Familiar Physical Activity to Familiar Music: The Effects on Apathy, Agitation, Eating Ability, and Dietary Intake in Institutionalized Older Adults with Dementia

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FAMILIAR PHYSICAL ACTIVITY TO FAMILIAR MUSIC: THE EFFECTS ON APATHY, AGITATION, EATING ABILITY, AND DIETARY INTAKE IN INSTITUTIONALIZED OLDER ADULTS WITH DEMENTIA

A Dissertation Presented
by

JANET R. MOORE

Submitted to the Graduate School of the University of Massachusetts Amherst in partial fulfillment of the requirements for the degree of DOCTOR OF PHILOSOPHY

February 2010

School of Nursing
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DEDICATION

To my parents, who saw me start and who were always proud of me, but who were not able to see me finish and to my husband Bill who was always positive and supportive throughout the process.
ACKNOWLEDGEMENTS

Many people have been involved in this study and it would not have been possible without their assistance. First I’d like to thank Jessica Mongeau who made the music CD and Mike Dialessi for making multiple copies of the music. I’d like to thank the staff and administration of Keystone Woods Assisted Living (Joan Roche, Deanna Lawrence, Becky) for allowing me to conduct the pilot study and the staff and administration of Jewish Geriatric Authority (Linda Donoghue, Lois White, Donna Campbell, Maria DeRosa, Deb Aberdale, and Gina Francis-Wilson) and the Atrium (Susan Brooks, Heather) who opened their facilities for the study and assisted in contacting families and mailing the consent form.

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ABSTRACT

FAMILIAR PHYSICAL ACTIVITY TO FAMILIAR MUSIC: THE EFFECTS ON APATHY, AGITATION, EATING ABILITY, AND DIETARY INTAKE IN INSTITUTIONALIZED OLDER ADULTS WITH DEMENTIA

FEBRUARY 2010

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Directed by: Professor Emeritus Dorothy Ann Gilbert

**Background:** Many older adults with dementia residing in nursing homes or assisted living facilities exhibit behavioral disturbances such as agitation and apathy. In addition they lose their ability to feed themselves and often suffer serious malnutrition as their dietary intake decreases. Music has been linked to decreased agitation in this population and physical activity to music linked to a slower decline in eating ability.

**Purpose:** The purpose of this study was to examine whether a familiar physical activity to familiar music would reduce apathy and agitation and increase eating ability and dietary intake among institutionalized older adults with dementia.

**Method:** Eighty four older residents with early to late-stage dementia were randomly assigned to a usual activity or to a group that received a 25-minute intervention (seated chair exercises and beach ball toss to music of the 1920’s to 1950’s) offered 30 minutes before the noon meal twice a week for three weeks. Prior to the intervention, research assistants observed and recorded participants’ apathy using the Frontal Systems Behavior Scale and agitation using the Cohen-Mansfield Agitation Inventory. Trained
research assistants (RAs) conducted the intervention, and then escorted participants in both groups to their noon meals. A second group of RAs, blinded to group, observed apathy and agitation as residents began their meals. At the end of the meals, RAs recorded eating ability using the Functional Independence Measure and the percentage of dietary intake for all participants. Digital photos of trays, pre- and post-meal, were also used to document the percentage.

**Results:** Participants, whose mean age was 85.92 and whose Mini Mental Status Exam scores ranged from 0 to 24, resided in two sites: a nursing home with assisted living and a separate assisted living facility. Repeated measures ANOVA revealed significant differences between groups for apathy \((p=.01)\) and dietary intake \((p=.01)\). There was no significant difference in agitation or eating ability.

**Discussion:** Participation in the intervention was associated with more positive outcomes for apathy and dietary intake. There is evidence that a familiar physical activity to familiar music is an effective approach for institutionalized older adults with dementia.
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CHAPTER 1

INTRODUCTION

Many older adults with dementia residing in nursing homes or assisted living facilities exhibit behavioral disturbances such as agitation and apathy. In addition, they lose their ability to feed themselves and often suffer serious weight loss with subsequent malnutrition as their dietary intake decreases. These consequences of dementia are among the most frequent and distressing health problems of institutionalized older adults (Boyle et al., 2003; Buettner & Fitzsimmons, 2006; Burger, Kayser-Jones, & Bell, 2000; Mahoney, Volicer, & Hurley, 2000; Reekum, Stuss, & Ostrander, 2005; White, McConnell, Bales, & Kuchibhatla, 2004).

The prevalence of dementia itself increases with age, and it is the disease found most frequently in nursing home and assisted living residents (Alzheimer’s Association, 2009). Despite the importance of dementia and its consequences for older adults who reside in institutions, however, there are few safe and effective interventions to address these consequences. The purpose of this study was to examine whether a familiar physical activity to familiar music would reduce apathy and agitation and increase eating ability and dietary intake among institutionalized older adults with dementia, whether their apathy, agitation, eating ability and dietary intake would improve over time, and whether participation in the intervention was associated with more positive outcomes.
Dementia, Alzheimer’s Disease, and Memory

Dementia and Alzheimer’s Disease

Dementa affects approximately 70% of nursing home residents and 65% of assisted living residents according to the most recent statistics of the Alzheimer’s Association (2009). Half of all adults age 85 or older may exhibit signs of dementia.

Dementia is a degenerative brain disease characterized by a decline in mental function. It is manifested by loss of memory and one of the following: loss of language (aphasia), inability to use an object such as an eating utensil (apraxia), inability to recognize an object (agnosia) or a disturbance in executive functioning (American Psychiatric Association, 2000). Memory impairment slowly progresses from mild to severe.

While there are many types of dementia (e.g., Vascular, Mixed, Frontotemporal, Normal Pressure Hydrocephalus, Parkinson’s), Alzheimer’s Disease (AD) is the most prevalent type. Fifty to seventy percent of all diagnoses of dementia are attributed to AD (Alzheimer’s Association, 2009; Blennow, deLeon, & Zetterberg, 2006), and much of the literature on dementia is based on those with AD. It currently affects 5.3 million Americans, and it is estimated that by the year 2050, up to 16 million Americans will be affected (Alzheimer’s Association, 2009).

AD is a diagnosis of exclusion. All other types of dementia are ruled out with laboratory, neurological exam, and/or diagnostic tests. AD can only conclusively be diagnosed on autopsy (Mooney & Shank, 2008).

There are many theories as to the cause of AD but the etiology of AD is largely unknown. AD was first described by Alois Alzheimer in the early 1900’s when, on
autopsy, he discovered neuritic plaques and neurofibrillary tangles in the brain (Blennow et al., 2006). These plaques and tangles are still hallmarks of the pathophysiology of the disease. Outside the neurons there are deposits of plaque that contain a protein known as amyloid beta (A-beta); inside the neurons are tangles that contain a protein known as tau. Both A-beta and tau are thought to be involved in causing AD (Wolfe, 2006). There is neuronal atrophy of the cortex of the brain and two subcortical structures of the limbic system located in the medial temporal lobe, specifically the hippocampus and the amygdala. The hippocampus aids in the formation of new memories by transferring information into memory (Phelps, 2004). These structures have been found to decrease in volume as demonstrated on magnetic resonance imaging (MRI) by approximately 15% (Barnes et al., 2006) with resultant decrease in memory (Phelps, 2004). It is this loss of neurons in Alzheimer’s disease that leads to the decline in memory and the aphasia, agnosia, apraxia, or disturbance in executive function that were noted above.

AD is generally thought of as occurring in three stages: mild or early, moderate or intermediate, and severe or late stage (Resnick & Galik, 2006). Mild or early dementia is characterized by changes in behaviors and difficulties with instrumental activities of daily living (IADLs) such as using the telephone, shopping, etc. The early stage is often not easily recognized by others as AD has an insidious onset. In the moderate or intermediate stage there is difficulty with language (aphasia), motor skills (apraxia), and recognition (agnosia). Poor judgment and behavior changes become more evident (Buettner & Fitzsimmons, 2006; Smith & Buckwalter, 2005). There is a decline in functional abilities, and activities of daily living (ADLs), such as bathing, dressing, or eating, become more difficult to perform (Mooney & Shank, 2008) as the disease progresses. In the severe or
late stage of AD there is severe memory impairment, incontinence, and a progressive inability to swallow. Assistance for all activities of daily living is required (Resnick & Galik, 2006).

Memory

Memory impairment is a key characteristic of dementia due to AD, however, not all memory is the same and some types of memory may be preserved. Memory is defined as the registration, retention, and retrieval of information (Venes, 2005). There are several forms of memory, both short and long term; explicit and implicit memory are two forms of long term memory (see Figure 1). Explicit (also referred to as episodic or declarative) memory is defined as the conscious recollection of information (Ballesteros & Reales, 2004; Venes, 2005). When tested, subjects are requested to think back to the information that has been previously presented. It is usually assessed with recognition and cued recall tasks (Backman, Almkvist, Nyberg, & Andersson, 2000; Pilotti, Meade, & Gallo, 2003). Implicit (also referred to as nondeclarative) memory is defined as an unconscious form of memory in which there is previous experience with the stimuli. It is assessed with tasks, such as word-stem completion, motor learning tasks, or word and picture identification, in which there is no direction or cue given to the individual to remember previous information; they are not told to think back to information that has been presented (Backman et al., 2000; Fleischman & Gabrieli, 1999).

Implicit memory can be divided into priming and procedural memory (Spaan, Raaijmakers, & Jonker, 2003). Procedural memory includes acquiring skills or habits.

Priming occurs when there is an improvement in performance based on recent information without being told to consciously remember the stimulus or information (Fleischman & Gabrieli, 1999; Spaan et al., 2003; Stirling, 2002). A previous experience may facilitate or change performance, albeit subconsciously. Priming can be perceptual (sensory based) or conceptual (meaning based) (Fleishman et al., 2005).

Implicit memory generally may be retained in those with AD whereas explicit memory is not (Ballesteros & Reales, 2004; Fleischman & Gabrieli, 1998). More specifically, several studies have found that it is perceptual implicit memory that is intact
or preserved in those with AD while conceptual implicit memory is found to be impaired (Fleischman & Gabrieli, 1998). Indeed, in a review of measures of memory used in those with AD versus normal aging, Spaan et al. (2003) found evidence for intact perceptual/identification priming tasks in 8 studies and, with two exceptions, impaired conceptual/generation priming tasks in 11 studies in those with AD.

Those with AD may recognize an object because of prior exposure, and be able to perform a task due to intact implicit memory. As Harrison, Son, Kim, and Whall (2007) point out, a person with AD may no longer be able to name or describe the use of a toothbrush, but may be able to continue to use it properly.

Apathy

One behavioral consequence of AD is apathy. The prevalence of apathy has been reported in the literature on AD as being from 25 to 50% (Landes, Sperry, Strauss, & Geldmacher, 2001) and upwards to 80% (Stephenson, 2005). Actual figures are difficult to determine, however. First, as noted above, AD is only one form of dementia. Second, the term apathy is used interchangeably with the term passivity in many studies. For example, Mahoney et al. (2000) describe people who are apathetic as appearing passive. In contrast to Mahoney, Buettner and Fitzsimmons (2006) identify passive behaviors as a symptom of apathy. In one study of community-dwelling elders with dementia exhibiting behavioral symptoms, these investigators (Fitzsimmons & Buettner, 2003) found 27.6% of individuals exhibited passivity only, 6.9% with agitation only, and 65.5% with mixed behaviors of both passivity and agitation. However, in a retrospective analysis of data from two former intervention projects (Buettner & Fitzsimmons, 2006), the same investigators found that 72.4% of participants from the community and 58.9% of
participants from long-term care exhibited both apathy and agitation. Although the percentages the investigators identified tend to support the higher percentages reported by Stephenson (2005), their inconsistent use of terms creates confusion about the actual prevalence.

Apathy is characterized by a lack of engagement (Landes et al., 2001) or involvement (Stout, Ready, Grace, Malloy, & Paulsen, 2003) and a lack of emotion (Burns, Folstein, Brandt, & Folstein, 1990; Landes et al, 2001; Stephenson, 2005). Several authors note a lack of interest in the environment (Burns et al., 1990; Landes et al, 2001; Mahoney et al., 2000; Robert et al., 2002; Stout et al, 2003). Apathetic people reportedly lack initiative (Landes et al, 2001; Robert et al., 2002) or motivation (Stout et al., 2003) with decreased daily function (Landes et al., 2001), decreased goal directed behavior (Starkstein, Jorge, Mizrahi, & Robinson, 2006) and decreased energy (Stout et al., 2003). Muller, Czymmek, Thone-Otto, and Von Cramon (2006), describing apathy as a “lack of self-initiated action,” found that those in a high apathy group napped significantly more and were less active during the day as compared to control subjects with low apathy scores.

There is a lack of consistency of definitions and apathy is sometimes categorized as an emotion (Reekum et al., 2005), a behavior (Marin, Firinciogullari, & Biedrzycki, 1993), or as a syndrome (Kant & Smith-Seemiller, 2002; McShane, 2000). It was conceptually defined in the study as a lack of interest, involvement, energy, and motivation based on factor analysis by Stout et al. (2003) and on the above characteristics.
Apathy is not to be confused with depression. While there is some overlap of symptoms (Starkstein, Ingram, Garau, & Mizrahi, 2005), people with apathy experience indifference, blunted emotional response and low social engagement, as opposed to those with depression who may exhibit guilt, pessimism and suicidal ideation (Landes et al., 2001). Symptoms common to both apathy and depression include diminished interest and psychomotor retardation. It is apathy that was of interest in this study.

Apathy is prevalent in cortical dementia with limbic-frontal-subcortical circuits affected (Reekum et al., 2005). Senanarong et al. (2005) report “the medial prefrontal cortex and anterior cingulate region mediate motivational aspects of behavior” (p. 82). Apathy and diminished motivation are theoretically caused by disruption of the medial frontal anterior cingulate circuits (Duffy & Kant, 1997; Reekum et al., 2005; Senanarong et al., 2005; Stout, Wyman, Johnson, Peavy, & Salmon, 2003) and lesions or dysfunctions of the prefrontal and basal ganglia regions (Levy & DuBois, 2006).

It has been suggested in the literature that understimulation of residents may contribute to passivity/apathy. Colling (2004) states that “lack of appropriate stimulation from the social and physical environment” (p. 117) causes a resident with dementia to be susceptible to passive behaviors. If residents with dementia are not provided with meaningful activity they may exhibit signs of apathy--sitting motionless, staring into space, and becoming disengaged (Mahoney et al., 2000).

Agitation

A second behavioral consequence of AD is agitation. Agitation is commonly observed in nursing home settings in up to 90% of residents (Cohen-Mansfield, Marx, & Rosenthal, 1989; Steffens, Maytan, Helms, & Plassman, 2005). Gruber-Baldini,
Boustani, Sloane and Zimmerman (2004) found that, at least once a week, one-third (34%) of residents of assisted living centers displayed agitated behaviors while Sourial, McCusker, Cole and Abrahamowicz (2001) found 95% of those with dementia hospitalized in acute care were agitated.

Agitation can lead to physical injury to self and others, including residents, staff, or visitors, and therefore safety is an ongoing concern (Kovach, Noonan, Schlidt & Wells, 2005). Kolanowski and Garr (1999) found 44% of residents exhibited physical aggression in a nursing home setting. Agitation also may lead to the eventual use of an antipsychotic medication as a means of restraint. Use of restraints and falls, in turn, have been linked to agitation, both as an antecedent and as a consequence (Marx, Cohen-Mansfield, & Werner, 1990).

Cohen-Mansfield and Billing (1989) define agitation as “inappropriate verbal, vocal, or motor activity that is not explained by needs or confusion” (p. 712). Agitation includes four subtypes: physically aggressive behaviors (hitting, kicking, biting), physically non-aggressive behaviors (wandering, restlessness), verbally aggressive behaviors (yelling, cursing) or verbally non-aggressive behaviors (repeatedly asking questions, complaining) (Cohen-Mansfield, 1996). These behaviors are often difficult for nursing home staff to manage and may adversely affect the resident. Agitation, too, is described as a behavior (Cohen-Mansfield) and as an emotion (Petrocelli & Smith, 2005).

The cause of agitation is multifactorial. Agitation is more common as dementia progresses and functional impairments become more pronounced due to frontal lobe dysfunction (Senanarong, Cummings, et al., 2004). It is described as an emotional reaction to a lack of ability to make sense of the environment (Mahoney et al., 2000).
Some possible physical causes of agitation may be hunger/thirst, illness, pain, incontinence or use of restraints (Mahoney et al., 2000). Environmental causes may be light, temperature, noise or invasion of personal space; social causes may be over-stimulation or boredom (Ragneskog, Gerdner, Josefsson, & Kihlgren, 1998; Vance, Moore, Farr, & Struzick, 2008). Agitation may be due to unmet needs (Algase et al., 1996). Although there may be identifiable causes of agitation, there is a group of those with agitation with unexplainable causes, hence Cohen-Mansfield’s definition “that is not explained by needs.”

Eating Ability and Dietary Intake

The cognitive and physical declines that accompany AD and its behavioral consequences of apathy and agitation have been linked to decreased eating ability and decreased dietary intake with subsequent weight loss and malnourishment (Boyle at al., 2003; Greenwood, Tam, Young, Binns, & van Reekum, 2005; Lam, Tam, Chiu, & Lui, 2007; Politis et al., 2004; Stout, Wyman, et al., 2003; Yu, Kolanowski, Strumpf, & Eslinger, 2006; Tonerelli, 2005; White et al., 2004). Carrier, West, and Ouellet (2007) found that difficulty manipulating food and food containers (apraxia), among other factors, was associated with malnourishment and found that 70% of 263 cognitively impaired residents reviewed were at risk for becoming malnourished. Reed, Zimmerman, Sloane, Williams, and Boustan (2005) found that 54% of residents from 45 assisted living facilities and nursing homes had a poor intake of food. Indeed, malnourishment has become an “epidemic” in nursing homes across the country since as many as 85% of institutionalized older adults are reported to be malnourished according to Burger, Kayser-Jones, and Bell (2000).
In addition to weight loss and malnourishment, decreased eating ability and dietary intake may be accompanied by low serum albumin, pressure ulcers, infections, and anemia. Weight loss is associated with a negative prognosis, decreased quality of life, and premature mortality (Burger et al., 2000; Elmstahl, Persson, Andrenn & Blabolil, 1997; Lou, Dai, Huang, & Yu, 2007; Yen, 2005).

Eating ability and dietary intake are linked with one another. Eating ability is defined as the use of suitable utensils, chewing, and swallowing (Uniform Data System for Medical Rehabilitation, 1997). Dietary intake is operationally defined as the percentage of food and fluid consumed in a meal. It is consistent with the denotative definitions of diet and intake in the proposed study: diet is “liquid and solid food substances regularly consumed in the course of normal living” (Venes, 2005, p. 593); intake is that which is taken in, esp. food and fluids (Venes, 2005, p. 1120).

As noted earlier, eating ability declines as AD progresses, and this decline is a typical symptom of the disease (Mahoney et al., 2000). The agnosia and apraxia that are characteristic of dementia put a person at risk of decreased eating ability and dietary intake. In an observation of five older adults with dementia in a long-term care facility, one was observed to have difficulty with the utensils (Sandman, Norberg, & Adolfsson, 1988). A typical observation in a nursing home is seeing residents utilizing the wrong utensil to manage the meal (e.g., attempting to eat soup with a fork or a knife). Berkhout, Cools, and van Houwelingen (1998) found that those with dementia who could not feed themselves were more likely to experience weight loss. The weight loss was associated with the inability to feed oneself because of the dementia versus the dementia diagnosis itself. Similarly, Knoops, Slump, deGroot, Wouters-Wesseling, Brouwer, and
vanStaveren (2005) followed 108 nursing home residents for 24 weeks. They too found dependency in eating to be associated with weight loss. Inadequate consumption of calories and nutrients leads to weight loss with eventual malnutrition.

