

Evaluation of the Music and Memory Program among Nursing Home Residents with Dementia

Final Report to the Wisconsin Department of Health Services

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EXECUTIVE SUMMARY

Background

This final report covers the project activities and findings related to the Evaluation of the Music and Memory Program among Nursing Home Residents with Dementia, a Civil Money Penalty (CMP) Funds grant. The grant was awarded by the Wisconsin Department of Health Services (WI DHS) to the University of Wisconsin-Milwaukee to evaluate the effect of the Music & Memory (M&M) program on outcomes for residents, staff, and family caregivers from nursing homes participating in the statewide M&M program initiative.

The Music and Memory (M&M) program has been increasingly adopted in nursing homes across the U.S. to support persons with dementia. M&M uses personalized music playlists delivered on digital music players set up and maintained by care staff trained in the program (Music and Memory, 2013). The underlying premise of M&M is that these musical favorites tap into deep memories not lost to dementia, thereby facilitating resident communication, engagement, and socialization. However, few rigorous evaluations of this popular non-pharmacologic alternative have been conducted.

This M&M evaluation had four parts: (1) a crossover study with 59 nursing home residents with dementia from 10 Wisconsin nursing home facilities, (2) a pre- and post- survey on medication use among 1500 residents who received M&M in 100 facilities participating in Phase 1 of the M&M statewide initiative, (3) a secondary data analysis of the Minimum Data Set (MDS) to compare nursing home resident outcomes between facilities that participated in the M&M at different time points, and (4) a key informant survey with administrators of Wisconsin nursing home facilities about implementation and sustainability of M&M. This final report provides information on the methods and findings from all four components of the evaluation.

Methods

See Table 1 for the summary of methods of each evaluation component. The sample, data collection methods, and analysis techniques are summarized separately for each study below.

Sample. An in-depth crossover study was conducted with 59 nursing home residents from 10 nursing homes from the Milwaukee county and geographically adjacent county areas in southeastern Wisconsin. The 10 nursing homes were selected from 100 nursing homes participating in the evaluation of the M&M program in the state of Wisconsin. Residents participating in the crossover study were randomly selected from lists of resident who met the study's eligibility criteria, and selected residents were randomly assigned to Condition 1 (M&M and treatment as usual (TAU) received during the first six weeks of the study, then TAU only during the washout period and remainder of the study) or Condition 2 (TAU during the first six weeks and washout period, then M&M and TAU for the last six weeks of the study). Families of nursing home residents (n=28) and direct care staff (n=63) also participated in the study.

In addition to the crossover study, basic pharmaceutical drug use data were collected from all nursing home residents (n=1,500) who were selected to participate in the M&M evaluation from the 100 nursing homes participating in the evaluation.

A secondary data analysis of the Minimum Data Set 3.0 (MDS) data was conducted to examine behavioral and psychotropic medication use outcomes across all nursing home residents in the state.

Last, 161 key informants participated in a survey regarding implementation of the M&M program in nursing homes that was sent to all nursing homes in Wisconsin (n=395).

Data Collection. As part of the crossover study, resident outcomes data were collected via medication chart review, direct observation, iPod music tracking application, accelerometer, and staff surveys regarding resident mood and behavior. Outcomes for families of the participating nursing home residents were measured using a pre/post mailed survey. Outcomes for participating nursing home direct care staff members were measured using a pre/post survey as well.

Pharmaceutical data were collected for the 1,500 nursing home resident using a pre/post survey design that was administered via Qualtrics, an electronic online data capture system that is HIPAA compliant. Nursing home staff completed the survey for each resident participating in the M&M evaluation before the evaluation began, and approximately one year after the beginning of the evaluation. In addition to pharmaceutical data, the survey also collected information regarding the reasons for selection into the evaluation. All 100 homes completed the pre-survey, while 79 completed the post-survey.

MDS data are collected for all nursing home residents in Wisconsin as part of their normal care, regardless of participation in the M&M evaluation. These data were obtained from the Centers for Medicaid and Medicare Services (CMS) without identifiers for secondary data analysis. Outcomes examined using these data include mood and behavioral problems indicators and psychotropic medication use.

