERENCES


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Appendix 1

NARI research laboratory

NARI is situated at the bottom right hand corner of the map below. The research laboratory is a small room inside the central building.
Appendix 2

Ethics approvals

Mental Health Research and Ethics Committee Approval Form

This is to certify that

MIHREC Project No: 2007.05 Approval date: 07.03.07 Expiry date: 07.03.09

Project Title: Evaluating the therapeutic effects of music interventions on hospitalised people with dementia

Principal Investigator: Dr Bruce Barber
NARI
PO Box 31
PARKVILLE 3052

Sponsored by: N/A

Protocol No: N/A

Participant Information and Consent Form: Version 1 dated 23/01/2007

Investigator Brochure: N/A

Other enclosures: N/A

Conducted at: Royal Melbourne Hospital, Royal Park Campus has been approved

It is now your responsibility to ensure that all people conducting this research project are made aware of which documents have been approved.

This approval is subject to ongoing, current and valid insurance coverage throughout the duration of the conduct of the study.

You are required to notify the Manager of the Mental Health Research and Ethics Committee of:
• Any change in the protocol and the reason for that change together with an indication of ethical implications (if any) by submitting an amendment to the study;
• Serious adverse effects on subjects and the action taken to manage them, including an amended Patient Information and Consent Form where appropriate;
• Any unforeseen events;
• Your inability to continue as Principal Investigator, or any other change in research personnel involved in the study;
• A delay of more than 12 months in the commencement of the project; and
• The actual date of commencement of the study.

You are required to submit the following reports to the Mental Health Research and Ethics Committee:
• An Annual Report every twelve months for the duration of the project; and
• A detailed Final Report at the conclusion of the project.

The Mental Health Research and Ethics Committee may conduct an audit at any time.

An extension of the project beyond the stated conclusion date should be sought from the Mental Health Research and Ethics Committee.

Signed:

Michelle Clemson
Manager
Mental Health Research and Ethics Committee
Standing Committee on Ethics in Research Involving Humans (SCERH)
Research Office

Dr Samia Toukhsati
School of Psychology, Psychiatry and Psychological Medicine
Faculty of Medicine, Nursing and Health Sciences
Caulfield Campus

27 April 2007

CF 07/0992 - 2007/0242MC - Evaluating therapeutic effects of music interventions on hospitalised people with dementia

Dear Researchers,

The above research project has been considered by the Standing Committee on Ethics in Research Involving Humans and approval has been given. This approval will be ratified at meeting A3/2007 on 8 May 2007. It is possible that issues may be raised by the Committee at that meeting. If you do not hear anything further you may assume that approval for the project is confirmed.

Terms of approval
1. This project is approved from 27 April 2007 to 7 March 2009 and this approval is only valid whilst you hold a position at Monash University.
2. It is the responsibility of the Chief Investigator to ensure that, if relevant, all information that is pending is forwarded to SCERH. You will then receive a letter from SCERH confirming that we have received the information.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by SCERH.
4. You should notify SCERH immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. Amendments to the approved project: Changes to any aspect of the project require the submission of a Request for Amendment form to SCERH and must not begin without written approval from SCERH. Substantial variations may require a new application.
6. Future correspondence: Please quote the project number and project title above in any further correspondence.
7. Annual reports: Continued approval of this project is dependent on the submission of an Annual Report. Please provide the Committee with an Annual Report determined by the date of your letter of approval.
8. Final report: A Final Report should be provided at the conclusion of the project. SCERH should be notified if the project is discontinued before the expected date of completion.
9. Monitoring: Projects may be subject to an audit or any other form of monitoring by SCERH at any time.
10. Retention and storage of data: The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

All forms can be accessed at our website www.monash.edu.au/resgrant/human-ethics

We wish you well with your research.

Alison Johannessen
Acting Human Ethics Officer (on behalf of SCERH)

Cc: Dr Bruce Barber, Ms Chatushka Fonseka, Prof David Ames, Dr Dina LoGuidice, Prof Denise Grocke, Ms Loretta Quinn

Postal - Monash University, VIC 3800, Australia
Building 5E, Room 111, Clayton Campus, Wellington Road, Clayton
Telephone +61 3 9905 5400 Facsimile +61 3 9905 1420
Email scerh@adm.monash.edu.au www.monash.edu.au/research/ethics/human/index.html
CRICOS Provider No. 00009C ABN 12 377 614 012
Appendix 3

Addit ethics approval

RESEARCH DIRECTORATE

25 March 2008

Dr Bruce Barber
Research Fellow
National Ageing Research Institute
Parkville

Dear Bruce,

RE: MHREC 2007.005 Evaluating the therapeutic effects of music interventions on hospitalised people with dementia

Thank you for submitting the following correspondence:

A Request for Approval of Amendments form enclosing:

- Updated Module One (addition of a third arm into an existing 2-arm randomised control trial);
- Updated PICF for individuals with dementia; and
- A PICF for healthy age-matched individuals.

The Mental Health Research and Ethics Committee have reviewed and approved the above amendment.

Yours sincerely,

[Signature]

Ms. Michelle Clemson
Manager
Mental Health Research and Ethics Committee
Thursday, 19 April 2007

Dr B Barber
National Animal Research Institute

This approval is for the following participant information and consent form(s):
- Participant Information and Consent Form version 2 dated 27 February 2007
- Person Responsible Information and Consent Form version 2 dated 27 February 2007

The following documents are enclosed:
- One signed copy of page 1 of the application form
- 3 copy(s) of the Approval to Examine Medical Records form #
- One copy of the Health Information Services (HIS) Research Guidelines

Yours sincerely

[Signature]

Dr Andrea Lines
Secretary, Human Research Ethics Committee-A

#cc: Health Information Services
18th September 2007

Ms Loretta Quinn
C/- National Ageing Research Institute
Gate 4
34-54 Poplar Road
PARKVILLE VIC 3052

Dear Ms Quinn

Thank you for your application for a PhD Scholarship with TIME for dementia, the Victorian and Tasmanian Dementia Training Study Centre for Health Professionals.

Applications have now been assessed by the selection committee and we are pleased to advise that your application has been successful.

Your scholarship will be managed through NARI and you should contact Professor Stephen Gibson to organise payments.

All scholarships are subject to TIME receiving evidence of successful enrolment and satisfactory progress reports.

Best of luck with your research.

Regards

Professor Rhonda Nay
Director
Appendix 5

Participant information and consent documents

Participant Information and Consent Form
Version 2 Dated 14/02/2007
Site 1

Full Project Title: Evaluating the therapeutic effects of music interventions on hospitalised people with dementia
Principal Researchers: Dr Bruce Barber, Professor David Ames, Dr Dina LoGiudice
Associate Researchers: Associate Professor Denise Groke, Dr Samia Toukhsati, Ms Loretta Quinn, Ms Chathushka Fonseka.