An additional cause of decreased dietary intake and malnutrition in institutionalized older adults may be inactivity. Schmid, Weib, and Heseker (2003) describe a model for malnutrition (see Figure 2).

![Figure 2](image-url)

They point out that decreased appetite and dietary intake, with eventual malnutrition, result from a loss of activity such as would occur when one is in an environment with few opportunities to engage in meaningful activities and when one is apathetic. Residents in
nursing homes are often inactive for long periods of time (Kolanowski, Buettner, Litaker, & Yu, 2006). A decrease in activity can lead to a loss of strength (Baum, Jarjoura, Polen, Faur, & Rutecki, 2003); a decline in muscle mass from the inactivity leads in a downward spiral to malnutrition according to Schmid et al. (2003).

Research Questions

Consequences of AD, including apathy, agitation, decreased eating ability, and decreased dietary intake, are among the most frequent for older adults residing in institutions. AD and other causes of impaired memory represent a major challenge for nurses working with institutionalized older adults. Nurses working in nursing homes and assisted living facilities are mandated, according to the Requirements for States and Long Term Care Facilities (2002) and the Certification Procedures and Standards for Assisted Living Residences (2006), to provide care of high quality by assessing residents’ function and ability to carry out ADL’s, such as eating, and intervening when behavioral disturbances or weight loss occur in residents with dementia. These mandates, known as quality indicators, include decreasing the use of antipsychotic medications for behavioral disturbances, such as agitation, that may lead to weight loss. They also include monitoring residents for weight losses of 5% or more in the past month and 10% or more in the past three months (Minimum Data Sets, 2005).

However, the regulations are vague when it comes to activity, stating only that residents must maintain their highest level of physical function and must not have a decrease in range of motion in nursing home settings and that residents will have planned activities that include gross motor activities in assisted living settings. There are no “best practices” for exercise activity in either nursing homes or assisted living. Further,
effective interventions that are alternatives to medications for residents with dementia are scarce.

The preservation of implicit memory in those with AD and the feelings of familiarity that may arise from implicit memory (Son, Therrien, & Whall, 2002) provide the foundation for a new intervention consisting of familiar physical activity to familiar music. The intervention may trigger their preserved memory and change their current behavior to participate in the intervention, thus, result in positive outcomes over time. Therefore, the research questions in the study were: a) What is the effect of a familiar physical activity to familiar music on apathy, agitation, eating ability, and dietary intake in institutionalized older adults with dementia? b) Do their apathy, agitation, eating ability, and dietary intake change over time? c) Is greater participation in the intervention associated with more positive outcomes?

Hypotheses

The research questions were addressed by testing twelve hypotheses:

1. Institutionalized older adults with dementia who receive an intervention involving a familiar physical activity to familiar music will have less apathy than those who do not receive the experimental intervention.

2. Institutionalized older adults with dementia who receive an intervention involving a familiar physical activity to familiar music will have less agitation than those who do not receive the experimental intervention.

3. Institutionalized older adults with dementia who receive an intervention involving a familiar physical activity to familiar music will have greater
eating ability than those who do not receive the experimental intervention.

4. Institutionalized older adults with dementia who receive an intervention involving a familiar physical activity to familiar music will have greater dietary intake than those who do not receive the experimental intervention.

5. Institutionalized older adults who participate in a familiar physical activity to familiar music will have a decrease in apathy over time.

6. Institutionalized older adults who participate in a familiar physical activity to familiar music will have a decrease in agitation over time.

7. Institutionalized older adults who participate in a familiar physical activity to familiar music will have an increase in eating ability over time.

8. Institutionalized older adults who participate in a familiar physical activity to familiar music will have an increase in dietary intake over time.

9. Participation in a familiar activity to familiar music will be negatively associated with apathy.

10. Participation in a familiar activity to familiar music will be negatively associated with agitation.

11. Participation in a familiar activity to familiar music will be positively associated with eating ability.
12. Participation in a familiar activity to familiar music will be positively associated with dietary intake.

Based on an experimental repeated measures design, older adults with dementia residing on units dedicated to their care in a nursing home and an assisted living facility were randomly assigned to an intervention or control group. Data were analyzed using repeated measures analysis of variance for Hypotheses 1 through 4, in which interest was in the difference between subjects. Repeated measure analysis of variance also was used to test Hypotheses 5 through 8, in which interest was in the interaction of groups and time. For Hypotheses 9 through 12, data were analyzed using Pearson’s correlation.

Conceptual and Operational Definitions

Familiar Physical Activity - bodily movement based on knowledge from past experiences (Son et al., 2002; USDHHS, 2002). It consisted of simple chair exercises of upper and lower extremities with recognizable movements (i.e. reach to pick the apple) and included a ball toss.

Familiar Music – harmonious sounds based on knowledge from past experiences (Son et al., 2002; Webster’s, 2002). It was music from the 1920’s to 1950’s – recognizable from past experiences to the elder cohort of 65 years of age and greater – played on a CD player.

Apathy – defined as a lack of interest, involvement, energy, and motivation (Stout, Ready, Grace, Malloy, & Paulsen, 2003). Apathy was measured with 10 items of the apathy subscale of the Frontal Systems Behavior Scale (FrSBe) (Grace, Stout, & Malloy, 1999) modified as an observer format.
Agitation – defined as “inappropriate verbal, vocal, or motor activity that is not explained by needs or confusion of the individual” (Cohen-Mansfield & Billing, 1989, p. 712). Agitation was measured with 29 items of the Cohen-Mansfield Agitation Inventory (CMAI) modified as an observer format.

Eating Ability – includes the use of suitable utensils, chewing, and swallowing (Uniform Data System for Medical Rehabilitation, 1997). Eating ability was measured with the seven categories of the Functional Independence Measure (FIM™) (Ottenbacher, Hsu, Granger, & Fiedler, 1996), ranging from complete independence to complete dependence.

Dietary intake – the amount of liquid and solid food consumed in the meal (Venes, 2005). It was measured as the percentage of food and fluid consumed at the noon meal.

Participation – the act of taking part (Webster’s, 2002). It was measured with five categories of a Participation in Activity form ranging from not at all to all the time.

Institutionalized Older Adult – a person age 65 years or older who resides in a nursing home or assisted living facility.

Dementia – an impairment in memory with at least one of the following: aphasia, apraxia, agnosia, or a disturbance in executive functioning (American Psychiatric Association, 2000). It was measured with the Mini Mental State Exam (Folstein, Folstein, & McHugh, 1975) and diagnosis of dementia in residents’ charts.
CHAPTER 2
REVIEW OF THE LITERATURE

In this chapter, current physical activity and music interventions for apathy, agitation, decreased eating ability, and decreased dietary intake are reviewed and critiqued, followed by a review of the literature and framework underlying the study intervention. Briefly stated, the study intervention of familiar physical activity to familiar music before a meal may reduce apathy and agitation and may increase eating ability and dietary intake because, despite memory impairment in older adults with dementia, phenomena from their past that remain familiar to them may trigger their preserved memory, change their current behavior, and result in positive outcomes (Son et al., 2002).

Current Interventions

Research to date supports the use of physical activity, music, or a combination of the two to reduce behavioral disturbances and increase dietary intake among older institutionalized adults with dementia. However, many of these studies are limited methodologically as will be pointed out.

Physical Activity

Physical activity is one strategy to reduce the problems of dementia. The U.S. Department of Health and Human Services makes a distinction between physical activity and exercise. Physical activity is “bodily movement produced by the contraction of skeletal muscles that increases energy expenditure above the basal level” (2002, p. 20) whereas exercise is defined as “physical activity that is planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness” (2002, p. 21). These terms are sometimes used interchangeably. It is physical
activity that was examined in this study; however, much of the literature uses the term exercise and will be described as such when it has been used in this manner in the studies presented below.

The consequences of dementia, that is, behavior disturbances and weight loss, also may be prevented with physical activity according to a review by Rolland, Abellan van Kan, and Vellas (2008). In a feasibility study with 29 residents with dementia, Netz, Axelrad, and Argo (2007) found even those with severe dementia (MMSE <12) were able to participate in an exercise program. Measuring participation from low to high performance, 5 of the 11 participants with low MMSE were among those in the high performance group.

Physical activity or exercise has been used as a strategy and found to improve behaviors such as mood (Williams & Tappen, 2007) and depression (Teri et al., 2003) as well as enhance fitness (Arkin, 2003) and cognition (Masley, Roetzheim, & Gualtieri, 2009) in Alzheimer’s patients. In a meta-analysis, Heyn, Abreu, and Ottenbacher (2004) reviewed 30 randomized controlled studies of physical exercise as an intervention for 2,020 participants who were cognitively impaired. Based on the 2,020 participants, they concluded that exercise improves fitness and physical and cognitive function in older adults with dementia.

More specific benefits of physical activity or exercise in relation to behaviors such as agitation in patients with AD also have been documented although studies have been fewer (Alessi, Yoon, Schnelle, Al-Sammarrai, & Cruise, 1999; Fitzsimmons & Buettner, 2003; Landi, Russo, & Bernabei, 2004). A combination of aerobic group exercises with strength, balance and flexibility training were used for four weeks in the
study by Landi et al. (2004). They examined the effect of the exercise program on “behavioral problems” in thirty older adults in a pilot longitudinal study in a nursing home. The control group did not receive exercises. While there was no mention of an instrument to measure behaviors, there was a reported decrease in wandering, decrease in verbal abuse and decrease in physical abuse in the intervention group. The authors stated the results were statistically significant, however, only means were presented; no inferential statistics were reported.

A group physical activity was performed for up to 4 times a day, 5 days a week for 14 weeks in the study by Alessi et al. (1999). They evaluated the effects of a physical activity, combined with an environmental intervention at night, on sleep and agitation. Participants were randomly assigned to the above physical activity or to a control group of usual care with the night environmental intervention only. Agitation was recorded as the percent of observations in which the subject was agitated. Seven of fifteen participants (47%) in the intervention group had a decrease in agitation while only one in the control group exhibited a decrease; nine exhibited an increase in agitation. Similar to the Landi study there was no mention of the instrument used to record agitation.

The effect of “individualized interventions” on agitated and passive behaviors on 29 community-dwelling older adults with dementia was studied by Fitzsimmons and Buettner (2003). Using a pre-test, post-test experimental design, they provided interventions tailored to the interests of the older adult 3-5 days per week for two weeks; exercise was one of several interventions. The control group received delayed interventions. The original Cohen-Mansfield Agitation Inventory (CMAI) was used to measure agitation and portions of the Passivity in Dementia Scale (PDS) were used to
measure passivity. Passivity and agitation improved with interventions matched to the interest level of the older adult. It is, however, difficult to determine how closely related passivity is to apathy.

Several studies have examined the impact of exercise in relation to functional ability with older adults without dementia. Fahlman, Topp, McNevin, Morgan, and Boardley (2007) conducted a 16 week exercise program, including weight lifting, with 73 older adults exhibiting diminished functional ability. Older adults in the intervention group (n=39) demonstrated increased strength after participating in the program versus those in the control group (n= 34). Functional abilities (improvements in ADLs), however, were not measured; although the researchers stated that an increase in fitness would lead to increased function. Similarly, Baum et al. (2003), studying “physical function,” conducted a group exercise program in a long term care facility which included nursing home and assisted living residents. They measured walking speed and balance in 20 frail residents. However, the Functional Independence Measure (FIM™) was used at baseline only with no post data reported and so improvement in functional ability such as eating could not be determined.

In contrast, activities of daily living were measured with the Katz Index of ADLs in a study by Rolland et al. (2007) and with the Barthel Index in a study by Galik et al. (2008). The Rolland study conducted an exercise program twice a week for 12 months with 67 residents with AD; 67 control subjects received routine care. Nutritional status was also measured with the Mini-Nutritional Assessment (MNA) and with measuring body weight. There was a slower decline in ADLs in those receiving the exercise program; it is difficult to know specifically about eating ability as it is one of six ADLs
measured with the Katz. Disappointingly, however, there was no significant change in nutritional status in this study. The MNA assesses weight loss and anthropometric measurement; it does not measure daily nutrition. The Galik study found no change in physical function ($p=.43$) over 6 months using a restorative care intervention described, in part, as physical activity with 46 nursing home residents with dementia. Again, feeding is only one dimension of the Barthel Index. This was a pilot study and they did not use a control group for comparison.

If inactivity, according to Schmid et al. (2003), does indeed lead to decreased dietary intake, then it would follow that activity could potentially increase dietary intake. However, with the exception of Rolland et al. (2007), no studies linking physical activity to improvements in dietary intake in older adults with dementia have been found.

A recent Cochrane Review (Forbes et al., 2009) of physical activity for those with dementia concluded that there is insufficient evidence to date of a benefit of physical activity for function or behavior. Of the 187 articles screened, only 4 were of sufficient quality to be reviewed. However, Hogan et al. (2008) reviewed 954 articles and concluded that exercise should be recommended for those with those with dementia. Interventions, such as exercise, may postpone functional decline according to Yu et al. (2006). Research is needed to investigate if physical activity can, in fact, improve eating ability and dietary intake in institutionalized older adults with dementia. The potential for physical activity is promising to not only improve apathy and agitation, but to improve function and dietary intake. Physical activity may well be the key to reversing the decline in eating ability and decreased dietary intake associated with inactivity among older adults residing in a nursing home or assisted living.
Music

In addition to physical activity, music also has been examined as a strategy to reduce the consequences of apathy (Holmes, Knights, Dean, Hodkinson, & Hopkins, 2006) and agitation (Denney, 1997; Gerdner, 2005; Gerdner & Swanson, 1993; Goddaer & Abraham, 1994; Hicks-Moore, 2005; Remington, 2002) and improve dietary intake (Richeson & Neill, 2004). Several studies have used music during the mealtime. For example, Richeson and Neill (2004) examined the effects of relaxing music during the evening meal on agitation and percentage of food eaten with 27 older adults with dementia. In a quasi-experimental time-series design, they introduced relaxing music for one hour at dinnertime. They found a decrease in agitation of 21% overall and an increase of 8.6% in food intake. Agitation was measured with the widely used Cohen-Mansfield Agitation Inventory (CMAI; Cohen-Mansfield, Marx, & Rosenthal, 1989); food intake was measured in percentages, however, it is difficult to determine the accuracy as the percentages were taken from a review of medical records.

Goddar and Abraham (1994) examined the effects of relaxing music on the type and incidence of agitated behaviors during mealtime with 29 residents with severe dementia (MMSE 0-17). Denney (1997) and Hicks-Moore (2005) each replicated the study with some modifications with 9 and 30 residents respectively. They each found a change over time in the overall incidence of agitation and each found a rebound of agitated behaviors occurred when music was removed.

Different types of music (relaxing music, 1920-1930 music, or pop and rock) were utilized to determine if they influenced food intake and symptoms of irritability and restlessness (aspects of agitation) when played during the dinner meal (Ragneskog, Brane, Karlsson, & Kihlgren, 1996). Using a quasi-experimental design with 20
residents, the investigators measured agitation with a “GBS” scale that was not described. Measuring the plates, they compared the amount of food served and consumed. Results were significant and indicated the patients ate more during the music interventions and were less irritable and anxious, especially when relaxing music was played. Food intake was poorer when the 1920-1930 music was played, but this finding is difficult to interpret given the absence of information about the GBS.

A slight to marked decline in agitated behaviors was demonstrated in 5 elderly females with dementia (Gerdner & Swanson, 1993) with the use of individualized music and, in a later study, a significant reduction with 8 female participants (Gerdner, 2005). Calming music was found to decrease the level of agitation in 68 subjects in 4 long term care facilities (Remington, 2002) and, in similar fashion, favorite music to decrease agitation in 41 residents (Hicks-Moore & Robinson, 2008); neither the Remington nor the Hicks-Moore study was done at mealtime.

There is a paucity of research on the effects of music on apathy. Only two studies were located (Holmes et al., 2006; Raglio et al., 2008). In the Holmes et al. study, thirty-two subjects with moderate to severe dementia and apathy were randomly assigned to live music, pre-recorded music, or silence for 30 minutes. They were filmed during the 30 minutes and then rated for the amount of engagement in music they exhibited over 3 minute intervals. The mute was used on the recording to blind the researchers to the intervention. Positive engagement was demonstrated in those exposed to live music (69%) as compared with those exposed to pre-recorded music (25%) or silence (12.5%). No measure of apathy was described however. The Raglio et al. study used the Neuropsychiatric Inventory (NPI) instrument and reported decreased apathy and agitation.
in those exposed to music. Apathy and agitation, however, constitute only two items on
the NPI asking only if the client is less interested in activities and if the patient is
stubborn and resistive to care. These questions do not constitute the full range of the
behaviors, especially agitation which may be verbal or physical in nature.

Music, as well, holds promise as an effective intervention for those with
dementia. However, many of the studies must be interpreted cautiously due to small
sample sizes, lack of consistent terms or instrument, and/or limited statistical analysis.
Indeed in a Cochrane Review of music for people with dementia, Vink, Birks, Bruinisma,
and Scholten (2006) excluded most studies from review stating that the quality of studies
was poor and no conclusions could be reached.

Physical Activity to Music

The combination of physical activity or exercise to music has been found to
provide pleasure (Kovach & Henschel, 1996) as well as improve mood (Heyn, 2003; Van
evaluated the effects of a multi-sensory exercise program on behavior. In a one-group,
pre-test/post-test, quasi-experimental design, storytelling and imagery was combined with
exercise to soft music (multi-sensory) to increase engagement. The intervention was held
after lunchtime for 15 minutes (increasing to 70 minutes), 3 times per week for 8 weeks.
Mood, rated as happiness and agitation, was rated by 8 examiners as a subjective measure
with the Caregiver Mood Report (CMR) questionnaire. Results indicated an improvement
in mood with the exercise intervention reportedly agitation decreased.

The Van de Winckel et al. (2004) study measured “aggressiveness” – one aspect
of agitation according to Cohen-Mansfield. They too examined the effect of exercise to
music on mood (and cognitive function) in twenty-five females with dementia. The intervention group (15) was randomly assigned to exercise to music. The control group (10) received conversation only. Group exercise class was held for 30 minutes daily for 3 months. Music was age-appropriate and included folk accordion songs (polka) and country and western. They measured the effect on cognition with the MMSE and Amsterdam Dementia Screening Test. Behavior was measured with the Stockton Geriatric Rating Scale (BOP scale) which reportedly includes items of aggressiveness and inactivity. There was an improvement in cognition in the intervention group. There were no significant effects on behavior in both groups.

Music or exercise was used in the study by Kovach and Henschel (1996). They described their observations from qualitative field notes made during a larger quantitative study. Twenty-three residents were observed during 5 different types of activities: music therapy and exercise were two of the activities (other activities included household chores, art therapy and a cognitive activity). Residents displayed pleasure during music and exercise activities as evidenced by laughing and smiling. Refusals to participate were most evident for household (8) and art (6) activities; four refused the exercise activity while two refused the music.

Few studies have examined the effects of a combination of physical activity (or exercise) and music on specific behaviors of apathy or agitation. Hagen, Armstrong-Esther, and Sandilands (2003) evaluated the effects of exercise to music on “behavioral disturbances” of older residents. Participants were non-randomly assigned to an exercise, occupational therapy (OT), or control group. Exercise was conducted to 1920-1940 music three times a week for 40 minutes over 10 weeks. Using the Behavior Rating Scale to
assess “social disturbance” and apathy, there was a decrease in behavioral disturbances in
the exercise group and OT groups; there was a return to baseline behaviors 10 weeks
after the program ended. It is difficult to determine the degree of reduction on agitation or
apathy as the scale was not specific. The exercise study by Rolland et al. (2007) was also
reportedly to music; however, the music was not described. They found no change in
behavioral disturbances however, similar to the Raglio study; they also used the
Neuropsychiatric Inventory (NPI) which again, only has two items related to apathy and
agitation.