The key informant survey was a cross-sectional survey administered via U.S. Mail to all nursing homes in Wisconsin, regardless of participation status in the M&M evaluation. Outcomes examined using this survey include basic respondent demographics, opinions about the M&M program, facilitators and barriers to the use of the M&M program, implementation factors for the M&M program, willingness to continue the M&M program in the future, and the perceived effect of the M&M program on resident pharmaceutical use.

Analysis. Data from all studies were analyzed using basic univariate and bivariate statistics to examine distribution patterns for responses as well as potential relationships between variables. The cross-over study analysis utilized mixed model ANOVAs for multivariate analyses where appropriate. Generalized linear mixed models (GLMMs) and generalized linear models (GLMs) were used to examine the pre/post pharmaceutical use data collected via the resident selection survey. MDS data were analyzed using the differences in difference analyses using conditional logistic regression with facility-fixed effects. The key informant survey analyses primarily relied upon simple descriptive statistics for the quantitative analysis, but content analyses were used to examine the qualitative data.

Findings

Effects on Residents. The summary of findings from each evaluation component is provided in Table 2. The results from the crossover study and MDS data analysis suggest that, contrary to our expectations, the M&M program had little or no effect on improving resident outcomes in the areas of cognition, memory, agitation, and mood although significant improvements in overall behavioral problems, and rejection of care were found among a sub-group of residents, specifically, Medicaid residents. No significant effect on movements measured by average vector magnitude was found. Results on

psychiatric medication use were mixed; the crossover study and MDS data analysis results showed no improvement or worse outcomes among residents whereas the pre- and post-survey found that the M&M program may have had some partial effect on the reduction of anti-anxiety medication use.

These results may be partially explained by several methodological limitations of the evaluation, and M&M program related issues. Methodological limitations include small sample size and use of global measures of functioning completed by direct care staff, and missing and incomplete data from accelerometers used in crossover study. Lack of random sampling, randomization and reliance on staff report on key resident outcome measures in the MDS data and pre- and post-survey limit internal and external validity of findings. Several M&M program related issues may also account for the findings from this evaluation. Music listening data from the crossover study and key informant survey with nursing home facilities data suggest either low fidelity to the guidelines recommended by the M&M program or that the M&M guidelines are insufficient when compared to the evidence-based practice guidelines on individualized music listening programs. To some extent, nursing home staff were attempting to provide M&M at times that would assist with curbing behavioral problems, however the duration of M&M delivery varied considerably, and it is unclear how routinely the program implementation guidelines were followed. Overall, the iPods did not appear to have been made available for use in some of the facilities either a sufficient amount or at the times of day when they may have provided the greatest benefit.

Although the overall evaluation results suggest minimal or modest effects of M&M in improving agitation, mood, and medication use, the majority of key informant survey respondents valued the program. The majority of key informant survey respondents viewed the M&M program favorably such as its ease of use, fit for helping residents experience and maintain personhood, and better social interactions and engagement. Respondents noted observing improved mood and enjoyment among residents, and emphasized that the personalized nature of the music was the key to enjoyment, triggering memories, and improving mood. Also noted were the calming effect of M&M, and the positive effect of headphone blocking noise and allowing each individual resident to listen to the music they prefer.

The findings suggest a particular subset of residents may be more likely to benefit from M&M than others. Residents who are most likely to benefit from M&M are individuals with an appreciation for, enjoyment of or experience with music. Although reasons are not clear, Medicaid residents receiving M&M appear to benefit in overall behavioral problems and rejection of care more than non-Medicaid residents.

Effects on Families. Pre/post survey of the crossover study results generally did not indicate any significant changes in family satisfaction with care or relationship quality between the family members and residents. The survey had small sample of family members participating in both surveys. Moreover, it is unclear how often the family member had opportunities to visit and observe residents during the study period.