This Participant Information and Consent Form is 8 pages long. Please make sure you have all the pages.

1. Your Consent
You are invited to take part in this research project.

This Participant Information contains detailed information about the research project. Its purpose is to explain to you as openly and clearly as possible all the procedures involved in the project before you decide whether or not to take part in it.

Please read this Participant Information carefully. Feel free to ask questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this.

Once you understand what the project is about and if you agree to take part in it, you will be asked to sign the Consent Form. By signing the Consent Form, you indicate that you understand the information and that you give your consent to participate in the research project.

You will be given a copy of the Participant Information and Consent Form to keep as a record.

2. Purpose and Background
The purpose of this project is to measure the capacity for music therapy to help in reducing the symptoms of diseases of the brain (commonly referred to as dementia) that cause memory loss, depression, emotional instability, language impairment and which lead to loss of independence and, in many cases isolation and loneliness.

A total of 180 people will participate in this project.

Previous experience has shown that current medications are unable to prevent or cure most of these conditions and that their capacity to reduce the associated is somewhat limited. In some cases, medications have significant side effects.

For the past twenty years there have been many reports that the therapeutic use of music leads to improvements in most of the symptoms and enables people with dementia to function at a

The National Ageing Research Institute
higher level than they would otherwise be able. While the claims are persuasive there is, currently, very little scientific evidence to confirm the benefits of music therapy. This project aims to test the claims and to provide scientific evidence to demonstrate whether they are justified or not. The study will compare music therapy to occupational therapy (a practice which is already employed successfully in hospitals) to find out if it offers benefits over and above those of occupational therapy.

You are invited to participate in this research project because you have been diagnosed with a condition that causes memory loss and other problems and are therefore ideally suited to assist us in collecting the type of information we need to assess the effects of music therapy.

The results of this research may be used to help two students on the research team obtain a degree. Ms Chathushka Fonseka is an honours student in Behavioural Neuroscience at Monash University. Ms Loretta Quinn is a Doctor of Philosophy student at The University of Melbourne.

3. Procedures

Participation in this project will involve the following.

- You will participate in either a music therapy program or an occupational therapy program of three one-hour sessions per week for three weeks while you are staying at Royal Melbourne Hospital (Royal Park). The day before the first therapy session you will be assessed using a number of different measures. These measures involve: a short recording of the electrical activity of your brain using a commonly used non-invasive procedure; taking your blood pressure; questionnaires that will assess your current memory and basic language and calculation skills; a questionnaire that assesses your mood. Midway through the three-week program, we will make a short video recording of you while you are participating in a therapy session. First we will film of the whole group simply confirm your presence at the session. Then we will record video images of your face to allow us to observe your responses to the activities on the basis of changes in your facial expressions. The day after the last therapy session we will repeat the same measures that were made before the first therapy session. Four weeks later a researcher will visit you at your home to repeat one questionnaire.

- If you agree to take part in the study you will be randomly assigned to either the group that receives music therapy or the group that receives occupational therapy. The reason for assigning people randomly to one procedure or the other is to prevent one group being made up only of people who have a particular characteristic, for example a love of music. For our research to meet scientific standards, it is necessary to ensure that both groups are as similar as possible.

- The music therapy group will be called the ‘experimental’ group. The occupational therapy group will be called the ‘control’ group. In scientific research that aims to find out the effects of an intervention – in this case, music therapy – it is necessary to compare the results of music therapy to some other routinely used therapy – in this case, occupational therapy. If the measures we made before and after the music therapy program showed that there were significant changes in, for example, memory functions we could not necessarily argue that this was a result of the music therapy. It might just be the result of the normal day-to-day care that is provided in the hospital. On the other hand, if the improvements occurred only in the music group but not in the occupational therapy group we will argue that music provided a benefit that was not evident as a result of occupational therapy.

- The initial measures, made the day before the therapy sessions begin, will involve approximately half an hour for the recording of your brain activity, fifteen minutes to record blood pressure four times during the morning, and a maximum of 45 minutes for the questionnaires. This is a total of about 90 minutes. These same measures will be repeated the day after the last therapy session. Over three weeks, there will be nine therapy sessions of approximately 50 minutes each. The visit to your home will take about 15 minutes.

The National Ageing Research Institute

Participant Information & Consent Form, Version 2, Date: 14/02/2007
• Your participation will also mean that we will need to collect information from your medical records held at the hospital. The information we need includes your date of birth, marital status, your nominated next of kin, your medical diagnoses and your medications.

4. Possible Benefits
We cannot guarantee or promise that you will receive any benefits from this project. We are undertaking the research because we believe there is sufficient evidence in support of music therapy to justify spending money, time and effort to investigate its potential value, but until we have strong evidence it is not possible for us to make any guarantees.

Based on many published reports, possible benefits include improved memory function, more stable and positive mood, less agitation, better communication skills, better sense of self-worth and well-being, reduced use of medications and better quality of life. The first goal of both occupational therapy and music therapy is that participants enjoy it. Therefore, the programs are designed not only to assist you coping with your health condition but also to provide you with a pleasurable and rewarding activity.

If the study produces evidence that music therapy is an effective intervention for older people with dementia, people with similar conditions in the future are more likely to have better access to music therapy services as a routine part of their health care.

It is also possible that when we record the electrical activity of your brain we may detect information that contributes to a better understanding of your current health status.

5. Possible Risks
Possible risks, side effects and discomforts include, for the most part, only those that are present in your day-to-day living in the hospital. However, there is about a one in one hundred chance that you may experience some discomfort as we prepare you for the recording of the electrical activity of your brain. To record this activity we place a cloth cap (similar to a shower cap) on your head. The cap has woven into it a number of electrodes that record the tiny electrical signals that are always present on the surface of your scalp. To ensure that we can record these signals accurately we place a small quantity of a water-based gel between your scalp and each of the electrodes. While the process does not involve any pain or do any injury to the skin, our experience shows that some people feel a little anxious at first. Having conducted several hundred such recordings, the NARI research team has only had one person who was unable to continue with the procedure. The water-based gel washes out of the hair easily.

One of the questionnaires can trigger an emotional response as it asks questions about your current mood. Typically, people who have been hospitalised with an illness are subject to emotional ups and downs and some of these questions can bring these to the surface. Approximately one in sixty people may find some of the questions upsetting. If this occurs the researcher will remind you that you are not obliged to continue with the questionnaire. In our experience with several hundred people in comparable circumstances not one has chosen to discontinue. In these situations people have indicated that despite the emotional nature of the questions they welcome the opportunity to discuss such issues. If a participant finds the questions deeply upsetting he or she will be given immediate access to counselling from one of the qualified staff on site at the hospital.