Few studies have used a combined physical activity to music intervention and
evaluated the effects on agitation specifically (Buettner & Fitzsimmons, 2004;
Kolanowski, Litaker & Buettner, 2005) using the CMAI. These same researchers have
also studied the effect on passivity but again, it is difficult to determine how closely
related this is to apathy. Agitation and passivity have been found to decrease when
activities are matched to the interest level of the participants (Fitzsimmons & Buettner,
2003; Kolanowski, Litaker & Buettner, 2005) as might occur when activities are familiar
to participants.

Timing of Intervention

The timing and frequency of physical activity to music may help to increase
participation in the intervention. To identify the best time of day to conduct an exercise
class, Buettner and Fitzsimmons (2004) conducted an exercise class to music in a pilot
study with 20 residents on two special care units. Ten participants were assigned to a
morning group (10 AM) and ten to an afternoon group (2:30 PM). Using the Cohen-
Mansfield Agitation Inventory and the Passivity in Dementia Scale to measure agitation
and passivity, respectively, they found passivity and agitation improved in the morning group only while agitation increased for the afternoon group. They concluded that exercise classes should be held in the morning for those with dementia.

The amount of time to spend on the physical activity to keep the person with dementia participating is not consistent. Similar physical activity interventions have lasted 15 minutes (Heyn, 2003), 40 minutes (Hagen et al., 2003), and up to 60 minutes (Baum et al., 2003). They have taken place twice a week (Arkin, 2003), three times a week (Hagen et al., 2003; Heyn, 2003) or five times a week (Alessi et al., 1999; Buettner & Fitzsimmons, 2004). The intervention has lasted from 2-4 weeks (Buettner & Fitzsimmons, 2004; Fitzsimmons & Buettner, 2003; Landi et al., 2004) to as much as 10-12 weeks (Alessi et al, 1999; Arkin, 2003; Van de Winckel et al., 2004). None have been “one time only” interventions as a rapport needs to be established with a resident with AD and improvements determined over time.

Participation in a physical activity for extended periods of time is sometimes difficult for residents with dementia (Kovach & Magliocco, 1998). Many simply doze, fidget, or wander away (Kovach & Henschel, 1996). Measuring “engagement” in an exercise activity, Heyn (2003) found that 69.2% of participants were engaged more than half the time. Similarly, Netz et al. (2007) found 60% of participants performed almost all movements of a physical activity. Participants were more engaged in exercise when rhythmic music accompanied the exercise according to Mathews, Clair, and Kosloski, (2001).

In summary, physical activity, music, or a combination of the two, have been studied in relation to apathy, agitation, eating ability, and dietary intake. Music has been
studied most extensively in relation to agitation and has been found to decrease agitation in institutionalized older adults with dementia. Physical activity to music has been effective in decreasing agitation and passivity, which closely resembles apathy. Eating ability has not been found to decline as rapidly when physical activity to music has been used as an intervention. There has been no effect on dietary intake when a combined intervention of physical activity to music was used although music during mealtime has been effective in increasing dietary intake in institutionalized older adults with dementia. Again, these studies must be interpreted cautiously due to methodological limitations.

Conceptual Framework

The intervention being tested in the study was based on the understanding of dementia and memory that were presented in the Introduction and on a framework of familiarity and related concepts, based on Son et al. (2002). The framework is presented in Figure 3. Son et al. (2002) define familiarity as “thorough knowledge of a subject derived from a close relationship and acquaintance from past experiences” (p. 264). It results from recognizing an experience from an earlier period. A previous experience may facilitate or change performance, albeit subconsciously due to preserved implicit memory. As previously stated, implicit memory is an unconscious form of memory in which there is previous experience with the stimuli. A past experience with music and a physical activity may provide a cue to trigger preserved implicit memory in an older adult with dementia. Interestingly, music has been found to activate the hippocampus and amygdala, areas in the brain associated with memory and behaviors (Boso, Politi, Barale, & Emanuele, 2006). Incorporating a physical activity and music into an intervention, then, could serve as a familiar cue. Once triggered by the cue, preserved implicit memory
may prompt a resident to participate in the intervention, which includes hand, arm, and leg movements. The authors also postulate that “exposure to familiar stimuli may spontaneously trigger appropriate functional activities” (p. 265). Eating is a functional ability.

Finally, this researcher reasoned that participation in the intervention is a change in behavior that may lead to decreased apathy and agitation. Further, greater participation may lead to enhanced eating ability as well as increased dietary intake. It is often observed that residents are bought into the dining room up to one-half hour before mealtime where they either nap or become agitated. While those with memory impairment may most likely forget that they have participated in an intervention, this

investigator postulated that there may be a “carry-over” effect of decreased apathy and agitation from participation in the intervention activity just prior to mealtime. Fleming, Kim, Doo, Maguire, & Potkin (2003) stated timing is important for immediate memory in those with AD. When presented with an emotional stimulus of positive, negative, or neutral words, those with AD had better recall of the emotional stimulus, albeit a negative stimulus, than when they were given a neutral stimulus. The researchers were quick to point out that there was no delay and assessment was immediately after the stimulus was presented. There was not a delay from intervention to mealtime in this study.

There does not appear to be evidence of use of familiar music (age specific music of the 1920’s – 1950’s) and its effect on agitation, apathy, and dietary intake. There are no studies which have focused on the combination of a familiar physical activity to familiar music before mealtime. Since this is the first time using a physical activity to music, the study was designed to determine if this is a promising intervention (therefore a factorial design is not being used in this study). It was anticipated that this combination would provide sensory-stimulation and enjoyment, triggering implicit memory just prior to eating which would increase intervention participation, decrease apathy and agitation, increase functional ability of eating, and, ultimately, improve dietary intake.
CHAPTER 3

METHODS

To examine whether an intervention consisting of a familiar physical activity to familiar music had an effect on apathy, agitation, eating ability, or dietary intake in institutionalized older adults with dementia, an intervention based on the conceptual framework of familiarity presented in Chapter 2 was used. In addition, the effect of time on these outcomes was examined as well as extent of participation. The design, sample, instruments, and procedure used to conduct this study will be presented in this chapter.

Design

A repeated measures experimental design was used in this study. Residents were randomly assigned to an experimental or control group. The experimental group received a physical activity of seated chair exercises to familiar music of the 1920s to 1950s one-half hour before mealtime. The control group received a quiet activity that did not include a physical activity or music or, in some cases, they waited in the dining room for the meal. The intervention was repeated twice a week for three weeks to determine if there was a change in the outcomes over time. Similar researchers have conducted an exercise program for 2-4 weeks (Buettner & Fitzsimmons, 2004; Fitzsimmons & Buettner, 2003; Landi et al., 2004) with older adults with dementia. Three weeks was chosen for the main study due to the availability of research assistants. It was feasible to repeat the study twice a week for 12 weeks given the time constraints of the research assistants.

The advantage of a repeated measures design is the ability to determine change over time in the same subjects. The disadvantage of repeated measures is mortality or the loss of subjects over time.
Sample

The target population for this study was institutionalized older adults with dementia. Institutionalized is defined as those residing in nursing homes and assisted living facilities. These facilities were chosen because there are similar mandates for monitoring weight loss and behavioral disturbances and to increase generalizability.

The accessible population consisted of older residents of two facilities in Western Massachusetts with special units for those with memory impairment due to dementia. The first facility was a 200-bed nursing home with a free-standing assisted living building. In the nursing home, there were 80 residents on two 40-bed dementia specific secure units and 80 residents on two 40-bed non-dementia specific units but with multiple residents with memory impairment. The assisted living building had a dementia specific secure unit with 20 residents. The second facility was a 56-bed assisted living facility for those with dementia with two secure units. A convenience sample of those residing in the facilities between September and December 2008 was used for this study.

Eligibility Criteria

To be eligible to participate in this study, residents had to meet 13 inclusion criteria. Participants had to meet the population criteria: (a) be age 65 or older to be familiar with the music of the 1920s to 1950s, (b) have a diagnosis of a cortical dementia (Alzheimer’s, Vascular, or mixed) to prevent those with movement disorder such as Parkinson’s disease and (c) have a score below 25 on MMSE (Folstein, Folstein & McHugh, 1975) to indicate mild to severe stage level of dementia. They also had to meet the criteria for dependent variables: (d) have had one or more instances of agitation within the past week as reported by nursing staff, (e) have had one or more instances of
apathy within the past week as reported by nursing staff, (f) have the ability to eat and drink independently or with some degree of assistance (a FIM™ score ranging from 2 (individual performs at least 25% of eating task) to 7 (complete independence)). In addition, they needed to: (g) be able to hear a normal speaking voice with or without hearing aids to hear the music and verbal cues, (h) be able to see with or without glasses to see the movements, (i) be able to follow directions in English to understand the cues (j) eat in the main dining room to enable visualization by research assistants of all participants, (k) not have an activity restriction in their medical record, (l) have a signed consent form from the responsible family member/legal guardian, and (m) provide verbal assent just prior to the intervention.

Participants were excluded if medicated for agitation or pain within four hours prior to the intervention protocol, other than a stable dose, due to side effects such as drowsiness which may influence the dependent variables. They were excluded if acutely ill on that day to prevent harm to the resident.

Sample Size

To identify the effect size, and thus the sample size, two methods were used. First, similar studies on the effects of music were examined. Most had a wide range of effect sizes using Cohen’s rule of thumb (Cohen, 1992) and four studies lacked inferential statistical evidence (Denney, 1997; Gerdner & Swanson, 1993; Hicks-Moore, 2005; Richeson & Neill, 2004) thus could not be used for calculating effect size; descriptive statistics only were presented with means and/or percentages reported. Effect size of $d = 0.81$ (Godkaer & Abraham, 1994), 0.63 (Clark, Lipe, & Bilbrey, 1998), 1.43
(Remington, 2002) and 0.35 (Ragneskog et al., 1996) were able to be calculated from the music studies of those with inferential statistics reported.

Second, to estimate the effect size of the intervention, and, thus, to calculate the needed number of participants, this investigator conducted a pilot study with 18 residents over six times in an assisted living facility (not otherwise involved in this study). The statistical test used for examination of the pilot study data was repeated measures analysis of variance (ANOVA).

The data for the pilot study were examined with SPSS Graduate Pack 15.0 for Windows, a statistical software package. Missing data were minimal. One subject was not enrolled until time 2; two subjects were not available at time 5. Missing data were handled by computing the mean score of the data and using the mean of the group for the missing person as suggested by Mertler and Vannatta (2005).

The effect size for the pilot was calculated with the latest version of Power Analysis and Sample Size (PASS) (Hintze, 2008) for apathy and dietary intake. No effect size for agitation could be calculated as there was insufficient agitation in the pilot study. Eating ability and participation were not collected in the pilot study. The study was expanded to include these in the main study. The effect sizes were calculated in PASS by dividing the standard deviation of effects by the standard deviation (Sigma). It is the ratio of the between-groups sum of squares and the total sum of squares known as partial eta-squared (Munro, 2005, p. 180). The effect size, or partial eta-square, for dietary intake was 0.57; for apathy it was 0.38.

Based on the effect sizes found in similar studies and in the pilot study, the number of participants needed in the main study for 6 repeated measures to provide a
power of .80 to detect an effect size of 0.38 at the .05 level for apathy using repeated measures ANOVA was 60. Sixty participants were determined to be sufficient for dietary intake and would provide power of .99. A greater number of subjects were needed to control for mortality and subject loss/turnover due to hospitalization therefore, over sampling was undertaken to ensure a sufficient sample. To account for mortality of participants, 24 more participants were recruited for the study for a total of 84 participants.

**Instruments**

**Modified Apathy Subscale of the Frontal Systems Behavior Scale**

Apathy was measured with the modified apathy subscale of the Frontal Systems Behavior Scale (FrSBe; Grace, Stout, & Malloy, 1999; Appendix A), a 46-item instrument. The modified apathy subscale consists of 10 items on a scale ranging from 1 (almost never) to 5 (almost always). The 10 items are: neglects personal hygiene, lacks energy, lost interest in things, does nothing, gets involved spontaneously, does things without reminders, unconcerned and unresponsive, lacks initiative and motivation, cares about appearance, and is sensitive to others. The definition of apathy is consistent with and includes items from the subscale.

The Frontal Lobe Personality Scale (FLOPS), an earlier version of the Frontal Systems Behavior Scale, has been found to be a reliable instrument for assessing apathy in patients with dementia (Grace et al., 1999) with internal consistency (Cronbach’s alpha) of 0.96. Construct validity of the FrSBe was undertaken with 83% of items loading on the three factors (Stout, Ready, Grace, Malloy, & Paulsen, 2003) of apathy, disinhibition and executive function; alpha values of 0.87, 0.84, and 0.91, respectively,
for the three subscales were reported. The apathy subscale had a Cronbach’s alpha of 0.87 (Stout et al., 2003).

The apathy subscale was modified by this researcher to have an observer format for the main study. A score of 0 was given if the behavior was not observed during the five minutes of observation pre intervention, 1 if the behavior was observed. The numbers were then added. This was repeated post intervention for five minutes. A higher score indicated greater apathy.

The scale as modified was used in the pilot study for the main study. It was feasible to use the modified subscale; however, interventionists in the pilot study stated that one item, *cares about appearance*, was difficult to measure with observation and was subsequently excluded from analysis. The inter-rater agreement was 100% in the pilot study. The items were reworded for this study so that all were negatively worded items.

Inter-rater reliability was determined in the main study prior to data collection with research assistants scoring ten residents during a trial of the protocol. Inter-rater reliability was calculated using the equation of: number of agreements divided by number of possible agreements (Burns & Grove, 2005). Inter-rater reliability was determined to be when there was agreement of 90%. Inter-rater reliability of 95% was achieved.

**Cohen-Mansfield Agitation Inventory**

Agitation was measured with the Cohen-Mansfield Agitation Inventory (CMAI; Appendix B), a 29-item questionnaire of agitated behaviors. Behaviors are rated on a 7-point rating scale during observation of the resident. The 29 behaviors on the instrument are: pacing, inappropriate robbing or disrobing, spitting, cursing or verbal aggression, constant requests for attention, repetitious sentences or questions, hitting, kicking,
grabbing, pushing, making strange noises, screaming, scratching, trying to get to a
different place, general restlessness, complaining, negativism, handling things
inappropriately, hiding things, hoarding things, tearing things, performing repetitious
mannerisms, verbal sexual advances, physical sexual advances, intentional falling,
throwing things, biting, eating inappropriate substances, and hurting oneself or others
(Cohen-Mansfield, Marx, & Rosenthal, 1989). The instrument is consistent with the
definition of agitation.

The CMAI has been modified to an observer format by Chrisman, Taber, Whall,
and Booth (1991) and used by Remington (2002) where a score of 0 is given if the
behavior is not present, 1 if the behavior occurred once, 2 if the behavior occurred twice,
etc. It was used in the manner similar to the apathy instrument in this study where 0 was
given if the behavior was not present and 1 if the behavior occurred during the 5 minutes
of observation. The numbers were then added up. A higher score indicated greater
agitation.

Inter-rater reliability was determined with research assistants scoring ten residents
during a trial orientation of the protocol. Reliability was determined when there was
agreement on 90%. The instrument has been used in many of the cited studies (Buettner
& Fitzsimmons, 2004; Denney, 1997; Gerdner, 2005; Kolanowski et al, 2005;
Remington, 2002; Richeson & Neill, 2004) with documented reliability and validity.
Reported inter-rater reliability in the Remington study was .93 to 1.00; it was .95 in the
Gerdner study. It was 95% in this study.

The modified CMAI was feasible to use during the pilot study, however, there
was very little agitation observed. It was decided, however, to continue to observe for
agitation in the main study as there may be more agitation observed in the nursing home setting and it was still of interest to the researcher.

Participation Form

Participation, defined as the act of taking part, was measured using a participation form for each member of the experimental group by the research assistants at the completion of the intervention. The form consisted of a 5-point scale ranging from 1 (not at all or almost not at all) to 5 (all the time or almost all the time) (Appendix C). The control group received a score of 0. It was used to collect scores on the extent of participation in the physical activity intervention to determine if there was an association with the outcomes of apathy, agitation, eating ability, and dietary intake.

Participation has been coded in similar studies as active, passive, null, dozing, or unrelated (Kovach & Magliocco, 1998; Mathews et al., 2001) or on a three point scale as not engaged, engaged up to half the time, engaged more than half the time (Heyn, 2003). The 5 point scale seemed to be more sensitive although no psychometric properties are available for the participation form.

Functional Independence Measure (FIM™)

Eating ability was measured with the Functional Independence Measure (FIM™; Ottenbacher, Hsu, Granger, & Fiedler, 1996; Appendix D1), a widely used instrument for functional abilities in rehabilitation. Permission to use the instrument was obtained from the Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc. (Appendix D2). It contains 18 items including those that fall under four categories of activities of daily living, sphincter management, mobility and executive function; only the eating subscale under activities of daily living was used for this study.
Items are rated using a 7-level scale (Jette, Warren, & Wirtalla, 2005) ranging from 1 (complete dependence) to 7 (complete independence). In a secondary data analysis, Jette et al. (2005) found a Cronbach’s alpha coefficient of 0.89 for the ADL domain (which includes eating). Rolland et al. (2007) recently investigated the effects of an exercise program on ADLs using the Katz Index of ADLs. While they found less decline in ADLs in those in the intervention group, the Katz is a less robust measure having only 3 ratings (of independent, semi-dependent, dependent) versus a 7 level scale in the FIM™. It was scored in the main study with a number from 1 to 7 determined for the participant.

Inter-rater reliability was to be determined with research assistants scoring ten residents during a trial of the intervention. Reliability would be determined when there was agreement on 90%. It was difficult to assess during the study as many dining room sites were crowded and the staff did not want more than two in the dining room. The two research assistants discussed and agreed between them, however, they did not record their independent measurements and, thus, the researcher was unable to consistently assess their accuracy.

Percentage of Dietary Intake

Dietary intake was measured as percentage of food and fluids consumed at the meal, the practice employed in institutional settings. A ratio was determined and it was recorded on the Dietary Intake form (see Appendix E) along with the FIM™ score. Inter-rater reliability was determined prior to data collection. Research assistants evaluated trays for percentage of meals consumed until agreement (within 10%) on ten trays during the training period or until inter-rater agreement of 90%. While weighing the plate, as used in the study by Ragneskog et al. (1996), may appear to be more precise, from
personal experience, many residents drop food in the lap and on the floor making observation of percentage consumed a more precise measure of intake. Shatenstein, Claveau, and Ferland (2002) found that visual observation was a valid means of assessment of dietary intake when compared with measuring plates.

In the study, research assistants not only estimated the percentage of intake, but also photographed participants’ trays before and after the meal to document intake as suggested by Williamson et al. (2003). Therefore, dietary intake was measured with digital pictures as well as percent of intake recorded. Food waste was included in the digital picture (Nichols, Porter, Hammond, & Arjmandi, 2002; Sherwin et al., 1998).

Mini-Mental Status Exam

A mini-mental status exam (MMSE; Appendix F) was administered within the month prior to the intervention to provide baseline data of extent of cognitive function. Some MMSE exams were on file in the residents chart and were within the month prior to the study; the rest were completed by the researcher. The MMSE is a widely used instrument to measure dementia with well documented reliability and validity (Folstein, Folstein & McHugh, 1975). It is a questionnaire with seven areas of assessment. The highest score is 30; scores below 25 are considered to indicate cognitive impairment.

Demographic Data Form

Demographic data were collected prior to the intervention study (see Demographic Data Form; Appendix G) and consisted of gender, age, ethnicity, marital status, education, score on MMSE, and type of dementia. Socio-economic status was not included as a demographic variable as those in nursing homes or assisted living centers do not have an income source and may have “spent down” to be on Medicaid. Also, it
was assumed that socio-economic data would not always be available in the resident’s chart.