Effects on Direct Care Staff. Direct care staff who completed both the pre- and post-survey regarding feelings about their jobs and about working with residents with dementia did not indicate any significant changes in those perceptions between the beginning and end of the data collection period. Key informant survey suggested that lack of buy-in and lack of time for training or implementation of the M&M by direct care staff were major barriers to sustainability of the program. As such, it is unlikely that

all direct care staff participants had opportunities to observe positive changes in residents or to learn about the M&M program. With limited exposure to the program, the effects of M&M on direct care staff is likely to be minimal. Moreover, numerous factors are related to job satisfaction and burnout, and it may be that other factors experienced by the respondents (such as changes in management) have a greater effect on the examined outcome variables than a single intervention such as M&M.

Barriers to the M&M Program Sustainability. Two key barriers to consistently and effectively delivering M&M for target residents were: a lack of buy-in from all levels of care staff and management and a lack of or limited time by staff to implement and maintain the program. Other barriers included technology and cost as additional cost will be incurred to replace existing equipment and buy new songs. Respondents acknowledged the grant from the state to be a valuable resource to initiate and implement the program. However, a remaining concern was sustainability of the program- how they will continue the program for existing and new residents as additional cost will be incurred to replace existing equipment and buy new songs.

Discussion

Some important methodological limitations of the evaluation notwithstanding, results from all components of the evaluation lead to a similar conclusion, that the effectiveness of M&M as it was carried out in Wisconsin during the statewide implementation period was minimal or modest at best with no or minimal effect on nursing home resident behavioral outcomes, and very modest effect on psychotropic medication use. The evaluation data suggest that such results may be in part due to lack of a standardized process of implementation and fidelity checks, which are evidenced by substantial variability in the music listening time duration and frequency across residents and facilities. To some extent, nursing home staff were attempting to provide M&M at times that would assist with curbing behavioral problems, however it is unclear how routinely the program implementation guidelines were followed. At the same time, many facilities viewed the M&M program as valuable noting improvements observed in residents such as enjoyment and improved mood with caveats that neither the M&M program (or music), nor using headphone or iPhone, work for everyone. Lastly, two key barriers to consistently and effectively delivering M&M for target residents that facilities identified were: a lack of buy-in from all levels of care staff and management and a lack of or limited time by staff to implement and maintain the program.

Given these findings, specific recommendations to improve efficacy of M&M program include: (1) select individuals who are most likely to benefit from M&M; (2) assess, identify and set specific goals for the M&M intervention; (3) develop individualized playlists and listening schedules tailored to each individual person; and (4) implement a systemic process evaluation of the M&M program and incorporate M&M into a formal care planning process. We also recommend that more efforts to be made for sustainability of the program by increasing buy-in from all involved in the process and develop and test training programs for volunteers such as students to implement the M&M program. Buy-in may be increased by helping staff to recognize any positive impacts of M&M on residents. Another way to facilitate buy-in would be to approach M&M like other care interventions or programs that require a systematic approach to assess, develop the playlist, deliver and monitor consistently. To make this possible, offering incentives or education and training among direct care will be important or integrating M&M into care plans. To address the time consuming aspect of developing individualized playlists, a significant barrier for the program to be sustained over time, future efforts should focus on developing

strategies to involve and train residents' families as well as volunteers to develop playlists and deliver the music will help reduce burden on direct care staff.

In conclusion, the literature concerning the use of music-based interventions with persons with dementia suggests that there is the potential for such interventions to provide pleasure and aid in the remediation of undesirable behavioral symptoms. There is little reason to believe that the M&M program cannot achieve greater impact if carefully implemented. Therefore, further efficacy studies should continue to review individual outcomes across the program in multiple facilities to determine the generalizability of the program's success.