It should be noted that all participants are free to suspend their participation or even withdraw from the study at any time if they so choose.

Despite substantial experience of the research team, it is possible that there may be additional unforeseen or unknown risks. Being in a hospital setting and research team and hospital staff combined are well-equipped to respond rapidly and effectively to such events.

The National Ageing Research Institute

Participant Information & Consent Form, Version 2, Date: 14/02/2007
6. Alternatives to Participation

If you choose not to participate in this project you will not be disadvantaged in any way. While you will not have access to a structured music therapy program, music is made available from time to time in the ward and you can also make alternative private arrangements to have your own music listening equipment for personal use. Occupational therapy is available as part of the normal hospital services. Whether you participate or not, no standard treatments will be withheld from any participants. It should be noted that participants in the music therapy group will still receive the usual occupational therapy treatments.

7. Privacy, Confidentiality and Disclosure of Information

All the hard copy (paper) information you provide will be held in locked filing cabinets on site at The National Ageing Research Institute. It will also be transferred to a database on our computer system. Such electronic data as well as video records will be held in secure databases on the NARI network protected by security procedures which allow access only to individuals with an authorised username and a unique password. Data will be retained for 15 years. At the end of this period hard copy data will be shredded, electronically stored data on computer hard discs, network backup storage systems and CD/DVD will be deleted.

Any information obtained in connection with this project and that can identify you will remain confidential. It will only be disclosed with your permission, except as required by law. If you give us your permission by signing the Consent Form, we plan to publish the aggregate results in international scientific journals and also to present results at national and international seminars and conferences. We will also notify public media groups.

In any publication or presentation, information will be provided in such a way that you cannot be identified. The information you provide, including the video recording, will be coded numerically and combined with the same information collected from all the participants. Our research depends almost entirely on combined, group data.

8. New Information Arising During the Project

During the research project, new information about the risks and benefits of the project may become known to the researchers. If this occurs, you will be told about this new information. This new information may mean that you can no longer participate in this research. If this occurs, the persons supervising the research will stop your participation. In all cases, you will be offered all available care to suit your needs and medical condition.

9. Results of Project

Results of the project are available in three ways. Firstly, on completion of the project, a summary plain language report of the results will be prepared. This will be forwarded to all participants. Secondly, The National Ageing Research Institute publishes a quarterly newsletter that provides brief summaries of research outcomes. This newsletter is distributed to people who are registered as members of NARI. At the time of recruitment, participants will be invited to register as members. Thirdly, after you participation has been completed, you can ask for access to your personal results. You can do this by contacting Dr Bruce Barber on 8387 2638.

10. Further Information or Any Problems

If you require further information or if you have any problems concerning this project (for example, any side effects), you can contact the principal researchers Dr Bruce Barber (8387 2638 or 0423 292 792), Professor David Ames (9816 0485) or Dr Dina LoGiudice (8387 2000) who are.

The National Ageing Research Institute

Participant Information & Consent Form, Version 2, Date: 14/02/2007

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the researchers responsible for this project. After hours you may contact Dr Barber on 9893 3240 or 0423 292 792.

11. Other Issues
If you have any complaints about any aspect of the project, the way it is being conducted or any questions about your rights as a research participant, then you may contact

Name: Dr Stacey Gabriel
Position: Manager, Mental Health Human Research Ethics Committee
Telephone: (03) 9342 7098

You will need to tell Dr Stacey Gabriel the name of one of the researchers given in section 10 above.

12. Participation is Voluntary
Participation in any research project is voluntary. If you do not wish to take part you are not obliged to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage.

Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your routine treatment, your relationship with those treating you or your relationship with Royal Melbourne Hospital or The National Ageing Research Institute.

Before you make your decision, a member of the research team will be available to answer any questions you have about the research project. You can ask for any information you want. Sign the Consent Form only after you have had a chance to ask your questions and have received satisfactory answers.

If you decide to withdraw from this project, please notify a member of the research team before you withdraw. This notice will allow that person or the research supervisor to inform you if there are any health risks or special requirements linked to withdrawing. Please note that in the event that you choose not to provide some of the information that is being sought it for the purposes of this research you may be advised to withdraw from the study.

13. Ethical Guidelines
This project will be carried out according to the National Statement on Ethical Conduct in Research Involving Humans (June 1999) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

The ethical aspects of this research project have been approved by the Mental Health Human Research Ethics Committee at Melbourne Health.

14. Reimbursement for your costs
You will not be paid for your participation in this project.
Consent Form
Version 2 Dated 14/02/2007
Site 1

Full Project Title: Evaluating the therapeutic effects of music interventions on hospitalised people with dementia.

I have read, or have had read to me and I understand the Participant Information Version 1 dated 22/01/2007.

I freely agree to participate in this project according to the conditions in the Participant Information.

I agree to the researchers making a video recording of me as described in the Participant Information. (please tick) □ Yes □ No

I agree to the researchers accessing my medical records as described in the Participant Information. (please tick) □ Yes □ No

I will be given a copy of the Participant Information and Consent Form to keep.

The researcher has agreed not to reveal my identity and personal details if information about this project is published or presented in any public form.

Participant's Name (printed) ..................................................
Signature ........................................................................
Date .............................................................................

Name of Witness to Participant's Signature (printed) ..................................................
Signature ........................................................................
Date .............................................................................

Declaration by researcher*: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's Name (printed) ..................................................
Signature ........................................................................
Date .............................................................................

* A senior member of the research team must provide the explanation and provision of information concerning the research project.

Note: All parties signing the Consent Form must date their own signature.
Third Party Acknowledgement Form
Version 2 Dated 14/02/2007
Site 1

Full Project Title: Evaluating the therapeutic effects of music interventions on hospitalised people with dementia

I have read, or have had read to me and I understand the Participant Information Version 1 dated 22/01/2007.
I acknowledge that the researchers would like to enrol ______________________ in the research project named above, according to the conditions in the Participant Information.
I agree to the researchers making a video recording of him/her as described in the Participant Information. (please tick) □ Yes □ No
I agree to the researchers accessing his/her medical records as described in the Participant Information. (please tick) □ Yes □ No
I will be given a copy of Participant Information and Third Party Acknowledgement Form to keep. The researcher has agreed not to reveal ______________________’s identity and personal details if information about this project is published or presented in any public form.