Procedure

The administrative contact at the nursing home and assisted living facilities granted permission to pursue the research with their residents. Institutional Review Board (IRB) approval was obtained from the Office of Research Affairs of the University of Massachusetts Amherst (IRB#07-117) as well as the ethics committee of the nursing home and assisted living facility. The researcher volunteered to post notices for meetings with families and staff to explain the purpose of the study and to answer any questions they might have, however, the administration contact and/or the nursing manager at each facility preferred to explain the study and to answer all questions with family members.

Human Subjects Protection

Residents with memory impairment are a vulnerable population in that they are unable to give informed consent (Arford, 2004) therefore family members/legal guardians were contacted to provide approval for the study. The purposes, risks and benefits were explained to visiting family members; a letter was sent to all residents’ families with or without visitors explaining the study (see Appendix H) and the consent form was included in the mailing (Appendix I). Surrogate consent from family members was obtained.

Protection of human subjects was undertaken by providing anonymity of participants. No charts were accessed during this study by the trained interventionists; no identifiable data was made available. Only the student investigator (JM) accessed charts for demographic data only; no identifiable personal data was collected by
interventionists. Data were de-identified and code numbers were assigned. The list of names that links the data to code numbers is kept in a locked file cabinet in the student investigator’s home office. Data is also on the student investigator’s personal computer which is password protected.

Employee HIPPA training was provided to all student research assistants during orientation to the nursing home with reminders not to divulge any personal information. A video on HIPPA, provided by the nursing home and mandatory for their orientation, was observed by all students and faculty. Research assistants also completed CITI Human Rights Training through the university and received course credit for the training (worth 5% of their grade).

It was anticipated that there would not be risks involved in this study; the risks and intrusion for the participant were estimated to be minimal. It was anticipated that evoking familiar memories through music and an activity would be a pleasant experience; however, there was always a risk that these memories would induce or further agitate a resident. While unlikely, familiar music could possibly invoke painful memories. There was no evidence that this occurred in the study.

Verbal assent of the resident was obtained prior to each session and all participants were free to withdraw from the activity at any time. To prevent any harm to residents, research assistants monitored for any risk of injury during the ball game activity, as well as symptoms of dissent such as “facial grimacing, shrieking, or other signs of agitation” (Slaughter, Cole, Jennings, & Reimer, 2007, p. 36). The ball game used a beach ball which is soft and has not been shown (from experience) to physically
harm a resident. It was possible that the beach ball could potentially knock a resident’s glasses off if another resident threw it hard accidentally. This did not occur.

The potential benefits of improved dietary intake and decreased apathy and agitation are many and include increased alertness, maintenance of weight, improved wound-healing, quality of life, and overall general health. The benefits far outweighed any risks involved.

Training

Senior nursing students from Elms College, who had taken a research course, were trained interventionists and were simultaneously in a clinical rotation with the doctoral student researcher from September to December, 2008. There were 10 students a day on Wednesday with 5 on each unit; a different clinical group of 10 students on Thursday with 5 on each unit.

Training of research interventionists took place one week prior to the study (see Training Program; Appendix J) during orientation to the site. The interventionists were trained to conduct the physical activity protocol and to administer the instruments used in the study (MMSE, FrSBe, CMAI, FIM™ and Percentage of Dietary Intake). Inter-rater agreement of 90% was the expectation for each instrument. Quizzes were developed for determining the research assistants’ ability to distinguish apathy, agitation and eating ability (Appendix K1-K3) and were completed during orientation. Quizzes were discussed until 100% was obtained for each student.

Research assistants were taught the symptoms of dementia, communication techniques, and how to redirect the resident who is wandering, as suggested by Kolanowski, Buettner, and Moeller (2006). A video, Accepting the Challenge: Providing
the Best Care for People with Dementia by the Eastern North Carolina Chapter of the Alzheimer’s Association (2003), was shown which identified how to deal with a wandering and/or agitated resident. This was shown during the training phase.

Training included assessment of nonverbal symptoms of assent/dissent as described by Slaughter et al. (2007). These nonverbal signs of dissent include “facial grimacing, shrieking, or other signs of agitation” (p. 36). Assent was continually monitored.

Mentes and Tripp-Reimer (2002) suggested having a “warm-up” time for the research assistants, where they had an opportunity to observe the facility and meet the staff, before implementation of the intervention. Training included an opportunity to observe on the unit and to practice communication and redirecting skills during the orientation to the facility. Many of the senior level students had prior experience on dementia units during their junior year in their Psych-Mental Health clinical rotation.

Random Assignment

To determine group allocation, the subject assignment, intervention or control, was written on a paper and placed in a separate envelope. When consent forms were received, the envelope was then opened. This provided the subject’s group assignment.

Setting

An activity room, lounge, or dining room was used for the physical activity protocol. The room was designated by each site. A quiet room away from the other residents was requested to prevent others from wandering into the intervention and to control sound. The research assistants redirected anyone from the control group who attempted to enter the room. The research assistants set up the room for the protocol (see
Research Protocol for full description; Appendix L) and sought out those in the intervention and control group to record apathy and agitation on the modified apathy subscale of the FrSBe and the modified CMAI after observing for 5 minutes. They gave each resident a name tag. Residents in the intervention group were then invited to participate in the activity and were escorted, or wheeled in wheelchair, to the designated room. The control group remained with staff and received a usual quiet activity or were seated in the dining room to wait for the meal.

Protocol

The physical activity protocol consisted of seated exercises, choreographed to music (Appendix L). The exercises included upper and lower extremity range of motion and incorporated a ball toss with a soft beach ball. It was anticipated that these exercises would be familiar to the individual. The research assistants provided constant cueing during the exercise protocol to maintain the elder’s attention (Heyn, 2003; Van de Winckel et al., 2004). Kovach and Henschel (1996) found residents were most active when cued and when behaviors were demonstrated/mirrored to them. They found residents often disengaged from an activity when frequent cueing was not provided and when the leader was not upbeat.

The exercises were developed based on personal knowledge of range of motion and with consultation from a physical therapist; guided by the U.S. Department of Health and Human Services guide to exercise (2007). While these were simulated movements, it was anticipated that these exercises would be familiar to the individual as they included familiar moves (i.e. waving, reaching up). The activity began with the ball toss to gain attention and then included: (1) shoulder shrugs and rolls; (2) arm flexion/extension and
abduction/adduction; (3) arms across chest (hugs); (4) rowing; (5) arms reaching to “pick an apple from a tree” (6) wrist flexion/extension and abduction/adduction; (7) finger flexion/extension and abduction/adduction; (8) seated leg marching; (9) knee flexion/extension; (10) ankle circles; (11) ankle flexion/extension (step on the gas) (see Appendix L). The physical activity included a warm-up and cool-down session with the ball toss.

The music to accompany the physical activity consisted of taped music of twelve songs (see Appendix L) of the 1920’s – 1950’s - those potentially familiar to the elder cohort. One was instrumental (In the Mood) and the others were sing-along style music; all were energetic. Prior to the pilot study, a collection of twenty five songs were played to an older (84 years) cognitively intact female who identified those she most enjoyed and the twelve songs were chosen. The music was played on a portable CD player throughout the entire physical activity intervention at a moderate level for those with hearing loss but not unduly loud to prevent sensory overload.

The intervention took place twice a week (Wednesday/Thursday) for three weeks on two units simultaneously, 30 minutes before mealtime and lasted 25 minutes. The activity was held in the morning as suggested by Buettner and Fitzsimmons (2004).

The control group received usual care that did not include a physical activity or music (see Table 1). It was planned that the control group would receive a delayed intervention after the completion of the study; however, instead the activity assistants of the nursing home requested and were given a copy of the music CD and protocol to use at their site.
To maintain a manageable size, a maximum of 10 participants at a time were in the intervention group and 10 in the control on each unit. The assistants, therefore, offered the intervention and collected data multiple times on each unit (nursing home and assisted living) until the required number of participants for each group was obtained. It was repeated three times on different units for a total of twelve weeks (see Table 1).

Similar studies have been done 3 to 5 days a week; this study was done twice a week largely due to student R.A. availability. It was done for 3 weeks at a time because power analysis was based on data from the pilot study, which was conducted twice a week for three weeks. Student R.A availability was for 12 weeks during a clinical rotation. It seemed feasible to recruit 60 participants by repeating the study 4 times in those 12 weeks.
<table>
<thead>
<tr>
<th>Week</th>
<th>Wednesday</th>
<th>Thursday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Site 1 Assisted Living</td>
<td>Site 1 Assisted Living</td>
</tr>
<tr>
<td>2</td>
<td>Site 1 Assisted Living</td>
<td>Site 1 Assisted Living</td>
</tr>
<tr>
<td>3</td>
<td>Site 1 Assisted Living</td>
<td>Site 1 Assisted Living</td>
</tr>
<tr>
<td>4</td>
<td>Site 1A Nursing Home</td>
<td>Site 1A Nursing Home</td>
</tr>
<tr>
<td>5</td>
<td>Site 1A Nursing Home</td>
<td>Site 1A Nursing Home</td>
</tr>
<tr>
<td>6</td>
<td>Site 1A Nursing Home</td>
<td>Site 1A Nursing Home</td>
</tr>
<tr>
<td>7</td>
<td>Site 1B Nursing Home</td>
<td>Site 1B Nursing Home</td>
</tr>
<tr>
<td>8</td>
<td>Site 1B Nursing Home</td>
<td>Site 1B Nursing Home</td>
</tr>
<tr>
<td>9</td>
<td>Site 1B Nursing Home</td>
<td>Site 1B Nursing Home</td>
</tr>
<tr>
<td>10</td>
<td>Site 2 Assisted Living</td>
<td>Site 2 Assisted Living</td>
</tr>
<tr>
<td>11</td>
<td>Site 2 Assisted Living</td>
<td>Site 2 Assisted Living</td>
</tr>
<tr>
<td>12</td>
<td>Site 2 Assisted Living</td>
<td>Site 2 Assisted Living</td>
</tr>
</tbody>
</table>

At the completion of the intervention, one research assistant, designated as the group leader, recorded the extent of participation in the activity (Appendix C) and then assisted the other four research assistants in escorting the residents in each group to the dining room for the noon meal. They made sure that name tags were on all residents in intervention and control groups. Two research assistants from a separate unit, who were blinded to the group assignment, were then allowed to enter the dining room. They divided the room in half, choose residents closest to them, and recorded apathy and agitation on the intervention and control group at the start of the meal after observing for 5 minutes. They remained in the dining room to observe the meal; they were instructed to
remain as unobtrusive as possible. At the completion of the meal, those same research assistants who were blinded to the assignment, recorded the eating ability and percentage of dietary intake on their designated residents. Those who were not blinded to the group assignments took photos of the plates/trays before and after the meal (see Appendix L for complete protocol and Table 2 for schematic).
<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Experimental Unit 1 R.A. #1-5</th>
<th>Control Unit 1 R.A. #1-5</th>
<th>Experimental Unit 2 R.A. #6-10</th>
<th>Control Unit 2 R.A. #6-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:15-11:20</td>
<td>R.A. #2 &amp; 3 observes and records apathy and agitation</td>
<td>R.A. #4 &amp; 5 observes and records apathy and agitation</td>
<td>R.A. #7 &amp; 8 observes and records apathy and agitation</td>
<td>R.A. #9 &amp; 10 observes and records apathy and agitation</td>
</tr>
<tr>
<td>Pre-Intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:20-11:30</td>
<td>R.A. #2 &amp; 3 escorts participants into room</td>
<td>Control group receives usual care</td>
<td>R.A # 7 and 8 escorts participants into room</td>
<td>Control group receives usual care</td>
</tr>
<tr>
<td>11:30-11:55</td>
<td>R.A. #1 conducts the Intervention</td>
<td></td>
<td>R.A. #6 conducts the Intervention</td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:55-12:00</td>
<td>R.A. #2 and 3 escorts participants into dining room</td>
<td>R.A. #4 and 5 escorts participants into dining room</td>
<td>R.A. #7 and 8 escorts participants into dining room</td>
<td>R.A. #9 and 10 escorts participants into dining room</td>
</tr>
<tr>
<td>12:00-12:05</td>
<td>R.A. #9 &amp; 10 (from unit 2) observe and record apathy and agitation</td>
<td>R.A. #9 &amp; 10 (from unit 2) observe and record apathy and agitation</td>
<td>R.A. #4 &amp; 5 (from unit 1) observe and record apathy and agitation</td>
<td>R.A. #4 &amp; 5 (from unit 1) observe and record apathy and agitation</td>
</tr>
<tr>
<td>In dining room, before meal is served</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:05-12:15</td>
<td>R.A. #1-3 take photos of plate/tray before meal is served</td>
<td>R.A. #1-3 take photos of plate/tray before meal is served</td>
<td>R.A. #6-8 take photos of plate/tray before meal is served</td>
<td>R.A. #6-8 take photos of plate/tray before meal is served</td>
</tr>
<tr>
<td>12:15-1:15</td>
<td>R.A. #9 and 10 observe meal and participants’ ability to eat</td>
<td>R.A. #9 and 10 observe meal and participants’ ability to eat</td>
<td>R.A. #4 and 5 observe meal and participants’ ability to eat</td>
<td>R.A. #4 and 5 observe meal and participants’ ability to eat</td>
</tr>
<tr>
<td>Mealtime (blinded R.A.s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:15-1:30</td>
<td>R.A. #9 and 10 record percent of dietary intake</td>
<td>R.A. #9 and 10 record percent of dietary intake</td>
<td>R.A. #4 and 5 record percent of dietary intake</td>
<td>R.A. #4 and 5 record percent of dietary intake</td>
</tr>
<tr>
<td>Completion of meal</td>
<td>R.A. #1-3 take a digital photo of the plate/tray on completion</td>
<td>R.A. #1-3 take a digital photo of the plate/tray on completion</td>
<td>R.A. #6-8 take a digital photo of the plate/tray on completion</td>
<td>R.A. #6-8 take a digital photo of the plate/tray on completion</td>
</tr>
</tbody>
</table>

To ensure intervention fidelity (Santacroce, Maccarelli, & Grey, 2004), the researcher continuously monitored adherence to the interventions of familiar music and familiar physical activity by repeatedly visiting each unit (the researcher simultaneously
spent the day on the two units as the student’s clinical instructor. A description of the intervention protocol was written in a notebook Operations Manual (Bowman, Wyman, & Peters, 2002) and research assistants were given a copy of the protocol, trained in the protocol, and asked to re-read the protocol prior to each session. Multiple visits on each unit were conducted by the researcher to ensure adherence to the protocol and end of day post conferences enabled two-way feedback to be directly given to the research assistants and to the researcher.

Demographic data were collected by the doctoral student researcher (JM) on each participant (Appendix G) prior to the protocol and were transcribed to a table in Excel to facilitate data analysis. The demographic variables of gender, ethnicity, marital status, religion, and education were collected at the nominal level or ordinal level. Age and mental status (MMSE) were collected at the ratio level.

A summary of data collected by the research assistants at each site was entered into Excel (see table 3). Pre-test scores for apathy and agitation were recorded before the protocol of familiar physical activity to familiar music began for intervention and control groups on the modified apathy subscale of the FrSBe and modified CMAI. At completion of the protocol, at the beginning of the meal, a digital picture of the tray was taken and the second groups of research assistants, blinded to the groups, recorded apathy and agitation scores, again on the FrSBe and CMAI. When the resident had completed his/her meal, the second (blinded) group of assistants recorded the score on eating ability and the percentage of dietary intake consumed by the resident. Research assistants again took digital photos of the trays post meal to validate the amount after the tray was removed from the resident.
To take a digital picture, a member of the research team put a bedside table into the hall next to the meal cart and placed a tray on it. The R.A. put a number onto the tray, to later identify it, and took a digital photo of the tray. The photo was taken at 18 inches, directly above the tray. The staff then delivered the tray to the resident. At the completion of the meal, any spilled food was placed back on the tray and a picture was taken – again at 18 inches above the tray. The research assistants watched in the dining room and recorded the percentage as there could be spilled food (i.e. spilled ice cream) not accounted for with a photo. This enabled less hurried evaluations and validation of the percentage after the tray had been removed. In the event there was a discrepancy in the percentage and the photograph, a nurse colleague would be consulted to determine the amount consumed.

Table 3. Data Entry of Variables

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Apathy Pre-Test FrSBe</th>
<th>Agitation Pre-test CMAI</th>
<th>Apathy Post-test FrSBe</th>
<th>Agitation Post-test CMAI</th>
<th>Eating Ability Score FIM™</th>
<th>Dietary Intake (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data Analysis

Data were entered by the researcher from Excel into SPSS Graduate Pack 15.0 for Windows, a statistical software package and were verified for accuracy by a second person. Data were visually examined for missing data and extreme values and were visually inspected for outliers on stem and leaf plots and boxplots.
Data were examined for fulfillment of test assumptions for repeated measure analysis of variance. The assumptions of normal distribution of the dependent variable and homogeneity of variance must be met. In addition, the assumption of compound symmetry must be met as the measures are from the same subjects (Munro, 2005).

Scatterplots were examined for linearity of dependent variables. Box’s Test of Equality of Covariance Matrices was examined to determine if assumption for multivariate equality has been met (Box’s M = > .05 – a non-significant value indicates homogeneity of variance). The $F$-ratio was examined as well as Box’s Test (Mertler & Vannatta, 2005). Because there is correlation between measures with repeated measures, Mauchly’s test of sphericity was examined to determine if the assumption of compound symmetry had been met (Munro, 2005).

The statistical test of the hypotheses was repeated-measures analysis of variance (ANOVA) to analyze the data and detect differences between and among groups from pre-test to post-test. A MANOVA is used when there are one or more nominal independent variables (physical activity/music – yes/no) and several continuous dependent variables (apathy, agitation, eating ability, and dietary intake) with random assignment of participants; however, repeated measures ANOVA is considered to be more powerful (Munro, 2005). The level of significance was set at .05.

The group assignment, intervention or control, was the between subjects factor. There were six data collection time points for each participant, therefore time was a within subjects factor. Additional within subjects factors for apathy and agitation were the measurements from pre to post intervention.
Pair-wise comparisons of means were conducted to determine the source of differences in the 6 time periods on those variables with a significant within subjects difference in time. Pearson’s correlation was used to examine the association of participation with the dependant variables.
CHAPTER 4

RESULTS

In Chapter 4, the sample and main study variables are described. Sample characteristics are compared by site and group, and pretest data for apathy and agitation also are compared by group. Finally, the results of testing the twelve hypotheses by means of ANOVA and Pearson’s correlation are reported.

Description of the Data

Characteristics of the Sample

Study participants were 84 institutionalized older adults with dementia residing in a nursing home or assisted living facility in western Massachusetts from September to December of 2008. None of the residents had an activity restriction nor were they medicated for agitation or pain just prior to the intervention. One resident was ill on one occasion. Several residents were off the unit for appointments on a few occasions, thus the number of subjects for whom data were available at the six measurement time periods ranged from 77 to 84.

Participants’ mean age was 85.92 with a range from 68 to 99, and they were predominately white women. The majority were widowed. Over half had a high school education or more. Most had a diagnosis of dementia, not specified or Alzheimer’s disease. Their mean mental status was 12.25 on the MMSE with a range from 0 to 24.

Description of the Main Study Variables

Baseline apathy. Mean pretest apathy scores at baseline ranged from 1.04 to 1.72 at each of the 6 pretest time periods. As can be seen in Table 4, there were no differences in baseline apathy by group.
In a comparison of pretest to post test apathy by group, the results were the same with and without including the pretest in the analysis. Because adding the pretest did not make a difference, the results without the pretest will be reported.