Table 1. Summary of Methods of Each Evaluation Component

	Crossover Study	Pre-Post Medication Use	MDS Analysis	Administrator Survey
Purpose	<ul style="list-style-type: none"> To evaluate efficacy of M&M to reduce residents' behavioral problems, use of psychotropic medication, and to improve satisfaction with care and relationship quality between residents and family, and staff attitudes toward residents and job satisfaction. 	<ul style="list-style-type: none"> To evaluate effectiveness of the M&M in reducing anti-psychotic and anti-anxiety medication use in 1,500 residents in facilities participating in the Phase I of the statewide implementation. 	<ul style="list-style-type: none"> To evaluate effectiveness of the M&M in improving behavioral outcomes and reducing psychotropic medication use in residents in all facilities participating in M&M in the State of WI. 	<ul style="list-style-type: none"> To identify barriers and challenges in implementing and sustaining M&M, and recommendations to address the barriers in facilities participating in the M&M statewide implementation.
Research questions	<ul style="list-style-type: none"> Does the M&M reduce anxiety, depression, agitation, and use of anti-psychotic and anti-anxiety medications? Does the M&M reduce agitation-related movements and improve sleep quality? Does the M&M improve family caregiver-resident relationship quality and satisfaction with care? Does the M&M improve staff attitudes toward residents? 	<ul style="list-style-type: none"> Does the M&M reduce anti-psychotic and anti-anxiety medication use? 	<ul style="list-style-type: none"> Does the M&M reduce behavioral problems and improve communication, mobility, and mood? Does the M&M reduce psychiatric medication use? 	<ul style="list-style-type: none"> What are the barriers and challenges in implementing and sustaining M&M in nursing home facilities? What is value of M&M? What are the best ways to foster effective implementation and ongoing sustainability of M&M in nursing home facilities?
Design	<ul style="list-style-type: none"> Crossover, RCT with two conditions - Condition 1 receiving the M&M intervention for a six-week period (Phase I) and Condition 2 receiving the M&M intervention for 6 weeks after the Condition 1 received the M&M and a two-week washout period (Phase II). Family members and direct care staff members for the participating residents assessed at pre- (baseline) and post- (end of the study) survey. 	<ul style="list-style-type: none"> Pre- and post- M&M implementation survey conducted online. 	<ul style="list-style-type: none"> Secondary analysis of MDS data on nursing home residents in all Wisconsin nursing home facilities in 2014, and 2015. 	<ul style="list-style-type: none"> Cross-sectional mail or web survey to all nursing home facilities in Wisconsin

Table 1. Summary of Methods of Each Evaluation Component

	Crossover Study	Pre-Post Medication Use	MDS Analysis	Administrator Survey
Sample	<ul style="list-style-type: none"> • 59 residents from a stratified random sample of 10 nursing homes in Milwaukee, Ozaukee, Racine and Waukesha counties. • 28 Family members of participating residents. • 63 care staff from 10 nursing homes. 	<ul style="list-style-type: none"> • 1,500 residents selected to participate in the M&M by 100 nursing homes that participated in the Phase I of the M&M statewide initiative. • Pre-survey was conducted between December 2013 and May 2014 while post-survey was conducted between February 2015 and January 2016. 	<ul style="list-style-type: none"> • Residents in nursing homes participating in M&M statewide implementation at Phase I (2014), Phase II (2015) and Phase III (2016) with residents in non-participating homes serving as controls. 	<ul style="list-style-type: none"> • 161 nursing homes (41%) in Wisconsin who responded to the mail survey.
Data Collection and Measures	<ul style="list-style-type: none"> • Staff report on memory/cognition (Clinical Dementia Rating Scale), agitation (Cohen-Mansfield Agitation Inventory), and mood (Neuropsychiatric Inventory). • Chart review on anti-psychotic medication use. • Movement measured by ActiGraph GT3X worn on the non-dominant wrists of nursing home residents. • Music data collected via app installed on iPods. 	<ul style="list-style-type: none"> • Online survey 	<ul style="list-style-type: none"> • Analysis of the MDS data 	<ul style="list-style-type: none"> • Mail Survey or web-based survey format selected by respondents
Analysis	<ul style="list-style-type: none"> • Generalized linear mixed model (GLMM) ANOVA, randomization tests using a resampling approach, Wilcoxon Signed-ranks tests. 	<ul style="list-style-type: none"> • GLMM and Generalized Linear Model (GLM) ANOVA. 	<ul style="list-style-type: none"> • Differences-in-difference analyses using fixed effects conditional logistic regression. 	<ul style="list-style-type: none"> • Descriptive and content analysis.