Participant’s Name (printed) ________________________________
Name of Person providing Third Party Acknowledgement (printed) ______________________
Relationship to participant: __________________________________________

Signature ____________________________ Date __________
Witness to Signature (printed) ________________________________
Signature ____________________________ Date __________

Declaration by researcher*: I have given a verbal explanation of the research project, its procedures and risks and I believe that the person named above as the Third Party has understood that explanation.

Researcher’s Name (printed) ________________________________
Signature ____________________________ Date __________

* A senior member of the research team must provide the explanation and provision of information concerning the research project.

Note: All parties signing the Consent Form must date their own signature.

The National Ageing Research Institute

Participant Information & Consent Form, Version 2, Date: 14/02/2007

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Revocation of Consent Form

Full Project Title: Evaluating the therapeutic effects of music interventions on hospitalised people with dementia

I hereby wish to WITHDRAW my consent to participate in the research proposal described above and understand that such withdrawal WILL NOT jeopardise any treatment or my relationship with The National Ageing Research Institute or The Royal Melbourne Hospital (Royal Park).

Participant's Name (printed) ....................................................

Signature ............................................................................ Date

The National Ageing Research Institute
Participant Information & Consent Form, Version 2, Date: 14/02/2007

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ST. VINCENT'S HEALTH

PERSON RESPONSIBLE INFORMATION AND CONSENT FORM

Version 4 Dated 08/01/2008

PROTOCOL NO. (SVH): A 003/07

NAME OF PARTICIPANT:

U.R. NO:

FULL PROJECT TITLE: Evaluating the therapeutic effects of music interventions on hospitalised people with dementia

NAMES OF INVESTIGATORS: Dr Bruce Barber (Principal Investigator), Professor David Ames, Dr Dina LoGiudice, Associate Professor Stephen Gibson, Associate Professor Denise Grocke, Dr Samia Toukhmat, Ms Christine Cook, Ms Loretta Quinn, Ms Chathushka Fonseka.

This Participant Information and Consent Form is 8 pages long. Please make sure you have all the pages.

1. Your Consent
As the ‘person responsible’ for your relative, you are invited to consider your relative’s participation in this research project. Victorian law allows the person responsible to consent to the patient taking part in medical research where the patient is unable to provide consent for themselves.

This Person Responsible Information contains detailed information about the research project. Its purpose is to explain to you as openly and clearly as possible all the procedures involved in the project before you decide whether or not to consent to your relative taking part in it.

Please read this Person Responsible Information carefully. Feel free to ask questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this.

Once you understand what the project is about and if you agree to your relative taking part in it, you will be asked to sign the Consent Form. By signing the Consent Form, you indicate that you understand the information and that you give your consent to your relative’s participation in the research project.

You will be given a copy of the Participant Information and Consent Form to keep as a record.

2. Purpose and Background
The purpose of this project is to find out if music therapy is effective in reducing the symptoms of brain diseases that cause dementia. These symptoms include memory loss, depression, emotional difficulties and reduced language skills.

A total of 180 people will participate in this project.
Current medications are unable to prevent or cure most of these conditions and provide only limited relief from the symptoms described above. In some cases, medications have unacceptable side effects.

There have been many reports that music therapy leads to improvements in most of these symptoms. While the claims are impressive there is very little scientific evidence to confirm the benefits of music therapy. This project aims to test the claims and to provide scientific evidence to demonstrate whether they are justified or not. The study will compare music therapy to diversional therapy (which is commonly used in the routine care of older people) to find out if it offers benefits over and above those of diversional therapy.

Your relative is invited to participate in this research project because she/he has been diagnosed with a condition that causes memory loss and other problems. She/he is well-suited to assist us in testing the effects of music therapy.

The results of this research may be used to help two students on the research team obtain a degree. Ms Chathushika Fonseka is an honours student in Behavioural Neuroscience at Monash University. Ms Loretta Quinn is a Doctor of Philosophy student at The University of Melbourne.

3. Procedures

Participation in this project will involve the following.

- Your relative will participate in either a music therapy program, a diversional therapy program or a non-intervention program. The music therapy session will consist of singing, listening to live and recorded music, instrument playing and movement to music. The diversional therapy sessions will consist of games (cards, board games, ball games), gentle exercises and arts and craft. The music therapy and diversional therapy groups will receive three 50 minute sessions per week for three weeks while staying at St George’s Hospital. The day before the first therapy session she/he will be assessed using a number of different measures. These measures include: making a short recording of the electrical activity of her/his brain with a commonly used, non-invasive procedure; taking her/his blood pressure; questionnaires that will assess her/his memory, language and calculation skills; a questionnaire that assesses her/his mood. Midway through the three-week program, we will make a short video recording of your relative while she/he is participating in a therapy session. First we will film the whole group to confirm her/his participation in the session. Then we will record video images of her/his face to allow us to observe changes in facial expressions. Facial expressions are a simple way of finding out whether people are enjoying themselves. After the last therapy session we will repeat the same measures that were made before the first therapy session.

- If you agree to your relative taking part in the study she/he will be randomly placed in either a music therapy group, a diversional therapy group, or a group that receives no intervention other than the medical care that is prescribed in the usual course of the hospital treatment. This random placement is done using an approach that is similar to drawing one of three different length straws where there is a 33% chance of being placed in one of the three groups. The reason for putting people randomly into groups is to prevent any of the groups from being made up only of people who have a particular characteristic, for example a love of music. For our research to meet proper scientific standards, it is necessary to ensure that all three groups are as similar as possible.

- The music therapy and diversional therapy groups will be called the ‘experimental’ groups. The non-intervention group will be called the ‘control’ group. In scientific research aimed at measuring the effects of interventions – in this case, music and diversional therapy – it is necessary to compare the results of both interventions to results recorded from a group that receives no interventions other than their normal treatment. If the measures we made before and after the music and diversional therapy programs showed that there were significant differences...
changes in, for example, memory functions, we could not necessarily argue that this was a result of the interventions. It might just be the result of the normal day-to-day care that is provided in the hospital. On the other hand, if the improvements occurred only in both intervention group but not in the non-intervention group we can conclude that the improvements are due to the interventions. If the music therapy group demonstrated improvements compared to the non-intervention and diversional therapy groups, we will argue that music therapy provided a greater benefit than diversional therapy.

- The initial measures, made the day before the therapy programs begin, will involve approximately half an hour for the recording of brain activity, fifteen minutes to record blood pressure four times during the morning, and a maximum of 45 minutes for the questionnaires. This is a total of about 90 minutes. These same measures will be repeated the day after the last therapy session. Over three weeks, there will be nine therapy sessions of approximately 50 minutes each. People in the non-intervention group will have the same initial measures as the music and diversional therapy groups, which will then be repeated three weeks later.