Table 4. Mean Apathy in the Sample at Baseline

<table>
<thead>
<tr>
<th></th>
<th>Pretest 1</th>
<th>Pretest 2</th>
<th>Pretest 3</th>
<th>Pretest 4</th>
<th>Pretest 5</th>
<th>Pretest 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>77</td>
<td>84</td>
<td>83</td>
<td>84</td>
<td>83</td>
<td>81</td>
</tr>
<tr>
<td>Mean</td>
<td>1.34</td>
<td>1.40</td>
<td>1.72</td>
<td>1.31</td>
<td>1.04</td>
<td>1.21</td>
</tr>
<tr>
<td>SD</td>
<td>1.95</td>
<td>1.83</td>
<td>2.26</td>
<td>1.65</td>
<td>2.07</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Baseline agitation. Mean agitation scores at baseline ranged from .23 to .52 at each of the 6 pretest time periods. There were no differences in baseline agitation by group (see Table 5).

In a comparison of pretest to post test agitation by group, again the results were the same with and without including the pretest in the analysis. Because adding the pretest did not make a difference, the results without the pretest will be reported.
Table 5. Mean Agitation in the Sample at Baseline

<table>
<thead>
<tr>
<th></th>
<th>Pretest 1</th>
<th>Pretest 2</th>
<th>Pretest 3</th>
<th>Pretest 4</th>
<th>Pretest 5</th>
<th>Pretest 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>77</td>
<td>84</td>
<td>83</td>
<td>84</td>
<td>83</td>
<td>81</td>
</tr>
<tr>
<td>Mean</td>
<td>.52</td>
<td>.51</td>
<td>.33</td>
<td>.29</td>
<td>.35</td>
<td>.23</td>
</tr>
<tr>
<td>SD</td>
<td>1.46</td>
<td>1.05</td>
<td>.98</td>
<td>.84</td>
<td>1.00</td>
<td>.66</td>
</tr>
</tbody>
</table>

Baseline eating ability and dietary intake. The control group means are presented for eating ability (see Table 6) and dietary intake (see Table 7) as there was not a pretest for these variables. The means were also similar for the control group. The means for eating ability ranged from 4.86 to 5.74 and for dietary intake from 53.14 to 64.86.

Table 6. Control Group Mean Percentages (S.D) of Eating Ability Over Time 1-6

<table>
<thead>
<tr>
<th>Time</th>
<th>Eating Ability Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>4.86 (1.21)</td>
</tr>
<tr>
<td>Time 2</td>
<td>5.37 (1.24)</td>
</tr>
<tr>
<td>Time 3</td>
<td>4.89 (.93)</td>
</tr>
<tr>
<td>Time 4</td>
<td>5.74 (1.01)</td>
</tr>
<tr>
<td>Time 5</td>
<td>4.91 (1.23)</td>
</tr>
<tr>
<td>Time 6</td>
<td>5.71 (1.12)</td>
</tr>
</tbody>
</table>
Table 7. Control Group Mean Percentages (S.D) of Dietary Intake Over Time 1-6

<table>
<thead>
<tr>
<th>Dietary Intake</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>63.29 (34.52)</td>
</tr>
<tr>
<td>Time 2</td>
<td>63.00 (29.07)</td>
</tr>
<tr>
<td>Time 3</td>
<td>64.86 (35.34)</td>
</tr>
<tr>
<td>Time 4</td>
<td>63.57 (31.47)</td>
</tr>
<tr>
<td>Time 5</td>
<td>53.14 (36.29)</td>
</tr>
<tr>
<td>Time 6</td>
<td>61.86 (32.43)</td>
</tr>
</tbody>
</table>

Participation in the Intervention. Table 8 shows that the level of participation in the intervention was high. At least 60% participated at a level of 4, indicating more than half the time, and 5, indicating all or almost all the time. The level of participation did not increase over time. The lowest percent of participation at levels 4 and 5 combined was at time 2 (60.9 %), and the highest (80.9 %) was at time 3.
Table 8. Level of Participation in the Intervention Group at Time 1-6 (n=43)

<table>
<thead>
<tr>
<th>Level</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Time 1</td>
<td>1 (2.8)</td>
<td>6 (16.7)</td>
<td>2 (5.6)</td>
<td>4 (11.1)</td>
<td>22 (61.1)</td>
</tr>
<tr>
<td>Time 2</td>
<td>6 (14.6)</td>
<td>6 (14.6)</td>
<td>4 (9.8)</td>
<td>6 (14.6)</td>
<td>19 (46.3)</td>
</tr>
<tr>
<td>Time 3</td>
<td>5 (11.9)</td>
<td>1 (2.4)</td>
<td>1 (2.4)</td>
<td>14 (33.3)</td>
<td>20 (47.6)</td>
</tr>
<tr>
<td>Time 4</td>
<td>2 (4.8)</td>
<td>5 (11.9)</td>
<td>5 (11.9)</td>
<td>11 (26.2)</td>
<td>16 (38.1)</td>
</tr>
<tr>
<td>Time 5</td>
<td>9 (20.9)</td>
<td>1 (2.3)</td>
<td>5 (11.6)</td>
<td>8 (18.6)</td>
<td>19 (44.2)</td>
</tr>
<tr>
<td>Time 6</td>
<td>6 (14.3)</td>
<td>1 (2.4)</td>
<td>4 (9.5)</td>
<td>9 (21.4)</td>
<td>22 (52.4)</td>
</tr>
</tbody>
</table>

Characteristics of the Sample by Type of Institution

The sample was compared by type of institution (assisted living, nursing home), to determine if there were differences, using one way ANOVAs for continuous variables or chi square tests for categorical variables. Site One was a nursing home with four units for residents with dementia; two of these were secure units. There was an additional secure assisted living area for residents with dementia. Site Two was a separate secure assisted living facility for residents with dementia. The residents of the two assisted living sites were combined and the two types of institutionalization (assisted living and nursing home) were compared.

As can be seen in Table 9, the assisted living differed significantly from the nursing home in the sample characteristics of age, mental status (MMSE), religion, and education. Although the mean age was 84.71 in the assisted living facility and 87.12 in
the nursing home, and although this difference was statistically significant \((p=.05)\), there is probably not much practical difference in an 85 versus an 87 year old resident. Religion was significant as there were a greater number of Jewish residents in the nursing home, which was a Jewish home. Education level was higher in assisted living than in the nursing home; roughly 50% were high school educated in both but there were more with a grammar school education in the nursing home. Mental status was significantly lower in the nursing home. However, a Pearson correlation was conducted on MMSE and education with results of \(r=.25, \ p=.03\); mental status was found to be correlated with education therefore only mental status was used in an ANCOVA. The results were the same as the ANOVA results for all variables with and without MMSE and therefore only the ANOVA results are reported.
Table 9. Characteristics of the Sample by Type of Institution

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Assisted Living n=31</th>
<th>Nursing Home n=53</th>
<th>p* value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>73 - 97 years M = 84.71 (S.D. = 6.18)</td>
<td>68 - 99 years M = 87.12 (S.D. = 7.01)</td>
<td>.05*</td>
</tr>
<tr>
<td>Mental Status</td>
<td>0 - 24 Intervention 15.88</td>
<td>0 – 24 Control 16.27 Overall M = 16.06 (S.D. = 5.84)</td>
<td>.01*</td>
</tr>
<tr>
<td>Gender</td>
<td>Male 9 (29%)</td>
<td>9 (17%)</td>
<td>.19</td>
</tr>
<tr>
<td></td>
<td>Female 22 (71%)</td>
<td>44 (83%)</td>
<td></td>
</tr>
<tr>
<td>Dementia</td>
<td>Alzheimer’s 12 (38.7%)</td>
<td>12 (22.6%)</td>
<td>.18</td>
</tr>
<tr>
<td></td>
<td>Vascular 2 (6.5%)</td>
<td>4 (7.5%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mixed 0 (.0%)</td>
<td>5 (9.4%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not specified 17 (54.8%)</td>
<td>32 (60.5%)</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td>Single 1 (3.2%)</td>
<td>4 (7.5%)</td>
<td>.74</td>
</tr>
<tr>
<td></td>
<td>Married 6 (19.4%)</td>
<td>12 (22.6%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divorced 2 (6.5%)</td>
<td>5 (9.4%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Widowed 22 (71.0%)</td>
<td>32 (60.4%)</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td>Catholic 15 (48.4%)</td>
<td>27 (50.9%)</td>
<td>.03*</td>
</tr>
<tr>
<td></td>
<td>Protestant 6 (19.4%)</td>
<td>10 (18.9%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jewish 3 (9.7%)</td>
<td>14 (26.4%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other 7 (22.6%)</td>
<td>2 (3.8%)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Grammar 3 (9.7%)</td>
<td>16 (30.2%)</td>
<td>.03*</td>
</tr>
<tr>
<td></td>
<td>High School 17 (54.8%)</td>
<td>25 (47.2%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Associate 0 (.0%)</td>
<td>5 (9.4%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor 9 (29.0%)</td>
<td>6 (11.3%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Master’s 1 (3.2%)</td>
<td>1 (1.9%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Doctorate 1 (3.2%)</td>
<td>0 (.0%)</td>
<td></td>
</tr>
</tbody>
</table>

*One-way ANOVA for continuous variables; chi-square for categorical variables
Characteristics of the Sample by Group

The sample was also compared by group (intervention or control), and the characteristics of the sample by group are presented in Table 10. To examine the extent to which random assignment resulted in comparable groups, a one-way ANOVA or chi square test was conducted for each sample characteristic by group. None of the sample characteristics was significant by intervention or control group, as can be seen in Table 10, indicating comparability of groups and adequacy of random assignment to intervention or control groups. There was a slightly higher mean on MMSE of 12.40 in the intervention group and a mean of 12.10 in the control group. This was not statistically significant. Nevertheless, mental status was a potential confounder and was, therefore, used as a covariate to control for differences in MMSE between groups using ANCOVA. The results were the same for all variables with and without MMSE, as previously stated, and therefore the ANOVA results will be reported.

The mean pre-intervention scores for apathy by group are presented in Table 11 and can be visualized in Figure 4. The mean pre-intervention scores for agitation by group are presented in Table 12 and can be visualized in Figure 5.
<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Control</th>
<th>(p^*) value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=43)</td>
<td>(n=41)</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>73 - 99 years</td>
<td>68 - 98 years</td>
<td>.55</td>
</tr>
<tr>
<td></td>
<td>M = 86.16</td>
<td>M = 87.07</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(S.D. = 6.87)</td>
<td>(S.D. = 6.85)</td>
<td></td>
</tr>
<tr>
<td><strong>Mental Status (MMSE)</strong></td>
<td>0 - 24</td>
<td>0 – 24</td>
<td>.86</td>
</tr>
<tr>
<td></td>
<td>M = 12.40</td>
<td>M = 12.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(S.D. = 7.58)</td>
<td>(S.D. = 8.26)</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td>.14</td>
</tr>
<tr>
<td>Male</td>
<td>12 (27.9%)</td>
<td>6 (14.6%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>31 (72.1%)</td>
<td>35 (85.4%)</td>
<td></td>
</tr>
<tr>
<td><strong>Dementia</strong></td>
<td></td>
<td></td>
<td>.13</td>
</tr>
<tr>
<td>Alzheimer’s</td>
<td>15 (34.9%)</td>
<td>9 (22.0%)</td>
<td></td>
</tr>
<tr>
<td>Vascular</td>
<td>4 (9.3%)</td>
<td>2 (4.9%)</td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>4 (9.3%)</td>
<td>1 (2.4%)</td>
<td></td>
</tr>
<tr>
<td>Not specified</td>
<td>20 (46.5%)</td>
<td>29 (70.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td>.38</td>
</tr>
<tr>
<td>Single</td>
<td>4 (9.3%)</td>
<td>1 (2.4%)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>11 (25.6%)</td>
<td>7 (17.1%)</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>3 (7.0%)</td>
<td>4 (9.8%)</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>25 (58.1%)</td>
<td>29 (70.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
<td>.95</td>
</tr>
<tr>
<td>Catholic</td>
<td>21 (48.8%)</td>
<td>21 (51.2%)</td>
<td></td>
</tr>
<tr>
<td>Protestant</td>
<td>9 (20.9%)</td>
<td>7 (17.1%)</td>
<td></td>
</tr>
<tr>
<td>Jewish</td>
<td>9 (20.9%)</td>
<td>8 (19.5%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4 (9.3%)</td>
<td>5 (12.2%)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td>.88</td>
</tr>
<tr>
<td>Grammar</td>
<td>8 (18.6%)</td>
<td>11 (26.8%)</td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>22 (51.2%)</td>
<td>20 (48.8%)</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>3 (7.0%)</td>
<td>2 (4.9%)</td>
<td></td>
</tr>
<tr>
<td>Bachelor</td>
<td>8 (18.6%)</td>
<td>7 (17.1%)</td>
<td></td>
</tr>
<tr>
<td>Master’s</td>
<td>1 (2.3%)</td>
<td>1 (2.4%)</td>
<td></td>
</tr>
<tr>
<td>Doctorate</td>
<td>1 (2.3%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
</tbody>
</table>

*One-way ANOVA for continuous variables; chi-square for categorical variables*
Table 11. Mean Scores (S.D) for Apathy Pre-Intervention by Group Over Time 1-6

<table>
<thead>
<tr>
<th>Time</th>
<th>Apathy Pretest Intervention Group</th>
<th>Apathy Pretest Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>1.07 (1.91)</td>
<td>1.51 (2.00)</td>
</tr>
<tr>
<td>Time 2</td>
<td>1.60 (1.88)</td>
<td>1.29 (1.79)</td>
</tr>
<tr>
<td>Time 3</td>
<td>1.13 (2.38)</td>
<td>2.06 (2.11)</td>
</tr>
<tr>
<td>Time 4</td>
<td>1.70 (1.71)</td>
<td>1.00 (1.56)</td>
</tr>
<tr>
<td>Time 5</td>
<td>1.27 (1.42)</td>
<td>2.29 (2.51)</td>
</tr>
<tr>
<td>Time 6</td>
<td>1.07 (1.40)</td>
<td>1.31 (1.70)</td>
</tr>
</tbody>
</table>
Figure 4. Apathy pre-intervention for intervention and control groups at times 1-6.
Table 12. Mean Scores (S.D.) for Agitation Pre-Intervention Over Time 1-6

<table>
<thead>
<tr>
<th>Time</th>
<th>Agitation Pretest Intervention Group</th>
<th>Agitation Pretest Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>.80 (1.91)</td>
<td>.40 (.92)</td>
</tr>
<tr>
<td>Time 2</td>
<td>.50 (.88)</td>
<td>.46 (1.21)</td>
</tr>
<tr>
<td>Time 3</td>
<td>.40 (.78)</td>
<td>.43 (1.16)</td>
</tr>
<tr>
<td>Time 4</td>
<td>.20 (.93)</td>
<td>.23 (.75)</td>
</tr>
<tr>
<td>Time 5</td>
<td>.27 (.62)</td>
<td>.51 (1.30)</td>
</tr>
<tr>
<td>Time 6</td>
<td>.27 (.82)</td>
<td>.14 (.41)</td>
</tr>
</tbody>
</table>
Figure 5. Agitation pre-intervention for intervention and control groups at times 1-6.
Analysis of the Data

Hypothesis 1

A repeated measures ANOVA was conducted to test Hypothesis 1 which stated that institutionalized older adults who received an intervention of a familiar physical activity to familiar music would have less apathy than those who did not receive the intervention. The assumption of compound symmetry needed for a repeated measures ANOVA was not met ($p=.04$) therefore the Greenhouse-Geiser results with an epsilon correction are reported.

Results indicated a statistically significant between subjects effect ($F=6.20$, $p=.02$) as can be seen in Table 13. There was a statistically significant change from pretest to posttest by group ($F=6.52$, $p=.01$).

Table 13. Repeated Measures ANOVA for Apathy

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>80.31</td>
<td>1</td>
<td>80.31</td>
<td>6.20</td>
<td>.02*</td>
</tr>
<tr>
<td><strong>Within subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>45.02</td>
<td>4.23</td>
<td>10.65</td>
<td>2.77</td>
<td>.03*</td>
</tr>
<tr>
<td>Time x Group</td>
<td>36.83</td>
<td>4.23</td>
<td>8.71</td>
<td>2.26</td>
<td>.06</td>
</tr>
<tr>
<td>Pre to Post x Group</td>
<td>26.97</td>
<td>1</td>
<td>26.97</td>
<td>6.52</td>
<td>.01*</td>
</tr>
</tbody>
</table>
Table 13 also reveals a significant within subjects effect of time, that is, there was a significant difference in apathy in the sample over time but not by group over time. This difference and the effects of time on the other variables, as well as the time by group interactions, will be presented under Hypothesis 5 through 8.

Hypothesis 2

A repeated measures ANOVA was conducted to test Hypothesis 2 which stated that institutionalized older adults who received an intervention of a familiar physical activity to familiar music would have less agitation than those who did not receive the intervention. The results did not meet the assumption of compound symmetry ($p=.01$), therefore the results based on Greenhouse-Geiser adjustment for degrees of freedom are reported.

The hypothesis was not supported. The results were not statistically significant ($F=.03$, $p=.86$) between groups as can be seen in Table 10.
Table 14. Repeated Measures ANOVA for Agitation

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>.07</td>
<td>1</td>
<td>.07</td>
<td>.03</td>
<td>.86</td>
</tr>
<tr>
<td>Within subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>9.02</td>
<td>3.54</td>
<td>2.55</td>
<td>2.07</td>
<td>.10</td>
</tr>
<tr>
<td>Time x Group</td>
<td>2.89</td>
<td>3.54</td>
<td>.82</td>
<td>.66</td>
<td>.60</td>
</tr>
<tr>
<td>Pre to Post x Group</td>
<td>.75</td>
<td>1</td>
<td>.75</td>
<td>.77</td>
<td>.38</td>
</tr>
</tbody>
</table>
Hypothesis 3

A repeated measures ANOVA was conducted to test Hypothesis 3 which stated that institutionalized older adults who received an intervention of a familiar physical activity to familiar music would have greater eating ability than those who did not receive the intervention. Because the assumption of compound symmetry was not satisfied ($p=.01$), the Greenhouse-Geiser results, with adjustments to degrees of freedom, are reported.

The hypothesis was not supported. The results were not statistically significant between groups ($F = .76, p=.39$) as can be seen in Table 15.

Table 15. Repeated Measures ANOVA for Eating Ability

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>3.34</td>
<td>1</td>
<td>3.34</td>
<td>.76</td>
<td>.39</td>
</tr>
<tr>
<td><strong>Within subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>46.17</td>
<td>3.69</td>
<td>12.53</td>
<td>12.09</td>
<td>.01*</td>
</tr>
<tr>
<td>Time x Group</td>
<td>4.08</td>
<td>3.69</td>
<td>1.11</td>
<td>1.07</td>
<td>.37</td>
</tr>
</tbody>
</table>
Hypothesis 4

A repeated measures ANOVA was conducted to test Hypothesis 4 which stated that institutionalized older adults who received an intervention of a familiar physical activity to familiar music would have greater dietary intake than those who did not receive the intervention. Because Mauchley’s sphericity test was not significant ($p = .08$), the assumption of compound symmetry was met; therefore the Sphericity Assumed results are reported.

Results indicated a statistically significant between subjects effect ($F = 7.01$, $p = .01$) for dietary intake (see Table 16). The overall mean for the intervention group was 76.72%; the mean for the control group was 61.62%.

Table 16. Repeated Measures ANOVA for Dietary Intake

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>22494.20</td>
<td>1</td>
<td>22494.20</td>
<td>7.01</td>
<td>.01*</td>
</tr>
<tr>
<td><strong>Within subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>4404.27</td>
<td>5</td>
<td>880.86</td>
<td>1.70</td>
<td>.13</td>
</tr>
<tr>
<td>Time x Group</td>
<td>1409.33</td>
<td>5</td>
<td>281.97</td>
<td>.54</td>
<td>.74</td>
</tr>
</tbody>
</table>
Hypothesis 5

A repeated measure ANOVA was conducted for Hypothesis 5 which stated that institutionalized older adults who participated in a familiar physical activity to familiar music would have a decrease in apathy over time. The assumption of compound symmetry was not met ($p = .04$) therefore the Greenhouse-Geiser results with an epsilon correction are reported.