- Your relative’s participation will also mean that we will need to collect information from her/his medical records held at the hospital. The information we need includes date of birth, marital status, nominated next of kin, medical diagnoses and medications.

4. Possible Benefits

We cannot guarantee or promise that your relative will receive any benefits from this project. We are undertaking the research because we believe there is sufficient evidence in support of music therapy to justify detailed investigation of its potential value. Diversional therapy has been reported to provide similar benefits to music therapy. However, until we have strong evidence it is not possible for us to make any guarantees.

Based on many published reports, possible benefits include improved memory function, more stable and positive mood, less agitation, better communication skills, better sense of self-worth and well-being, reduced use of medications and better quality of life. The first goal of both diversional therapy and music therapy is that participants enjoy it. Therefore, the programs are designed not only to assist your relative in managing her/his health condition but also to provide a pleasurable and rewarding activity.

If the study produces evidence that music therapy is an effective intervention for older people with dementia, people with similar conditions in the future are more likely to have better access to music therapy services as a routine part of their health care.

It is also possible that when we record the electrical activity of your relative’s brain we may detect information that contributes to a better understanding of her/his current health status.

5. Possible Risks

Possible risks, side effects and discomforts include, for the most part, only those that are present in your relative’s day-to-day living in the hospital. However, there is about a one in one hundred chance that she/he may experience some discomfort as we prepare her/him for the recording of the electrical activity of you’re her/his brain. To record this activity we place a cloth cap (similar to a shower cap) on the head. The cap has woven into it a number of electrodes that record the tiny electrical signals that are always present on the surface of the scalp. To ensure that we can record those signals accurately we place a small quantity of a water-based gel between the scalp and each of the electrodes. While the process does not involve any pain or do any injury to the skin, our experience shows that some people feel a little anxious at first. Having conducted several hundred such recordings, National Ageing Research Institute researchers have only had one person who was unable to continue with the procedure. The water-based gel washes out of the hair easily.

The National Ageing Research Institute
One of the questionnaires can trigger an emotional response because it asks questions about the participant’s current mood. Typically, people who have been hospitalised with an illness are subject to emotional ups and downs and some of these questions can bring these to the surface. Approximately one in sixty people may find some of the questions upsetting. If this occurs the researcher will remind your relative that she/he is not obliged to continue with the questionnaire. In our experience with several hundred people in comparable circumstances not one has chosen to discontinue. In these situations people have indicated that despite the emotional nature of the questions they welcome the opportunity to discuss such issues. If a participant finds the questions deeply upsetting he or she will be given immediate access to counselling from one of the qualified staff on site at the hospital.

It is possible that your relative may become agitated during participation in this research. Should this happen, the procedure would be stopped and she/he would be given appropriate assistance to treat the agitation.

It should be noted that all participants are free to suspend their participation or even withdraw from the study at any time if they so choose.

Despite substantial experience of the research team, it is possible that there may be additional unforeseen or unknown risks. Being in a hospital setting the research team and hospital staff combined are well-equipped to respond rapidly and effectively to unforeseen events.

6. Alternatives to Participation

If you choose not to consent to your relative’s participation in this project she/he will not be disadvantaged in anyway. While she/he will not have access to a structured music therapy program, music is made available from time to time in the ward and alternative private arrangements can be made for her/him to have music listening equipment for personal use. Whether your relative participates or not, no necessary medical or other treatments will be withheld from any participants.

7. Privacy, Confidentiality and Disclosure of Information

All the hard copy (paper) information your relative provides will be held in locked filing cabinets on site at The National Ageing Research Institute (NARI). It will also be transferred to a database on our computer system. Such electronic data as well as video records will be held in secure databases on the NARI network protected by security procedures that allow access only to individuals with an authorised username and a unique password. Data will be retained for 15 years. At the end of this period hard copy data will be shredded. Electronically stored data on computer hard discs, network backup storage systems and CD/DVD will be deleted.

Any information obtained in connection with this project that can identify your relative will remain confidential. It will only be disclosed with your permission, except as required by law. If you give us your permission by signing the Consent Form, we plan to publish the aggregate results in international scientific journals and also to present results at national and international scientific seminars and conferences. We will also notify public media groups of any outcomes that may be of interest to the general public.

In any publication or presentation, information will be provided in such a way that your relative cannot be identified. The information she/he provides, including the video recording, will be coded numerically and combined with the same information collected from all the participants. Our research depends almost entirely on combined group data in which individuals are not identified.

The National Ageing Research Institute

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8. New Information Arising During the Project
During the research project, new information about the risks and benefits of the project may become known to the researchers. If this occurs, you and your relative will be told about this new information. This new information may mean that she/he can no longer participate in this research. If this occurs, the persons supervising the research will stop her/his participation. In all cases, your relative will be offered all available care to suit their needs and medical condition.

9. Results of Project
Results of the project will be made available to participants in three ways. Firstly, on completion of the project, a summary plain language report of the results will be prepared. This will be forwarded to all participants. Secondly, The National Ageing Research Institute publishes a quarterly newsletter that provides brief summaries of research outcomes. This newsletter is distributed to people who are registered as members of NARI. At the time of recruitment, participants will be invited to register as members. Membership is free. Thirdly, after your relative's participation has been completed, you can ask for access to his/her personal results. You can do this by contacting Dr Bruce Barber on 8387 2638.

10. Further Information or Any Problems
If you require further information or if you have any problems concerning this project (for example, any side effects), you can contact the principal researchers Dr Bruce Barber (8387 2638 or 0423 292 792), Professor David Ames (9816 0485) or Dr Dina LoGiudice (8387 2000) who are the researchers responsible for this project. After hours you may contact Dr Barber on 9893 3240 or 0423 292 792.

11. Other Issues
If you have any complaints about any aspect of the study or the way in which it is being conducted you may contact the Patient Representative at St Vincent’s Health on Telephone: 9288 2211. You will need to tell the Patient Representative the name of the person who is noted above as principal investigator.

12. Research Participant’s Rights
If you have any questions about the rights of your relative as a research participant, then you may contact Jill Hamblig, Executive Officer Research at St. Vincent’s Health on Telephone: 9288 3930

13. Participation is Voluntary
Participation in any research project is voluntary. If you do not want your relative to take part there is no obligation to do so. If you decide that your relative can take part and later change your mind, you are free to withdraw her/him from the project at any stage.

Your decision whether your relative takes part or does not take part, or takes part and then withdraws, will not affect her/his routine treatment, relationship with those treating her/him or her/his relationship with St George’s Hospital or The National Ageing Research Institute.