Results were not statistically significant for apathy over time by group assignment ($F = 2.26, p = .06$) as can be seen in Table 13. The post-intervention mean for the intervention group was 1.05; the mean for the control group was 2.07. Mean scores for apathy post-intervention for intervention and control groups over all 6 time periods can be seen in Table 17 and can be visualized in Figure 6.

Table 17. Mean Scores (S.D) for Apathy Post-Intervention Over Time 1-6

<table>
<thead>
<tr>
<th>Time</th>
<th>Apathy Post Intervention Group</th>
<th>Apathy Post Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>1.60 (2.21)</td>
<td>2.11 (2.04)</td>
</tr>
<tr>
<td>Time 2</td>
<td>.83 (1.62)</td>
<td>1.86 (1.92)</td>
</tr>
<tr>
<td>Time 3</td>
<td>1.37 (2.32)</td>
<td>2.60 (2.08)</td>
</tr>
<tr>
<td>Time 4</td>
<td>.93 (1.32)</td>
<td>1.60 (1.49)</td>
</tr>
<tr>
<td>Time 5</td>
<td>1.03 (1.48)</td>
<td>2.57 (2.34)</td>
</tr>
<tr>
<td>Time 6</td>
<td>.53 (1.08)</td>
<td>1.66 (2.09)</td>
</tr>
</tbody>
</table>
Figure 6. Apathy post-intervention for intervention and control groups at times 1-6.
Hypothesis 6

A repeated measures ANOVA was conducted to test Hypothesis 6 which stated that institutionalized older adults who participated in a familiar physical activity to familiar music would have a decrease in agitation over time. The results did not meet the assumption of compound symmetry \( (p=.01) \), therefore the results based on Greenhouse-Geiser adjustment for degrees of freedom are reported.

There was not a statistically significant decrease in agitation over time by group assignment \( (F=.66, p=.60) \) as can be seen in Table 14. Each mean for times 1-6 is presented in Table 18. As can be seen in the table, there was little agitation observed in the sample.

Table 18. Mean Scores (S.D.) for Agitation Post-Intervention Over Time 1-6

<table>
<thead>
<tr>
<th>Time</th>
<th>Agitation Post Intervention Group</th>
<th>Agitation Post Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>.30 (1.03)</td>
<td>.43 (1.54)</td>
</tr>
<tr>
<td>Time 2</td>
<td>.23 (1.08)</td>
<td>.49 (1.03)</td>
</tr>
<tr>
<td>Time 3</td>
<td>.20 (.74)</td>
<td>.09 (.37)</td>
</tr>
<tr>
<td>Time 4</td>
<td>.17 (.65)</td>
<td>.40 (1.07)</td>
</tr>
<tr>
<td>Time 5</td>
<td>.13 (.76)</td>
<td>.23 (.54)</td>
</tr>
<tr>
<td>Time 6</td>
<td>.17 (.68)</td>
<td>.06 (.35)</td>
</tr>
</tbody>
</table>
Figure 7. Agitation post-intervention for intervention and control groups at times 1-6.
Hypothesis 7

A repeated measures ANOVA was conducted to test Hypothesis 7 which stated that institutionalized older adults who participated in a familiar physical activity to familiar music would have an increase in eating ability over time. Because the assumption of compound symmetry was not satisfied \((p=.01)\), the Greenhouse-Geiser results, with adjustments to degrees of freedom, are reported.

Results indicated eating ability was not statistically significant by group over time \((F=1.07, p=.37)\) (see Table 15). It was statistically significant within subjects over time \((F=12.09, p=.01)\). As can be seen in Table 19 and in Figure 8, the means of both intervention and control groups are lower at times 1, 3, and 5 then at times 2, 4, and 6.

Table 19. Mean Scores (S.D) for Eating Ability Over Times 1-6

<table>
<thead>
<tr>
<th>Time</th>
<th>Eating Ability Intervention</th>
<th>Eating Ability Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>5.10 (1.10)</td>
<td>4.86 (1.21)</td>
</tr>
<tr>
<td>Time 2</td>
<td>5.90 (1.22)</td>
<td>5.37 (1.24)</td>
</tr>
<tr>
<td>Time 3</td>
<td>5.13 (.99)</td>
<td>4.89 (.93)</td>
</tr>
<tr>
<td>Time 4</td>
<td>5.80 (1.65)</td>
<td>5.74 (1.01)</td>
</tr>
<tr>
<td>Time 5</td>
<td>5.10 (1.31)</td>
<td>4.91 (1.23)</td>
</tr>
<tr>
<td>Time 6</td>
<td>5.57 (1.50)</td>
<td>5.71 (1.12)</td>
</tr>
</tbody>
</table>
A pair-wise comparison of time was conducted because the effect of time was significant \((F=12.09, \ p=.01)\). As expected, based on figure 8, there was pairwise significance for time 1 to time 2, 4 and 6.; from time 2 to time 1, 3, and 5, etc. (even to odd, odd to even times).

Table 20. Pairwise Comparisons of Eating Ability

<table>
<thead>
<tr>
<th>Time</th>
<th>Time</th>
<th>Mean Difference</th>
<th>Std Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>-.66</td>
<td>.17</td>
<td>.004</td>
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<td>3</td>
<td>4</td>
<td>-.03</td>
<td>.14</td>
<td>1.00</td>
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<td>4</td>
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<td>.16</td>
<td>.00</td>
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<td>6</td>
<td>-.03</td>
<td>.14</td>
<td>1.00</td>
</tr>
<tr>
<td>6</td>
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<td>.003</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>.66</td>
<td>.17</td>
<td>.004</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>.63</td>
<td>.14</td>
<td>.000</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>-.13</td>
<td>.14</td>
<td>1.00</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>.63</td>
<td>.18</td>
<td>.015</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>-.04</td>
<td>.13</td>
<td>1.00</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>.03</td>
<td>.14</td>
<td>1.00</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>-.63</td>
<td>.14</td>
<td>.000</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>-.76</td>
<td>.13</td>
<td>.000</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>.03</td>
<td>.13</td>
<td>1.00</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>-.63</td>
<td>.16</td>
<td>.003</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>.79</td>
<td>.16</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>.13</td>
<td>.14</td>
<td>1.00</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>.76</td>
<td>.13</td>
<td>.000</td>
</tr>
<tr>
<td>5</td>
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<td>.77</td>
<td>.17</td>
<td>.000</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>.13</td>
<td>.12</td>
<td>1.00</td>
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<tr>
<td>5</td>
<td>1</td>
<td>.03</td>
<td>.14</td>
<td>1.00</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>-.63</td>
<td>.18</td>
<td>.015</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>-.03</td>
<td>.13</td>
<td>1.00</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>-.77</td>
<td>.17</td>
<td>.000</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>-.63</td>
<td>.19</td>
<td>.027</td>
</tr>
<tr>
<td>6</td>
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<td>.66</td>
<td>.17</td>
<td>.003</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>.04</td>
<td>.13</td>
<td>1.00</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>.63</td>
<td>.16</td>
<td>.003</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>-.13</td>
<td>.12</td>
<td>1.00</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>.63</td>
<td>.19</td>
<td>.027</td>
</tr>
</tbody>
</table>
Figure 8. Eating ability post-intervention for intervention and control groups at times 1-6.
Hypothesis 8

A repeated measures ANOVA was conducted for Hypothesis 8 which stated that institutionalized older adults who participated in a familiar physical activity to familiar music would have an increase in dietary intake over time. Because Mauchley’s sphericity test was not significant ($p = .08$), the assumption of compound symmetry was met; therefore the Sphericity Assumed results are reported.

Comparing time by group there were no statistically significant effects over time ($F=.54$, $p = .74$) nor were there statistically significant within subjects effects over time ($F=1.70$, $p = .13$) as can be seen in Table 16. Mean percentages over the six times are presented in Table 21 and can be visualized in Figure 9.

Table 21. Mean Percentages (S.D) of Dietary Intake Over Times 1-6

<table>
<thead>
<tr>
<th>Time</th>
<th>Dietary Intake Intervention</th>
<th>Dietary Intake Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>72.90 (28.18)</td>
<td>63.29 (34.52)</td>
</tr>
<tr>
<td>Time 2</td>
<td>79.52 (28.72)</td>
<td>63.00 (29.07)</td>
</tr>
<tr>
<td>Time 3</td>
<td>83.39 (29.92)</td>
<td>64.86 (35.34)</td>
</tr>
<tr>
<td>Time 4</td>
<td>74.36 (27.52)</td>
<td>63.57 (31.47)</td>
</tr>
<tr>
<td>Time 5</td>
<td>73.07 (33.09)</td>
<td>53.14 (36.29)</td>
</tr>
<tr>
<td>Time 6</td>
<td>77.10 (29.85)</td>
<td>61.86 (32.43)</td>
</tr>
</tbody>
</table>
Figure 9. Dietary intake post-intervention for intervention and control groups at times 1-6.
Hypothesis 9

A Pearson’s correlation was conducted to test Hypothesis 9 which stated that participation in a familiar physical activity to familiar music would be negatively associated with apathy. Participation was negatively associated with apathy. It was statistically significant 5 of the 6 times; the exception was at time 3 ($r=-.16, p=.32$) (see Table 22).

Table 22. Correlation Coefficients of Apathy and Participation at Time 1-6 (n=43)

<table>
<thead>
<tr>
<th></th>
<th>Apathy</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>-.66</td>
<td>.01</td>
</tr>
<tr>
<td>Time 2</td>
<td>-.59</td>
<td>.01</td>
</tr>
<tr>
<td>Time 3</td>
<td>-.16</td>
<td>.32</td>
</tr>
<tr>
<td>Time 4</td>
<td>-.44</td>
<td>.01</td>
</tr>
<tr>
<td>Time 5</td>
<td>-.38</td>
<td>.01</td>
</tr>
<tr>
<td>Time 6</td>
<td>-.31</td>
<td>.04</td>
</tr>
</tbody>
</table>
Hypothesis 10

A Pearson’s correlation was conducted to test Hypothesis 10 which stated that participation in a familiar physical activity to familiar music would be negatively associated with agitation. Participation at times 3 through 6 was negatively associated with agitation; results were statistically significant at time 3 only ($r=-.36$, $p=.02$) (see Table 23).

Table 23. Correlation Coefficients of Agitation and Participation at Time 1-6 (n=43)

<table>
<thead>
<tr>
<th>Time</th>
<th>Agitation</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>.11</td>
<td>.55</td>
</tr>
<tr>
<td>Time 2</td>
<td>.04</td>
<td>.80</td>
</tr>
<tr>
<td>Time 3</td>
<td>-.36</td>
<td>.02</td>
</tr>
<tr>
<td>Time 4</td>
<td>-.00</td>
<td>.98</td>
</tr>
<tr>
<td>Time 5</td>
<td>-.10</td>
<td>.53</td>
</tr>
<tr>
<td>Time 6</td>
<td>-.90</td>
<td>.57</td>
</tr>
</tbody>
</table>
Hypothesis 11

A Pearson’s correlation was conducted to test Hypothesis 11 which stated that participation in a familiar physical activity to familiar music would be positively associated with eating ability. Participation at time 1, 2, 4, and 6 was positively associated with eating ability. It was statistically significant at time 2, 4, and 6 (see Table 24).

Table 24. Correlation Coefficients of Eating Ability and Participation at Time 1-6 (n=43)

<table>
<thead>
<tr>
<th>Time</th>
<th>Eating Ability</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>.19</td>
<td>.28</td>
</tr>
<tr>
<td>Time 2</td>
<td>.40</td>
<td>.01</td>
</tr>
<tr>
<td>Time 3</td>
<td>-.04</td>
<td>.81</td>
</tr>
<tr>
<td>Time 4</td>
<td>.46</td>
<td>.01</td>
</tr>
<tr>
<td>Time 5</td>
<td>-.21</td>
<td>.18</td>
</tr>
<tr>
<td>Time 6</td>
<td>.45</td>
<td>.01</td>
</tr>
</tbody>
</table>
Hypothesis 12

A Pearson’s correlation was conducted to test Hypothesis 12 which stated that participation in a familiar activity to familiar music would be positively associated with dietary intake. Participation was positively associated with dietary intake 5 of the 6 times as can be seen in Table 25. With the exception of time 1 ($r=.15, p=.40$), it was statistically significant each of the 5 times.

Table 25. Correlation Coefficients of Dietary Intake and Participation at Time 1-6 (n=43)

<table>
<thead>
<tr>
<th>Time</th>
<th>Dietary Intake</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>.15</td>
<td>.40</td>
</tr>
<tr>
<td>Time 2</td>
<td>.34</td>
<td>.03</td>
</tr>
<tr>
<td>Time 3</td>
<td>.46</td>
<td>.01</td>
</tr>
<tr>
<td>Time 4</td>
<td>.50</td>
<td>.01</td>
</tr>
<tr>
<td>Time 5</td>
<td>.55</td>
<td>.01</td>
</tr>
<tr>
<td>Time 6</td>
<td>.46</td>
<td>.01</td>
</tr>
</tbody>
</table>
Clinical Significance

The effect size \( d \), or magnitude of the effect of the intervention (Munro, 2005) was calculated for those variables, specifically apathy and dietary intake, that were statistically significant. The effect size for agitation and eating ability were not calculated as the results of the hypotheses were not statistically significant for these variables. The effect size was calculated with the means and standard deviations of the intervention and control group using the following equation:

\[
M = \text{mean} \\
\sigma = \text{standard deviation} \\
d = \text{Cohen's } d
\]

\[
d = \frac{(M_1 - M_2)}{\sigma_{\text{pooled}}}
\]

\[
\sigma_{\text{pooled}} = \sqrt{\left(\frac{\sigma_1^2 + \sigma_2^2}{2}\right)}
\]

Apathy

The mean apathy score for the intervention group was 2.07 (S.D. 1.67); the mean for the control group was 1.05 (S.D. 1.99). Using the above formula, Cohen’s \( d \) effect size was calculated:

\[
\frac{2.07 - 1.05}{\sqrt{\left((1.99^2 + 1.67^2) / 2\right)}}
\]

Cohen’s \( d \) was 0.56 for a moderate effect according to Cohen (1992). The effect size was calculated using the same formula for the pilot study data. Cohen’s \( d \) was 0.66 or a large effect in the pilot study.
Dietary Intake

The dietary intake mean for the intervention group was 76.72 (S.D. 29.55) and for the control group was 61.62 (S.D. 33.19). Using the above formula, Cohen’s $d$ effect size was calculated:

$$
\frac{76.72-61.62}{\sqrt{[(29.55^2+33.19^2) / 2]}}
$$

Cohen’s $d$ was 0.48 for a moderate effect according to Cohen (1992). Again, the pilot study data was calculated using the above formula to compare with the effect size for the study. Cohen’s $d$ was 0.79 in the pilot study for a large effect.
CHAPTER 5

DISCUSSION

The purpose of this study was to examine if a familiar physical activity to familiar music just prior to the noon meal had an effect on apathy, agitation, eating ability, and dietary intake in institutionalized older adults with dementia. The study intervention employed a familiar activity to familiar music for the experimental group and usual care for the control group, and the two groups were compared over time. In this chapter the findings of the study will be discussed and compared with the current literature, the strengths and limitations will be described, and the implications for nursing practice and future research will be suggested.

The research questions guiding this study were: a) What is the effect of a familiar physical activity to familiar music on apathy, agitation, eating ability, and dietary intake in institutionalized older adults with dementia? b) Do their apathy, agitation, eating ability, and dietary intake change over time? c) Is greater participation in the intervention associated with more positive outcomes?

A summary of the hypotheses and results of the hypothesis testing appears in Table 26. Briefly, there was evidence that there was decreased apathy and increased dietary intake in those who participated in the intervention. Compared to the control group who did not engage in the activity, the intervention group had improved apathy and dietary intake. The intervention had no statistically significant effect on agitation or eating ability. There was not a statistically significant change over time by group for any of the four variables. Participation in the activity was associated with positive outcomes for apathy and dietary intake only.
Table 26. Summary of Twelve Hypotheses

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Abbreviated Summary</th>
<th>Supported/Not Supported at p&lt;.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>less apathy</td>
<td>supported</td>
</tr>
<tr>
<td>2</td>
<td>less agitation</td>
<td>not supported</td>
</tr>
<tr>
<td>3</td>
<td>greater eating ability</td>
<td>not supported</td>
</tr>
<tr>
<td>4</td>
<td>greater dietary intake</td>
<td>supported</td>
</tr>
<tr>
<td>5</td>
<td>decreased apathy over time</td>
<td>not supported</td>
</tr>
<tr>
<td>6</td>
<td>decreased agitation over time</td>
<td>not supported</td>
</tr>
<tr>
<td>7</td>
<td>increased eating ability over time</td>
<td>not supported</td>
</tr>
<tr>
<td>8</td>
<td>increased dietary intake over time</td>
<td>not supported</td>
</tr>
<tr>
<td>9</td>
<td>correlation of apathy and participation</td>
<td>supported 5 of 6 time periods</td>
</tr>
<tr>
<td>10</td>
<td>correlation of agitation and participation</td>
<td>not supported</td>
</tr>
<tr>
<td>11</td>
<td>correlation of eating ability and participation</td>
<td>supported 3 of 6 time periods</td>
</tr>
<tr>
<td>12</td>
<td>correlation of dietary intake and participation</td>
<td>supported 5 of 6 time periods</td>
</tr>
</tbody>
</table>
Summary of the Findings

Apathy

Apathy was measured with the modified apathy subscale of the FrSBe. It has not been used before as an observation instrument. There was good inter-rater reliability of .95 in this study. One item, *cares about appearance*, was omitted after using the instrument in the pilot study. An additional item, *lacks sensitivity to others*, was difficult to measure by observation in this study and was never included by the research assistants.

It was hypothesized that participants who received the intervention would have less apathy than the control group. Apathy was reduced in those who received the physical activity intervention in this study. In similar studies, Buettner and Fitzsimmons (2004) found a decrease in passivity in those exposed to an exercise to music program in the morning. Fitzsimmons and Buettner (2003) and Kolanowski et al. (2005) found a decrease in passivity in those introduced to individualized interventions. Exercise to music was one of several individualized activity interventions offered. As previously stated, each of these three studies used the Passivity in Dementia (PDS) scale and, again, it is difficult to determine if passivity is indeed an aspect of apathy or vice versa.

The present study appears to be the only physical activity/exercise to music study to report results specific to apathy. While Hagen, Armstrong-Esther, and Sandilands (2003) evaluated the effects of exercise to music of the 1920s to 1940s on behavioral disturbances (which included apathy) of older residents, it was difficult to determine the degree of reduction in apathy in their study. The residents were not defined as those with dementia, no MMSE was provided, and it was stated that residents “were excluded if they had severe cognitive impairment.”
The present study included those with severe cognitive impairment (MMSE ≤ 10). The mean in this study was lower than anticipated (12.4 intervention group, 12.1 control group) and many participants had scores below 10 indicating a severe level of dementia. In the pilot study by this researcher with 18 residents of an assisted living facility, 13 had scores from 11 to 23, 5 had scores below 10. It was anticipated that the majority would be early to mid-stage level of dementia, based on the pilot study, and would have scores of 10-24 on the MMSE. Residents in this study were able to participate in the intervention, even with scores of 0 on MMSE.

It was also hypothesized in this study that those who participated in the intervention would have a decrease in apathy over time and that participation in the intervention would be negatively associated with apathy. The first hypothesis was not supported; apathy did not decrease over time. The second hypothesis was partially supported; participation in the intervention was negatively associated with apathy five of six times. Participation in the intervention did affect apathy scores (see Table 26).

Agitation

The modified CMAI was used in this study to measure agitation. The unmodified CMAI is a widely used instrument, and the modified version has documented reliability. There was good inter-rater reliability of .95 in this study.

It was hypothesized that participants who received the intervention would have less agitation than the control group. In the pilot study, there was little agitation observed, yet other researchers have supported that music (Denny, 1997; Gerdner, 2005; Gerdner & Swanson, 1993; Goddaer & Abraham, 1994; Hicks-Moore, 2005; Remington, 2002; Richeson & Neill, 2004) or physical activity (Alessi et al., 1999; Buettner &
Fitzsimmons, 2004; Fitzsimmons & Buettner, 2003; Heyn, 2003; Galik et al, 2008; Landi et al., 2004) have decreased agitation and that agitation was considerable. It was still of interest to the researcher and it was felt that there may be more agitation in the nursing home setting, where it is reportedly up to 90% (Cohen-Mansfield et al., 1989; Steffens et al., 2005). It was pursued in this study; however, very little agitation was observed once again in both settings, assisted living and nursing home. While there was a slight decrease in agitation in the intervention group, it was not statistically significant. Interestingly, agitation also decreased in the control group on several occasions.

There may be several reasons why little agitation was observed in either study. It may be that agitation was well controlled in these facilities. Medications were not included in demographic data yet may have contributed to the lack of agitation seen.

A second possible reason for the lack of agitation seen is that participants were observed only for 5 minutes pre-intervention and 5 minutes post-intervention/pre-meal. The pre-intervention agitation seemed to be in the form of restlessness during a pre-meal activity (or lack thereof). The post-intervention agitation, which took place in the dining room just before the meal, seemed to be in the form of complaining. A third possible reason is that agitation seemed to be fleeting and quickly quieted at the meal. The dining room was crowded and complaining took place if someone bumped another or was served a meal before another resident, however, this was a small amount.

Because little agitation was observed in this study, the results for agitation were skewed with means close to zero and with high standard deviations. Changing the data to a nominal level (yes/no) could have enabled non-parametric tests to be performed; however, there are no non-parametric tests that would have fit the statistical design of the
study with one between and two within subject effects. Thus, the hypothesis could not have been examined in this manner.

In addition, it was hypothesized that those who participated in the intervention would have a decrease in agitation over time and that participation in the intervention would be negatively associated with agitation. Unlike Goddaer and Abraham (1994), Denney (1997), and Hicks-Moore (2005) who each found a change in agitation over time with a music intervention, agitation did not change over time in this study. Further, participation in the intervention was not associated with agitation. These two hypotheses were not supported (see Table 26).

Eating Ability

Eating ability was measured with the eating subscale of the FIM™. As noted in chapter 3, the FIM is a widely used instrument for functional abilities in rehabilitation. However, in the present study, inter-rater reliability was not consistently assessed as it was difficult for the researcher to enter the dining room without causing a disturbance. The students made themselves as unobtrusive as possible while observing in the dining room. One facility specifically asked to only allow the two students to enter as they had a small dining room. The students discussed each resident between themselves and agreed upon a score but unfortunately it was not consistently verified by the researcher.

It was hypothesized in this study that participants who received the intervention would have greater eating ability than the control group. This hypothesis was not supported. One reason may be that the FIM™ has 7 levels and may have been too complex for the students. It may have been too difficult to pick up subtle cues (i.e.
putting the correct utensil into the meal with or without verbal cues such as, “time to
eat”) while watching five to ten residents at a time.

It was also hypothesized in this study that the participants who received the
intervention would have an increase in eating ability over time. Such an increase would
have been possible because a range of assistance in the scores was found. The FIM scores
in the nursing home environment ranged from level 2 to 5, meaning that these
participants needed anywhere from 25 to 75% assistance. In the assisted living the scores
ranged from a level of 5 to 7, meaning that these participants ranged from needing cues to
complete independence. However, the scores did not consistently increase over time; this
hypothesis was not supported.

In a similar study, both exercise and non-exercise groups declined in ADLs (using
the Katz Index of ADLs) over twelve months (Rolland et al., 2007) although the
intervention group had a slower decline. Those who exercised, however, declined one-
third as much as the control group in ADLs (which included eating) in their study. Galik
et al. (2008) found no improvement in physical function (using the Barthel Index) over 6
months. There was no control group in their study.

The present study was only repeated for three weeks and was most likely too short
a period of time to detect any change in eating ability. There was, however, a difference
in time 1, 3, and 5 versus time 2, 4, and 6 (as was observed in Figure 8); the former was
measured on Wednesday, the latter on Thursday. Although visually strikingly different, it
was not statistically different over time by group ($p=.37$) other than pairwise
comparisons. It is unclear why there was a difference in residents eating ability on the
2nd day of the study each week in both intervention and control groups. Perhaps there
could have been a delayed response in eating ability. Interestingly, apathy was also found to decrease in both intervention and control groups on day 2 (see Figure 6) each of the three weeks and was statistically significant for time. Apathy on day 2 may have been a rebound, such as has occurred with music intervention to agitation (Denney, 1997; Goddaer & Abraham, 1994; Hicks-Moore, 2005). It is also possible that the increase in eating ability and the decrease in apathy on day 2 may not have been related to the residents. Instead, may have been due to the presence of young student RAs in the dining room to affect both intervention and control groups or to the different groups of students on Wednesday versus Thursday.

Lastly, it was hypothesized that participation in the intervention would be positively associated with eating ability. This was partially supported; participation in the intervention was positively associated with eating ability 3 of 6 times (see Table 26). 

Dietary Intake

In this study, the percentage of dietary intake was measured. In addition, digital photos helped to ensure preciseness in measurement. The students were aware the percentage they recorded would be compared again by the clinical instructor/researcher and they were presumably most diligent in their estimates of the amount. There was excellent inter-rater reliability with 100% agreement.

The students were initially unsure why they needed to stay in the dining room and observe throughout the meal when, in fact, a photo would be taken of the tray and the percentage of intake would be recorded. Early in the study, however, a student picked up the tray for a post meal picture and it appeared as if the participant had eaten 100%; the plate was clean. The student then opened the milk carton where the resident had
methodically stuffed the carton full of the entire lasagna meal. The student realized that, had he not been observing, the incorrect amount would have been recorded and photographed. It underscores the need for vigilance in the dining room.

It was hypothesized in this study that participants who received the intervention would have greater dietary intake than the control group. There was a statistically significant increase in percentage of diet consumed in this study. In contrast, the Rolland et al. (2007) study found no significant change in nutritional status by measuring body weight over twelve months. The Rolland et al. (2007) study similarly employed exercise to music as the intervention.

Several studies have found an increase in dietary intake when music was played during the mealtime (Ragneskog et al., 1996; Richeson & Neill, 2004). On one occasion (of 24 total), music was playing in the present study in the dining room during the meal which could potentially confound the results, however, both intervention and control groups were equally exposed to the music. There was consistently greater dietary intake in the intervention group in this study.

It was also hypothesized that participants would have an increase in dietary intake over time and that participation in the intervention would be positively associated with dietary intake. The first hypothesis was not supported; there was no difference in dietary intake over time. The second hypothesis was partially supported; participation in the intervention was positively associated with dietary intake 5 of 6 times (see Table 26).
Familiarity Framework

The conceptual framework of familiarity, adapted from Son et al. (2002), guided this study in which it was presumed that a past experience with music and a physical activity may have provided a cue to trigger preserved implicit memory. It has been recommended that activities involving implicit memory, where there is no conscious recollection, be provided to those with dementia (Vance et al, 2008) and that the activities be familiar to them (Kovach & Henschel, 1996). The familiar music chosen for this study was from the 1920s to 1950s, recognizable to the cohort of residents. The physical activity was seated chair exercises of movements presumably familiar to the resident. Participation in the activity was high with two-thirds of those in the intervention group involved in the activity.

Memory for music and physical activity was not formally assessed; however, many residents appeared to recognize the music. Once triggered by the cue, preserved implicit memory may have prompted a resident to participate in the intervention. Many residents sang along despite low MMSE and most participated in the activity at a level of 4 to 5. Some stood to dance and clap with the music and many laughed when “scrubbing the wash.” However, it was not possible to determine whether memory for the familiar activity (step on the gas, reach for the stars, scrub the wash) and familiar music along with cues prompted the participation in the activity or if residents could simply have been mimicking the motions of the interventionists.

The framework further postulates that participation in the intervention would lead to decreased apathy and agitation and enhanced eating ability and dietary intake. This was partially supported. Apathy was reduced and dietary intake increased in those who
participated in the activity. There was, however, no statistically significant difference in agitation or eating ability in this study.

Strengths and limitations of the study

The strengths of the study are that the concepts were clearly defined and linked to the familiarity framework. Several instruments (specifically MMSE and FIM) are widely used in practice and research. There was good inter-rater reliability for the modified apathy subscale, the modified CMAI, and for the percentage of dietary intake. There was control over data collection with attention to fidelity (Burns & Grove, 2005). The research assistants, who observed all of the dependent variables post intervention, were blinded to the group assignments, therefore, decreasing potential bias.

The study used an experimental design with random assignment to intervention/control groups, which minimizes such threats to internal validity as self selection into groups. The groups were compared on each of the demographic variables and the intervention and control groups were similar to each other.

The sample was a representative sample. It was estimated that the sample would consist of mostly white, older women, which would be a representative sample based on data from the National Nursing Home Survey (Krauss & Altman, 2001). The survey found that ninety percent of residents living in nursing homes are white, the mean age is 85, and more than two-thirds are women (Krauss & Altman, 2001); there was a similar finding in this study. This was also not unexpected for this geographic location where 96% of the population is white according to the town census (U.S Census Bureau, 2009) and 63% in this age group are female (U.S Census Bureau, 2009).
A pilot study was conducted prior to this study to determine feasibility, identify and correct any foreseeable problems, and to determine effect size. The proposed number in the sample was determined from power analysis with data from the pilot study; an additional strength. The sample size was adequate to detect a moderate effect size for apathy and dietary intake, although the observed effect size was slightly less than in the pilot study.

This study provided senior nursing students with an opportunity to be trained in research protocols and data collection and to be introduced to older adults in institutional settings. This helps to dispel myths that older adults with dementia are unable to participate in a physical activity.

Assent was continually monitored and no harm came to participants. Wandering was controlled by the research assistants and it did not interfere with the protocol. On one occasion a resident in the control group was disruptive and became agitated when she tried to take part in the intervention. She was quietly removed from the group by the research assistant.

In spite of the strengths there were limitations to the study. One limitation of this experimental design was time and labor. It took many weeks at each site to perform a MMSE on each participant and complete the intervention protocol using no greater than ten participants at a time. However, trained interventionists facilitated the process with five interventionists on each of two units. The students were energetic and cued the residents throughout the physical activity. Without all of the students this study would not have been possible.
A second limitation is the homogeneity of the sample in relation to age and ethnicity. Nationally, women comprise greater than two-thirds of the population residing in nursing homes, half are over the age of 85, and nearly ninety percent are white (Krauss & Altman, 2001). The results were compared to the National Nursing Home Survey to estimate the extent they compare and how serious a threat homogeneity would be. The study results were found to be comparable to the national norm; however, the study does not contribute knowledge about more diverse populations.

Limited generalizability to all types of dementia is a third limitation. Only those with AD, Vascular and mixed dementia were included which limits generalizability to those with other forms of dementia. In addition, the findings are not able to be generalized to the general population due to the limited geographical location of Western Massachusetts and the age and ethnic homogeneity. The use of six units at two sites, however, helped to reduce threats to external validity. Regardless of the setting, the intervention was effective for increasing dietary intake and reducing apathy.

A fourth limitation involves rival hypotheses. One rival hypothesis was that stimulation, as noted in Colling (2004), from energetic young research assistants could have contributed to the participation in the intervention as opposed to a memory for the familiar. Another rival hypothesis is that the meaningful activity in the experimental group as Mahoney et al., (2000) suggest, may well have been the stimulus for them to participate in the intervention rather than the familiarity of the music and activity.

Implications for nursing practice

The U.S. Department of Health and Human Services (2000) Healthy People 2010 goals are to increase the quality and years of life. One of the leading health indicators of
Healthy People 2010 is physical activity for everyone and this does not exclude elders and should not exclude those in institutional settings. Maas, Kelley, Park and Specht (2002) however, report that health promotion is not the focus of long term care and the medical model is still the mainstay of practice. Custodial care becomes the norm in most facilities and physical activity is not always provided despite the recommendations from the American College of Sports Medicine and the American Heart Association for older adults to engage in physical activity (Nelson et al., 2007).

Nursing home and assisted living regulations (*Requirements for States and Long Term Care Facilities* (2002); *Certification Procedures and Standards for Assisted Living Residences* (2006)) state that residents must receive an assessment of their function and ability to carry out ADL’s (such as eating) and must receive adequate nutrition. The regulations are vague when it comes to physical activity, stating only that residents must maintain their highest level of physical function and must not have a decrease in range of motion. There are no “best practices” for exercise activity in nursing homes and assisted living facilities.

The results of this study offer preliminary evidence to indicate that a physical activity to music has an effect on apathy and dietary intake. It is noteworthy that, similar to Netz et al. (2007), even those with severe dementia were able to participate in the physical activity. Keeping older adults with dementia active may help to prevent apathy, weight loss, and malnutrition and may improve quality of life.

**Recommendations for future studies**

There are at least five future studies that can be recommended based on the present study. Replication of this study is warranted but with a more ethnically diverse...
sample from another geographic location, given the homogeneity of the sample in the present study. Further, the replication should include fewer subjects to more easily assess the subtle cues associated with the FIM.

The design of the study on replication should be modified in other ways. First, the demographic data should be expanded to include antipsychotic medications to eliminate the possibility that it contributed to the lack of agitation observed.

The second modification involves time and timing. The replication study could be before the evening meal when sundowning and agitation may be more prevalent. The morning was chosen for the intervention based on Buettner and Fitzsimmons (2004) study which determined morning was the best time of day for an activity and to capitalize on the noon meal which is typically the largest. In addition, participants would need to be observed for a longer period than 5 minutes, as would also be the case with apathy, still using the modified CMAI and modified apathy scale. Alternately, agitation could be eliminated altogether as it appears to be well controlled and is usually quieted by expert caregivers. Three weeks was most likely too short a period of time to produce any significant changes over time in any of the dependent variables.

A second future study would involve the dose of the intervention. The present study incorporated a physical activity for 25 minutes twice a week. Future studies need to determine the optimal length of time and number of days needed to improve function. It is difficult to know if two days a week was sufficient. In a recent review by Rolland et al. (2008), they noted that a physical activity in the studies reviewed were as low as 20 minutes three times a week to as much as 150 minutes five times a week.
Because music played during mealtime has been found to be effective in increasing dietary intake (Ragneskog et al., 1996; Richeson & Neill, 2004), a third future study might examine the difference in dietary intake between residents who had familiar physical activity to familiar music prior to the noon meal and residents with music playing in the dining room during the meal. One could argue that it would be easier and less costly to simply play music during the meal.

A fourth future study would be a secondary analysis of the data to include a correlation of participation and mental status. It would add to the understanding of the ability of those with low mental status to participate in an intervention. While it was recognized that those with low MMSE scores did participate, there is no statistical analysis to support this. Further, whereas apathy and participation were partially correlated, secondary analysis could also include the correlation between apathy and dietary intake as well as eating ability to see what extent apathy influences the other variables. The level of apathy may well influence the outcome of each of these variables.

Since there is the possibility that the energetic young students were the stimulus for participation in the intervention versus the memory of the familiar from the cues provided, a fifth study might be to more definitively test the conceptual framework by using an attention control group as suggested by Gross (2005). The experimental group that receives a familiar physical activity to familiar music could be compared to a group receiving an unfamiliar activity to unfamiliar music but all the while receiving attention and stimulation from energetic students.

The results of the present study offer evidence that residents with dementia are able to benefit from a physical activity. The intervention holds promise as it is a low cost,
easily administered activity prior to mealtime. Physical activity is desirable in institutional settings with residents with dementia to improve function and decrease behaviors. Nurses may need to be more forth coming in advocating for an activity before mealtime to decrease apathy and improve dietary intake. Ultimately, this would improve quality of life for residents with dementia.
APPENDIX A

MODIFIED APATHY SUBSCALE OF FRONTAL SYSTEMS BEHAVIOR SCALE (FrSBE)

**Please circle:**  Pre  Post

**Date:** ______________

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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td>Neglects personal hygiene</td>
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<td></td>
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<tr>
<td>Lacks energy</td>
<td></td>
<td></td>
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<tr>
<td>Lost interest in things</td>
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<tr>
<td>Does nothing</td>
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<td>Does not get involved spontaneously</td>
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<td>Does not start conversations</td>
<td></td>
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<tr>
<td>Needs reminders to do things</td>
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<tr>
<td>Unconcerned and unresponsive</td>
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<td>Lacks initiative and motivation</td>
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<td>Lacks sensitivity to others</td>
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# APPENDIX B

## COHEN-MANSFIELD AGITATION INVENTORY (CMAI)

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<th>6</th>
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</tr>
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<tbody>
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<td>Pace, aimless wandering</td>
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<td></td>
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</tr>
<tr>
<td>2</td>
<td>Inappropriate dress or disrobing</td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Spitting (include at meals)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>Cursing or verbal aggression</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Constant unwarranted request for attention or help</td>
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<tr>
<td>6</td>
<td>Repetitive sentence or questions</td>
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<tr>
<td>7</td>
<td>Hitting (include self)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>Kicking</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>9</td>
<td>Grabbing onto people</td>
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<td></td>
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</tr>
<tr>
<td>10</td>
<td>Pushing</td>
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<td>11</td>
<td>Throwing things</td>
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<tr>
<td>12</td>
<td>Strange noises (weird laughter or crying)</td>
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<tr>
<td>13</td>
<td>Screaming</td>
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<td>14</td>
<td>Biting</td>
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<td>15</td>
<td>Scratching</td>
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<tr>
<td>16</td>
<td>Trying to get to a different place (e.g. out of the room, building)</td>
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<tr>
<td>17</td>
<td>Intentional falling</td>
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<tr>
<td>18</td>
<td>Complaining</td>
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<tr>
<td>19</td>
<td>Negativism</td>
<td></td>
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<tr>
<td>20</td>
<td>Eating/drinking inappropriate substances</td>
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<td>21</td>
<td>Hurt self or other (cigarette, hot water, etc)</td>
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<td>22</td>
<td>Handling things inappropriately</td>
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<td>23</td>
<td>Hiding things</td>
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<td>24</td>
<td>Hoarding things</td>
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<tr>
<td>25</td>
<td>Tearing things or destroying property</td>
<td></td>
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<tr>
<td>26</td>
<td>Performing repetitious mannerisms</td>
<td></td>
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<tr>
<td>27</td>
<td>Making verbal sexually advances</td>
<td></td>
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<tr>
<td>28</td>
<td>Making physical sexual advances</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>29</td>
<td>General restlessness</td>
<td></td>
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</tbody>
</table>
APPENDIX C

PARTICIPATION IN ACTIVITY FORM

Date: ________________

Please rate the extent each resident participated in the physical activity and check in the appropriate column:

<table>
<thead>
<tr>
<th>Name</th>
<th>1 = not at all or almost not at all</th>
<th>2 = less than half the time</th>
<th>3 = about half the time</th>
<th>4 = more than half the time</th>
<th>5 = all the time or almost all the time</th>
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<tbody>
<tr>
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</tbody>
</table>
EATING: Includes the use of suitable utensils to bring food to the mouth, chewing and swallowing, once the meal is presented in the customary manner on a table or tray. Performs safely.

NO HELPER

7 Complete Independence—Subject eats from a dish, while managing a variety of consistencies of food, and drinks from a cup or glass with the meal presented in the customary manner on a table or tray. The subject opens containers, butters bread, cuts meat and pours liquids, and uses a spoon or fork to bring food to the mouth, and chews and swallows food. Performs safely.

6 Modified Independence—Subject requires an adaptive or assistive device such as a long straw, spork, or rocking knife, requires more than a reasonable time to eat, or requires modified food consistency or blenderized food, or there are safety considerations. If the individual relies on other means of alimentation, such as parenteral or gastrostomy feedings, then he/she administers the feedings him/herself.