Before you make your decision, a member of the research team will be available to answer any questions you have about the research project. You can ask for any information you want. Sign the Consent Form only after you have had a chance to ask your questions and have received satisfactory answers.

If you decide to withdraw your relative from this project, please notify a member of the research team before you do so. This notice will allow that person or the research supervisor to inform you

The National Ageing Research Institute
Participant Information & Consent Form, Version 4, Date: 08/01/2008

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If there are any health risks or special requirements linked to withdrawing. Please note that in the event that your relative chooses not to provide some of the information that is being sought for the purposes of this research you may be advised to withdraw her/him from the study.

14. Ethical Guidelines
This project will be carried out according to the National Statement on Ethical Conduct in Research Involving Humans (January 2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

The ethical aspects of this research project have been approved by the St. Vincent’s Human Research Ethics Committee.

15. Reimbursement for your costs
You will not be paid for your participation in this project.
ST. VINCENT'S HEALTH

PERSON RESPONSIBLE FORM

Version 4 Dated 08/01/2008

PROTOCOL NO. (SVH): A 003/07

NAME OF PARTICIPANT:

U.R. NO:

FULL PROJECT TITLE: Evaluating the therapeutic effects of music interventions on hospitalised people with dementia.

I have read, or have had read to me and I understand the Participant Information Version 4 dated 08/01/2008.

I acknowledge that the researchers would like to enrol ___________________ in the research project named above, according to the conditions in the Participant Information.

I will be given a copy of Participant Information and Person Responsible Form to keep.

The researcher has agreed not to reveal ___________________'s identity and personal details if information about this project is published or presented in any public form.

Participant’s Name (printed) ......................................................

Name of Person Responsible (printed) ......................................

Relationship to participant: .........................................................

Signature Date

Witness to Signature (printed) ...................................................

Signature Date

Declaration by researcher*: I have given a verbal explanation of the research project, its procedures and risks and I believe that the person named above as the person responsible has understood that explanation.

Researcher’s Name (printed) ......................................................

Signature Date

* A senior member of the research team must provide the explanation and provision of information concerning the research project.

Note: All parties signing the Consent Form must date their own signature.

The National Ageing Research Institute

Participant Information & Consent Form, Version 4, Date: 08/01/2008

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ST. VINCENT'S HEALTH

PERSON RESPONSIBLE REVOCATION OF CONSENT FORM

Version 4 Dated 08/01/2008

PROTOCOL NO. (SVH): A 003/07

NAME OF PARTICIPANT:

U.R. NO:

FULL PROJECT TITLE: Evaluating the therapeutic effects of music interventions on hospitalised people with dementia

I hereby wish to WITHDRAW my consent for my relative to participate in the research proposal described above and understand that such withdrawal WILL NOT jeopardise any treatment or her/his relationship with The National Ageing Research Institute or St Vincent’s Health.

Person Responsible Name (printed) ......................................................

Signature Date

The National Ageing Research Institute

Participant Information & Consent Form, Version 4, Date: 08/01/2008 P&C Page 8 of 8
Appendix 6

Plain language statement

NATIONAL AGEING RESEARCH INSTITUTE
Incorporated A0029603G
Poplar Road Parkville Victoria 3052 Australia
PO Box 31 Parkville Victoria 3052 Australia
ABN 17 203 790 712

BRIEF PLAIN LANGUAGE STATEMENT

EVALUATING THE EFFECTS OF MUSIC INTERVENTIONS ON HOSPITALISED PEOPLE WITH DEMENTIA

You are invited to participate in this new research study. There are many reports that music therapy can improve memory, communication skills and mood for older people with memory problems. However, these reports have yet to be fully tested in a way that will provide sound scientific evidence of the nature required by modern public health systems.

This research will use scientific methods to test whether music therapy has real benefits for older people who have memory loss and other symptoms linked to a variety of brain diseases.

If you agree to take part in this project you will be randomly placed in one of two groups each of 4–6 people. Both groups will receive the usual occupational therapy provided by the hospital. One group will also take part in music therapy sessions. You will receive three 50 minute sessions for 3 weeks during your stay in hospital.

Before the first therapy session we will take you through three questionnaires that provide information about your memory and your current mood. We will also make a recording of some aspects of your brain function using a well-established method in which, by placing a cloth cap on your head, we can record the tiny brain electrical signals that constantly make their way to the surface of your scalp. These signals provide valuable information about your brain function. We will also check your blood pressure. The questionnaires and brain activity recording will take about 90 minutes of your time on the day before the first therapy session. On the day after the final therapy session we will do exactly the same again. This will allow us to see whether you have benefited from the therapies.

During the fifth therapy session we will make a short video recording that will show the whole group as it participates and will also allow us to observe changes in your facial expressions. Facial expressions are a good way of measuring the extent to
which people are enjoying the therapy session and can also provide information about the effects of the therapies.

The last body of information we will collect does not involve your input but it does involve us reading your current medical records at the hospital to collect information such as your age, your current health status and the medications you are currently using.

We cannot promise that you will receive any benefits from participating in this project. We believe that participation will at least be enjoyable and we are doing the study because there is some evidence that the therapies being used are beneficial. The purpose of the research is to test these claims.

All the information you provide us with is confidential. It will be stored in secure storage systems at The National Ageing Research Institute. Although we will publish the results of the study, your identity will not be publicly revealed under any circumstances.

It is important that you understand that your participation in this project must be voluntary. This is the case with all human research. If you suffer from memory problems, in addition to asking for your consent to participate, we will also seek acknowledgment from your family carer or your doctor.

You are under no obligation to participate. If you choose to participate then later change your mind you are free to withdraw at any stage. Your decision to take part or not to take part, or to withdraw, will not have any affect on your routine medical treatment or your relationship with the hospital.

A more detailed and extensive Participant Information document will be provided together with consent forms to be signed should you choose to take part in this research. If you have any questions or concerns, or would like more information now or at any stage do not hesitate to ask the researchers or your doctor. People you can talk to include Dr Bruce Barber who can be contacted on 8387 2636. You may also like to discuss your participation in this project with a relative, friend or your doctor.