HELPER

5 Supervision or Setup—Subject requires supervision (e.g., standing by, cuing, or coaxing) or setup (application of orthoses or assistive/adaptive devices); or another person is required to open containers, butter bread, cut meat, or pour liquids.

4 Minimal Contact Assistance—Subject performs 75 or more of eating tasks.

3 Moderate Assistance—Subject performs 50 to 74 of eating tasks.

2 Maximal Assistance—Subject performs 25 to 49 of eating tasks.

1 Total Assistance—Subject performs less than 25 of eating tasks; or, the individual relies on parenteral or gastrostomy feedings, and does not administer the feedings him/herself.
APPENDIX D2

PERMISSION LETTER TO USE THE FIM™

August 22, 2008

Janet Moore
104 Burleigh Road
Wilbraham, Massachusetts 01095

Dear Ms. Moore:

Thank you for your recent request for permission to reproduce the Section III Eating Decision Tree and criteria for levels 1-7 of the Guide for the Uniform Data System for Medical Rehabilitation (including the FIM™ instrument), Version 5.1, to be used solely for your dissertation at the University of Massachusetts at Amherst.

Limited Permission is hereby granted to reproduce the enclosed camera-ready Decision Tree and criteria for levels 1-7 only for the purposes described above and with the following restrictions:

1. The forms layout shall remain intact and unaltered including any trademark or copyright notices in any reproductions.

2. The forms are not to be reproduced or distributed in any manner, with the exception that one (1) copy may be distributed to the appropriate faculty member for grading purposes.

3. In the event dissertation is published additional permission must be requested from UDSMR prior to publication.

Please refer to the enclosed sheets giving correct citations for our publications and proper uses for our service marks and trademarks.

If you have any questions regarding copyright, please do not hesitate to contact Marianne Honan at legalinfo@udsmr.org.

Sincerely,

Carl V. Granger, M.D.
Executive Director
UDSMR

Enclosure

CVG/mh
**APPENDIX E**

**DIETARY INTAKE AND EATING ABILITY**

**Date:** _______________

<table>
<thead>
<tr>
<th>Resident’s Name</th>
<th>Percentage of Intake</th>
<th>FIM™ Score</th>
</tr>
</thead>
<tbody>
<tr>
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</table>
MINI-MENTAL STATE EXAMINATION (MMSE)

**ORIENTATION**

1. “What is the (year) (season) (date) (day) (month)?”
2. “Where are we?” (state) (county) (town or city) (hospital) (floor).

**REGISTRATION**

Ask the patient if you may test his/her memory. Then say the names of 3 unrelated objects, clearly and slowly, about one second for each (e.g. “apple,” “table,” “penny”). After you have said all 3, ask him/her to repeat them. The first repetition determines the score but keep saying them until he/she can repeat all 3, up to 6 trials.

**ATTENTION AND CALCULATION**

Ask the patient to spell the word “WORLD” backwards. The score is the number of letters in the correct order (e.g. DLROW = 5; DLRW = 4; DLORW, DLW = 3; OW = 2; DRLWO = 1).

**RECALL**

Ask the patient to recall the 3 items from above (e.g. “apple,” “table,” “penny”)

**LANGUAGE**

**Naming:** Show the patient a wristwatch and ask him/her what it is. Repeat for pencil.

**Repetition:** Ask the patient to repeat the phrase “No ifs, ands, or buts”

**3-Stage Command:** Give the patient a piece of blank paper and ask him/her to “take a piece of paper in your right hand, fold it in half, put it on the floor.”

**Reading:** On a blank piece of paper, print the sentence “CLOSE YOUR EYES” in letters large enough for the patient to see clearly. Ask him/her to read it and do what it says.

**Writing:** Give the patient a blank piece of paper and ask him/her to write a sentence. Do not dictate a sentence; it is to be written spontaneously. It must contain a subject and verb and be sensible.

**Copying:** Ask the patient to copy a figure of intersecting pentagons exactly as it is. All ten angles must be present and must intersect.
APPENDIX G

DEMOGRAPHIC DATA

ID Number: ______
Date: ______

Gender: (please circle)  
1. Male  
2. Female  

Score on MMSE: _____/30

Date of Birth: __________

Ethnicity: (please circle)  
1. Native American  
2. White or Caucasian  
3. African American or Black  
4. Asian or Asian American  
5. Hispanic or Latino (a)  
6. Other (describe)___________

Diagnosis of Dementia:  
1. Alzheimer’s  
2. Vascular Dementia  
3. Mixed Dementia  
4. Other___________

Marital Status: (please circle)  
1. Single  
2. Married  
3. Separated  
4. Divorced  
5. Widowed

Religion: (please circle)  
1. Catholic  
2. Protestant  
3. Jewish  
4. Other (describe)______________

Education: (circle highest level of education)  
1. Grammar school  
2. High school diploma/GED  
3. Associate of Arts degree  
4. Bachelor of Science/Art degree  
5. Master’s degree  
6. Doctorate degree  
7. Other (describe)________________
APPENDIX H

LETTER TO FAMILY MEMBERS

To the Family Members of Residents of the Memory Impaired Unit:

As you know, those with dementia can have changes in mood and behavior. I am interested that people with dementia have behaviors of apathy and agitation and that they experience difficulty with eating. I am a nursing PhD student at the University of Massachusetts Amherst and I will be conducting a research study this fall at the nursing home. I would like for your family member to participate in this study which has been approved by the university and the Jewish Nursing Home.

I will be conducting a seated exercise class to music just before the noon meal to see if residents are more cheerful at mealtime and if it helps them to focus on eating. I will have student assistants with me who will record if the resident is apathetic or agitated before the exercises and again before the meal begins. They will also record the eating ability and the percentage of dietary intake of the resident at the end of the meal.

Residents will be called by first name only during the exercise class. They will be given a number for recording on the forms to keep all information anonymous.

I would be very happy to explain this project to the staff and family members of those on the memory impaired unit. I am asking for permission to enroll your family member in this study. Attached is a consent form which explains the risks and benefits of participating in this study. If you would like to have your family member enrolled, please complete the consent form and return it in the self-addressed envelope provided. If you should have any questions, you may contact me at 413-596-4594. Thank you very much.

Sincerely,

Janet Moore, MS, RN, GCNS-BC
University of Massachusetts
APPENDIX I

RESEARCH INFORMED CONSENT FORM

**TITLE OF PROJECT:**  Familiar Physical Activity to Familiar Music: The Effects on Apathy, Agitation, Eating Ability, and Dietary Intake.

**PRINCIPAL INVESTIGATOR:**  Dorothy Gilbert, RN, PhD, University of Massachusetts Amherst

**STUDENT INVESTIGATOR:**  Janet Moore, RN, PhD student, University of Massachusetts Amherst

**PURPOSE OF RESEARCH:**  The purpose of this study is to find out if residents who are assigned to an activity have different levels of apathy, agitation, eating ability, and dietary intake than residents with dementia who are assigned to continue with their usual routine.

**PROCEDURES:**  The residents who are assigned will have a physical activity of seated chair exercises and a beach ball toss to music of the 1920’s to 1950’s. The activity will take place for 25 minutes before the noon meal, twice a week for three weeks. There will be Elms College nursing students helping to keep track of whether or not the resident is apathetic or agitated. The nursing students will record the ability to self feed and percentage of dietary intake at the completion of the meal. Some residents will be randomly assigned to participate while others will be assigned to receive usual care.

**BENEFITS:**  The benefits of participating may be improved dietary intake and eating ability and decreased apathy and/or agitation. It is possible that the resident may not benefit from participation in this study.

**RISKS AND DISCOMFORTS:**  There are no foreseeable risks involved in this study. It is possible residents could become fatigued from engaging in seated exercises. It is possible that a resident could have glasses knocked off - if another resident tossed the beach ball too hard. While not anticipated, familiar music could invoke painful memories. The risk is not any greater than any group activity at the facility.

**COSTS & COMPENSATION:**  There are no costs associated with this study. The University of Massachusetts does not have a program for compensating subjects for injury or complications related to human subjects research but the study personnel will assist the resident in getting treatment if there is a problem.
**ALTERNATIVES TO PARTICIPATION:** Participation is voluntary and the resident is free to refuse to participate or to stop participating at any time.

**SUBJECT ENROLLMENT/LENGTH OF STUDY:** It is expected that forty residents will be enrolled in this study – twenty from each unit. This study is expected to last for fifteen weeks, and the resident’s participation is expected to last three weeks, twice a week.

**CONFIDENTIALITY:** Information produced by this study will be confidential and private. A demographic form will be collected initially and will be kept locked in a file cabinet in the student investigator’s home office. Residents will be identified by number only on data collection forms and no identifiable personal data will be collected by the nursing students. If the data are used for publication in the scientific literature or for teaching purposes, no names will be used. The facility’s name will not be used in any publication. After this research is over, the “de-identified” data may be used for other, similar projects.

**VOLUNTARY PARTICIPATION:** Neither you nor the resident are under any obligation to participate in this project. You may withdraw the resident’s participation at any time without any loss of benefits from the Jewish Nursing Home. The resident is free to refuse to participate or to stop participating at any time. Verbal assent from the resident will be obtained for each session.

**REQUEST FOR ADDITIONAL INFORMATION:** If you have any questions about this study, you may call: Janet Moore at 413-596-4594. If you experience a research related injury during this study, you may contact: Dorothy Gilbert, principal investigator at 413-545-5080. If you would like to speak with someone not directly involved in the research study, you may contact the Human Research Protection Office at the University of Massachusetts via email at humansubjects@ora.umass.edu; telephone (413) 545-3428; or mail at the Human Research Protection Office, Research Administration Building, University of Massachusetts Amherst, 70 Butterfield Terrace, Amherst, MA 01003-9242.

**SUBJECT STATEMENT OF VOLUNTARY CONSENT:** When signing this form I am agreeing to allow _____________________________ to voluntarily enter this study. I understand that, by signing this document, I do not waive any of my legal rights. I have had a chance to read this consent form, and it was explained to me in a language which I use and understand. I have had the opportunity to ask questions and have received satisfactory answers. A copy of this signed Informed Consent Form has been given to me.

________________________________________________ __________________
Family Member/ Legal Guardian's Name (Print or type)                   Relationship

________________________________________________ __________________
Signature of Family Member/Legal Guardian  Date
APPENDIX J

TRAINING PROGRAM

Familiar Physical Activity to Familiar Music

Research Assistants will be trained on the protocol (see Appendix L) during orientation to the facility and will be asked to re-read the protocol with each visit to the setting.

**Intervention:**

**Familiar Physical Activity to Familiar Music:**

The doctoral student researcher (JM) has choreographed exercises to music and will train the student interventionists to conduct the protocol.

**Instruments:**

**Mini-Mental Status Exam:** Students have been taught to conduct a MMSE during their health and physical assessment and psych-mental health class at Elms College. JM will review MMSE and ask each interventionist to complete one on their partner. JM will review scoring technique with student interventionists. The MMSE will be completed prior to the intervention as demographic data.

**Apathy Instrument:** JM will train interventionists. A true/false questionnaire (Appendix K) has been made with items from the FrSBe and items which are not, such as “the resident is doing nothing” or “the resident says ‘I want to go home’”. The interventionists will indicate true or false if the resident is displaying apathy. Discussion of items on the FrSBe will take place. Interventionists will take the quiz until a score of 100% is achieved.

**Agitation Instrument:** JM will train interventionists. A true/false questionnaire (Appendix K) has been made with items from the CMAI and items which are not, such as “the resident is singing to self” or “the resident says ‘I want to go home’”. The interventionists will indicate true or false if the resident is displaying agitation. Discussion of items on the CMAI will take place. Interventionists will take the quiz until a score of 100% is achieved.

**Functional Independence Measure (FIM™):** The ratings for the FIM™ range from 1-7. Scenarios will be presented to the student interventionists to determine the extent to which a resident is able to self-feed. A quiz (Appendix K) has been made with different scenarios of the amount of guidance needed by the resident to feed self. The interventionists will take a quiz until 100% is achieved.
**Dietary Intake Percentage:** JM will photograph ten trays in various stages of completion of a meal (0%, 25%, 50%, 75%, and 100%). The student interventionists will observe the pictures and will identify the percentage eaten until inter-rater agreement of 100% is achieved. A dietary intake guide from Ross Laboratories will serve as the initial guide to percentages consumed. The pictures will be laminated to provide a visual cue and will be placed at each site after training has taken place. In addition, Photographs will be taken of each tray before and after the meal to document the percentage eaten.
APPENDIX K

SELF-FEEDING QUIZ

Indicate from 1-7 the degree of self-feeding the resident is able to perform.

The resident is able to:

1. perform 50% of the task of eating/needs 50% help from others
   1 2 3 4 5 6 7
2. do none of the feeding of self/relies on caregivers
   1 2 3 4 5 6 7
3. complete self-feeding but needs adaptive equipment
   1 2 3 4 5 6 7
4. perform 75% of feeding self/needs verbal cues
   1 2 3 4 5 6 7
5. feed self/needs no more than infrequent cues
   1 2 3 4 5 6 7
6. feed self without cueing, cuts meat, butters bread
   1 2 3 4 5 6 7
7. perform less than 25% of feeding self/needs frequent cues
   1 2 3 4 5 6 7
8. perform greater than 25% of feeding self/needs cues
   1 2 3 4 5 6 7
9. feed self when the correct utensil is placed in hand or food
   1 2 3 4 5 6 7
10. feed self but requires occasional cues (i.e. caregiver takes napkin away if resident is folding it) to be on task
    1 2 3 4 5 6 7
APPENDIX K2

APATHY QUIZ

Identify if the resident is displaying apathy by marking true or false.

The resident is:

1. conversing quietly with another resident    true  false
2. unconcerned with the activity               true  false
3. stating, “I want to go home”               true  false
4. slumped in the chair                       true  false
5. sensitive to others                         true  false
6. making strange noises                      true  false
7. closing eyes                                true  false
8. doing nothing                               true  false
9. snoring                                    true  false
10. neglecting personal hygiene               true  false
AGITATION QUIZ

Identify if the resident is displaying agitation by marking true or false. The resident is:

1. conversing quietly with another resident true false
2. singing to self true false
3. stating, “I want to go home” true false
4. slumped in the chair true false
5. sensitive to others true false
6. making strange noises true false
7. pushing a chair true false
8. complaining about the staff true false
9. asking repeatedly for the time of day true false
10. yelling, “Help” true false
11. wandering in the hall true false
12. restless true false
13. falling down intentionally true false
14. doing nothing true false
15. tearing a magazine true false
16. grunting repeatedly true false
17. grabbing onto people true false
18. disrobing true false
19. making a sexual statement true false
20. making negative statements true false
One Hour Before Mealtime
- Research assistants (3) arrive at the site and determine from the charge nurse if those in the intervention group (10 residents) are feeling well, have not received medication for agitation or pain and are able to attend the intervention.

Forty-Five Minutes Before Mealtime
- Research assistants go to the designated room for the intervention and set up the room. Assistant #1 stays in the room for oversight and is the leader of the intervention (will conduct the physical activity class).
- Assistant #2 and #3 seek out those in the intervention group and control group.
- Research assistant #2 seeks out those in the control group (10 residents), observes for 5 minutes, and records apathy and agitation scores using the Modified Apathy Subscale of the Frontal Systems Behavior (FrSBe) Scale and the Cohen-Mansfield Agitation Inventory (Modified CMAI). The residents are each given a name tag.
- Research assistant #3 seeks out those in the intervention group (10 residents), observes for 5 minutes, and records apathy and agitation using the modified FrSBe and modified CMAI for the intervention group. The residents are each given a name tag.
- Assistant #2 and #3 invite the resident to participate in the activity and obtain verbal assent before escorting the residents in the intervention group to the room. The residents are arranged in a semi-circle, facing the interventionist.

Thirty Minutes Before Mealtime
- Research assistant #1 begins the Protocol:

<table>
<thead>
<tr>
<th>Music</th>
<th>Time</th>
<th>Physical Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hail, Hail the Gang’s All Here</td>
<td>1:23</td>
<td>ball toss</td>
</tr>
<tr>
<td>In the Mood</td>
<td>4:01</td>
<td>ball toss</td>
</tr>
<tr>
<td>When the Saints Go Marching In</td>
<td>2:25</td>
<td>slap thighs, shoulder shrugs, punch, march</td>
</tr>
<tr>
<td>Song/Activity</td>
<td>Duration</td>
<td>Instructions</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>----------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>California Here We Come</td>
<td>2:26</td>
<td>wave hands  windscreen wipers  swim  swim backstroke</td>
</tr>
<tr>
<td>Yankee Doodle Dandy (medley)</td>
<td>2:53</td>
<td>march  step on the gas/clutch  kick the can  wipe the table  play piano</td>
</tr>
<tr>
<td>Shine On, Harvest Moon</td>
<td>2:30</td>
<td>row the boat  reach for the stars  arms circle  “moon”  kick (can/can)</td>
</tr>
<tr>
<td>Happy Days Are Here Again (medley)</td>
<td>4:39</td>
<td>smile  pull rubber band  wave with foot  lift weights  scrub the wash  iron the clothes  flap your wings  hug yourself</td>
</tr>
<tr>
<td>After the Ball is Over</td>
<td>2:02</td>
<td>ball toss</td>
</tr>
<tr>
<td>Toot, Toot Tootsie</td>
<td>2:11</td>
<td>ball toss</td>
</tr>
</tbody>
</table>

Clap – thank everyone for coming – good job everyone

After class – on the way to the dining room - play:
- Singing in the Rain  4:15
- Heaven, I’m in Heaven  3:04
- Tennessee Waltz  2:58

Five Minutes Before Mealtime:
- Research assistants #2 & #3 escort the residents to the dining room
- Research assistant #1 again provides oversight of the room.
Mealtime:
- Research assistants # 4 and #5 arrive and are allowed to enter the dining room once all have been seated so they are unable to identify group assignments. They are blinded to the intervention and control group.
- Research assistants # 1-3 take photos of each tray, before it is handed out, and assist with mealtime. A number is placed on each tray to keep track of each picture taken.
- Research assistants #4 and #5 decide which ten residents they are able to watch during the meal, observe for 5 minutes, and record apathy and agitation for the 20 residents (intervention and control group) on separate modified apathy subscale of FrSBe and modified CMAI forms at the start of the meal.

End of Mealtime:
- Research assistants # 4 and #5 record the ability to self feed on the FIM™ data collection form. The percentage (%) of dietary intake on each tray is recorded on the data collection form. They must agree on the percentage of intake for each tray.
- Research assistants #1-3 put numbers back on the appropriate tray and take photos of the trays as they are collected. Any spillage of food is put back on the tray to assure accuracy in the calculation of the percentage.

Important Notes:

Emergency Occurrence:
In the remote event that there is an emergency during the protocol, one of the research assistants will obtain a staff member or bring the resident to a staff member immediately. In the event of choking during the meal, the research assistant will intervene by doing the Heimlich choking maneuver. Otherwise, the research assistant is observing the meal.

Untoward Event:
In the event of witnessing an untoward event (i.e. abuse, mistreatment, or neglect), the research assistant will report the event to the clinical instructor/doctoral student researcher (JM) immediately. The instructor will report the event to the charge nurse on the same day - before leaving the facility.

Symptoms of Dissent:
The resident is free to withdraw at any time and will be escorted from the intervention if any signs of dissent, such as facial grimacing, shrieking, or other signs of agitation, occur during the intervention.
REFERENCES


Certification procedures and standards for assisted living residences, 651 C.M.R. § 12.00 (2006).


Requirements for states and long term care facilities, 42 C.F.R. § 483 (2002).


Uniform Data System for Medical Rehabilitation (1997). Guide for the Uniform Data Set For Medical Rehabilitation (Adult FIM) Version 5.1. UB Foundation Activities Inc.