Remember, participation in this project is entirely voluntary and you are free to withdraw at any time.
Appendix 7

Places where MT sessions were held on the AC1 ward
Appendix 8

Places where MT sessions were held in the Ellerslie Unit
Appendix 9

Set of MT techniques and songs used by the Music Therapist

Songs most often used for each Music Therapy technique

<table>
<thead>
<tr>
<th>SS</th>
<th>Singing at the start of the session (incorporate name of each participant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Hello, hello, who’s your lady friend?</td>
</tr>
<tr>
<td>23</td>
<td>Jolly good company</td>
</tr>
<tr>
<td>54</td>
<td>Two little girls in blue.</td>
</tr>
<tr>
<td>63</td>
<td>You are my sunshine</td>
</tr>
<tr>
<td>4</td>
<td>Are you lonesome tonight?</td>
</tr>
<tr>
<td>13</td>
<td>Have you ever been lonely?</td>
</tr>
<tr>
<td>33</td>
<td>Love letters in the sand</td>
</tr>
<tr>
<td>3</td>
<td>Alice blue gown</td>
</tr>
<tr>
<td>5</td>
<td>Bluebird of happiness</td>
</tr>
<tr>
<td>27</td>
<td>Lambeth Walk</td>
</tr>
<tr>
<td>29</td>
<td>Let me call you sweetheart</td>
</tr>
<tr>
<td>39</td>
<td>Pal of my cradle days</td>
</tr>
<tr>
<td>43</td>
<td>Ramona</td>
</tr>
<tr>
<td>40</td>
<td>Peggy O’Neil</td>
</tr>
<tr>
<td>35</td>
<td>My Blue Heaven</td>
</tr>
<tr>
<td>31</td>
<td>Lilli Marlese (sung in English or Italian)</td>
</tr>
<tr>
<td>44</td>
<td>Red sails in the sunset</td>
</tr>
<tr>
<td>91</td>
<td>How great thou art</td>
</tr>
<tr>
<td>92</td>
<td>The old rugged Cross – George Bennard (1913)</td>
</tr>
<tr>
<td>93</td>
<td>Abide with me</td>
</tr>
<tr>
<td>94</td>
<td>Nearer my God to thee</td>
</tr>
<tr>
<td>88</td>
<td>Il Tai Mondo</td>
</tr>
<tr>
<td>80</td>
<td>Quel Mazzolin di fiore</td>
</tr>
<tr>
<td>84</td>
<td>Rosamunda (&quot;Roll out the barrel&quot; in English)</td>
</tr>
<tr>
<td>90</td>
<td>Piemontesina Bella</td>
</tr>
<tr>
<td>82</td>
<td>Reginella Campagnola (&quot;The woodpecker’s song&quot; in English)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WC</th>
<th>Word Cueing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>All by yourself in the moonlight</td>
</tr>
<tr>
<td>11</td>
<td>Don’t bring Lulu</td>
</tr>
<tr>
<td>56</td>
<td>Walking my baby back home</td>
</tr>
<tr>
<td>12</td>
<td>Don’t fence me in</td>
</tr>
<tr>
<td>7</td>
<td>Can’t help loving that man of mine</td>
</tr>
<tr>
<td>17</td>
<td>I can’t give you anything but love (baby)</td>
</tr>
<tr>
<td>51</td>
<td>The best things in life are free (1927)</td>
</tr>
<tr>
<td>41</td>
<td>Pretty baby</td>
</tr>
<tr>
<td>50</td>
<td>Silver threads amongst the gold</td>
</tr>
<tr>
<td>82</td>
<td>Reginella Campagnola</td>
</tr>
<tr>
<td>84</td>
<td>Rosamunda</td>
</tr>
<tr>
<td>90</td>
<td>Piemontesina Bella</td>
</tr>
</tbody>
</table>

158
### ML  Music Listening using pre-recorded music

<table>
<thead>
<tr>
<th>Number</th>
<th>Song Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>In the mood – Glen Miller Band</td>
</tr>
<tr>
<td>66</td>
<td>When Irish eyes are smiling – Bing Crosby</td>
</tr>
<tr>
<td>9</td>
<td>Danny Boy – Bing Crosby</td>
</tr>
<tr>
<td>95</td>
<td>Sigma – Secret Garden</td>
</tr>
<tr>
<td>96</td>
<td>The Blue Danube – Strauss</td>
</tr>
<tr>
<td>67</td>
<td>Rock around the clock – B Haley &amp; the Comets</td>
</tr>
<tr>
<td>71</td>
<td>(1950’s)</td>
</tr>
<tr>
<td>72</td>
<td>Johnny be good – Chuck Berry (1958)</td>
</tr>
<tr>
<td>75</td>
<td>Heartbreak Hotel – Elvis Presley (1950’s)</td>
</tr>
<tr>
<td>97</td>
<td>Mambo Italiano – Rosemary Clooney</td>
</tr>
<tr>
<td>98</td>
<td>Ave Maria – Schubert</td>
</tr>
<tr>
<td></td>
<td>Ave Maria – Gounod</td>
</tr>
</tbody>
</table>

### MM  Music and Movement (including dancing)

<table>
<thead>
<tr>
<th>Number</th>
<th>Song Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Did you ever see a dream walking?</td>
</tr>
<tr>
<td>21A</td>
<td>I’m gonna wash that man right out of my hair</td>
</tr>
<tr>
<td>47</td>
<td>Row, row, row.</td>
</tr>
<tr>
<td>38</td>
<td>Pack up your troubles</td>
</tr>
<tr>
<td>13</td>
<td>Five minutes more (give me..)</td>
</tr>
<tr>
<td>21</td>
<td>I’m gonna hang out the washing on the Zaigfried line</td>
</tr>
<tr>
<td>26</td>
<td>Knees up Mother Brown</td>
</tr>
<tr>
<td>52</td>
<td>There’s a rainbow round my shoulder</td>
</tr>
<tr>
<td>42</td>
<td>Put your arms around me honey (hold me tight)</td>
</tr>
<tr>
<td>81</td>
<td>Marina, Marina, Marina</td>
</tr>
</tbody>
</table>

### IT  Instrument Playing

<table>
<thead>
<tr>
<th>Number</th>
<th>Song Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>There’s a rainbow round my shoulder</td>
</tr>
<tr>
<td>18</td>
<td>If you were the only girl in the world.</td>
</tr>
<tr>
<td>14</td>
<td>Grandfather’s clock</td>
</tr>
<tr>
<td>59</td>
<td>When the red, red, robin comes bop, bop, boppin’ along.</td>
</tr>
<tr>
<td>1</td>
<td>Ahy (my boy)</td>
</tr>
<tr>
<td>99</td>
<td>Marco polo – Loreena McKennitt</td>
</tr>
<tr>
<td>21</td>
<td>I’m gonna sit right down and write myself a letter</td>
</tr>
<tr>
<td>28</td>
<td>Leaning on a lamppost (1937 – film “Feather your nest”)</td>
</tr>
<tr>
<td>25</td>
<td>Kiss me goodnight Sergeant Major</td>
</tr>
<tr>
<td>45</td>
<td>Roaming in the glomin’</td>
</tr>
<tr>
<td>46</td>
<td>Roll out the barrel</td>
</tr>
<tr>
<td>84</td>
<td>Rosamunda (Italian version of Roll Out The Barrel)</td>
</tr>
<tr>
<td>34</td>
<td>Mary’s a grand ol’ name</td>
</tr>
<tr>
<td>60</td>
<td>When the Saints go marching in</td>
</tr>
</tbody>
</table>
### Improvisation

|   | live music used, with drums |

### Singing at the end of the session

<table>
<thead>
<tr>
<th></th>
<th>Song Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Amazing Grace (English)</td>
</tr>
<tr>
<td>85</td>
<td>Amazing Grace (Italian)</td>
</tr>
<tr>
<td>55</td>
<td>Waiting at the Church</td>
</tr>
<tr>
<td>30</td>
<td>Let the rest of the world go by</td>
</tr>
<tr>
<td>8</td>
<td>Cruising down the river</td>
</tr>
<tr>
<td>6</td>
<td>Bye, bye blackbird</td>
</tr>
<tr>
<td>22</td>
<td>It's a long way to Tipperary</td>
</tr>
<tr>
<td>49</td>
<td>Side by side</td>
</tr>
<tr>
<td>53</td>
<td>Three o'clock in the morning</td>
</tr>
<tr>
<td>19</td>
<td>If I had my life to live over</td>
</tr>
<tr>
<td>24</td>
<td>K-K-K-Katie</td>
</tr>
<tr>
<td>62</td>
<td>White cliffs of Dover</td>
</tr>
<tr>
<td>57</td>
<td>When I grow too old to dream</td>
</tr>
<tr>
<td>32</td>
<td>Look for that silver lining</td>
</tr>
<tr>
<td>163</td>
<td>Wish me luck</td>
</tr>
</tbody>
</table>
Appendix 10

List of familiar songs used in the MT sessions

Evaluating the effects of music therapy interventions on speech deficits in hospitalised people with dementia.

Music therapy data coding sheet

Music therapy activities codes. Music therapy activity codes on all data collection will be written in order of process.

SS  Singing at the start of the session
WC  Word cueing
RE  Reminiscing using pre-recorded music
MM  Music and movement
IT  Instrument playing
IP  Improvisation
SE  Singing at the end of the session.

Coding for all songs used during all music therapy activities used.

1  Aby (my boy)
2  Alice blue gown
3  All by yourself in the moonlight
4  Are you lonesome tonight
5  Bluebird of happiness
6  Bye, bye blackbird
7  Can’t help loving that man of mine.
8  Moonlight Bay
9  Danny boy
10 Did you ever see a dream walking?
11 Don’t bring Lulu
12 Don’t fence me in
13 Five minutes more (give me...)
14 Grandfather’s clock
15 Have you ever been lonely?
16 Hello, hello, who’s your lady friend?
17 I can’t give you anything but love
18 If you were the only girl in the world
19 If I had my life to live over
20 I’m gonna hang out the washing on the Zeigfeld line.
21 I’m gonna sit right down and write myself a letter
21A I’m gonna wash that man right out of my hair
22 It’s a long way to Tipperary
23 Jolly good company
24 K-K-K-Katie
25 Kiss me goodnight Sergeant Major
26 Knees up Mother Brown
27 Lambeth walk
28 Leaning on a lamppost
29 Let me call you sweetheart
30 Let the rest of the world go by
31 Lili Marlene  (Lilli Marlene, Ital)
32 Look for the silver lining
33 Love letters in the sand
34 Mary’s a grand of’ name.
35 My blue Heaven
36 Now is the hour
37 Over the rainbow
38 Pack up your troubles
39 Pal of my cradle days
40 Peggy O’Neil
41 Pretty baby
42 Put your arms around me honey, (hold me tight).
43 Ramona
44 Red sails in the sunset.
45 Roaming in the gloaming
46 Roll out the barrel (Rosamunda, Ital)
47 Row, row, row.
48 Show me the way to go home
49 Side by side
50 Silver threads amongst the gold.
51 The best things in life are free.
52 There’s a rainbow round my shoulder
53 Three o’clock in the morning
54 Two little girls in blue
55 Waiting at the Church
56 Walking my baby back home
57 When I grow too old to dream
58 When Irish eyes are smiling
59 When the red, red, robin.
60 When the saints go marching in.
61 White Christmas
62 White cliffs of Dover
63 You are my sunshine
64 You’d be surprised
65 In the mood – Glen Miller Band, Original version
66 When Irish eyes are smiling – Bing Crosby – Original version
67 Rock around the clock – Bill Haley and the Comets (1950’s)
68 Hound Dog – Elvis Presley (1956)
69 Jailhouse Rock – Elvis Presley (1956)
70 Love Me Tender – Elvis Presley (1956)
71 Johnny Be Good – Chuck Berry
72 Heartbreak Hotel – Elvis Presley (1950’s)
73 I saw her standing there – Beatles (1960’s)
74 That’s Amore – Dean Martin
75 Mambo Italiano – Dean Martin
76 Sway – Dean Martin (Spanish)
77 Volare – Dean Martin (Italian)
78 Everybody loves somebody sometime – Dean Martin
79 Memories are made of this – Dean Martin

162
Italian
80 Quel Mazzolin di fiore
81 Marina, Marina
82 Regineilla Campagnola
83 Terra Straniera
84 Rosamunda
85 Amici a mei
86 Ave Maria (Latin)
87 La Donne il Mobile
88 Il Tuo Mondo
89 Oj Marie!
90 Piemontesina Bella
91 How Great Thou Art
92 The Old Rugged Cross
93 Abide With Me
94 Nearer My God To Thee
95 Sigma (Secret Garden)
96 The Blue Danube
97 Ave Maria (Schubert)
98 In the cool, cool of the evening
99 Marco Polo (Loreena McKennitt)
100 Petit Papa Noel
101 La Mer
102 La Vien Rose
103 Wish me luck

CD’s: Traditional songs of the following cultures: Greece, Poland, Germany, Vietnam, China, France and Holland were available and used where required.
Appendix 11

Examples of pictures of well-known singers used in the MT sessions

Vera Lynn

Bing Crosby
Author/s:
Quinn, Loretta A.

Title:
The accumulative effects of music therapy on dementia-related speech deficits in a sub-acute hospital setting

Date:
2011

Citation:

Persistent Link:
http://hdl.handle.net/11343/37122

File Description:
The accumulative effects of music therapy on dementia-related speech deficits in a sub-acute hospital setting

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