Table 2. Summary of Findings of Each Evaluation Component

	Crossover Study	Pre-Post Medication Use	MDS Analysis	Administrator Survey
Results	<ul style="list-style-type: none"> • No statistically significant differences were found in: memory/cognition, agitation, and mood. • Actual rates of use during the total days the iPods were available were quite low for the majority of the residents. • No statistically significant differences were found in staff or family outcomes. • Tests of differences in vector magnitudes were all nonsignificant indicating M&M had no apparent effect on movement. 	<ul style="list-style-type: none"> • Statistically significant mean reductions in anti-psychotic and anti-anxiety medication use. • It is unclear from the data the extent to which M&M contributed to the medication use reduction due to data limitations. 	<ul style="list-style-type: none"> • Significant differences in difference tests for number of days of antipsychotic use and any use of antipsychotics for the Wave 1 versus Wave 2 and 3 nursing homes. Reductions in antipsychotic use were greater in nursing homes not participating in M&M. No significant differences in difference tests for Wave 2 and Wave 3 comparisons. In sub-group analysis of Medicaid residents, reductions in anti-anxiety use days were greater in nursing homes not participating in M&M while reductions in behavioral problems and rejection of care were greater in Wave 2. 	<ul style="list-style-type: none"> • Two key barriers to consistently and effectively delivering M&M for target residents were: (1) a lack of buy-in from all levels of care staff and management and (2) a lack of or limited time by staff to implement and maintain the program. • Other barriers included technology and cost as additional cost will be incurred to replace existing equipment and buy new songs. • Value of M&M include: enjoyment and improved mood, personalized nature of the music, the positive effects of headphones to block noise and allow each individual resident to listen to the music they prefer.
Implications	<ul style="list-style-type: none"> • Results from the study call into question (1) the efficacy of the M&M program in affecting the resident outcomes, and (2) other issues such as low fidelity to the guidelines recommended by the M&M program or insufficient guidelines from the M&M program. 	<ul style="list-style-type: none"> • Findings provide some indication that the implementation of the M&M program may have had some partial effect on the reduction of the use of anti-anxiety medications among residents. 	<ul style="list-style-type: none"> • Findings suggest that M&M made no improvement or had worse improvements on use of psychiatric medication than no M&M while Medicaid residents experienced some positive improvements in 	<ul style="list-style-type: none"> • Although M&M is perceived as a valuable program to enhance quality of life of residents, M&M does not work for everyone, and more efforts are needed to enhance buy-in from all levels of staff in facilities, increase support from families

Table 2. Summary of Findings of Each Evaluation Component

Crossover Study	Pre-Post Medication Use	MDS Analysis	Administrator Survey	
		behavioral problems and rejection of care.	and volunteers, and to improve fidelity of the program implementation.	
Limitations	<ul style="list-style-type: none">• Small sample size, use of global measures of functioning collected over several week intervals, and reliance on staff reports on key resident outcome measures	<ul style="list-style-type: none">• Lack of random sampling of residents and facilities, and lack of random assignment (i.e., no control group)	<ul style="list-style-type: none">• Lack of random sampling or residents and facilities, and lack of random assignment.	<ul style="list-style-type: none">• Cross-sectional, descriptive survey with 40% response rate.
Recommendations	<ul style="list-style-type: none">• For the M&M Program: 1) select individuals who are most likely to benefit from M&M; (2) assess, identify and set specific goals for the M&M intervention; (3) develop individualized playlist and listening schedule tailored to each individual person; and (4) implement a systemic process evaluation of the M&M program and incorporate M&M into a formal care planning process.• Future research should include larger sample sizes, direct behavioral observations using validated methods, and the evaluation of different protocols for the implementation of M&M on behavioral outcomes.	<ul style="list-style-type: none">• Additional research is needed to determine whether, and perhaps the extent to which, the use of the M&M program effects the use of psychotropic medications in nursing home residents.	<ul style="list-style-type: none">• Additional research is needed to identify resident and facility level related factors accounting differential resident outcomes in Wave 1, 2, and 3, and to examine further on potential reasons for differences in outcomes between Medicaid and non-Medicaid residents.	<ul style="list-style-type: none">• Buy-in may be increased by: (1) helping staff to recognize any positive impacts of M&M on residents; (2) approaching M&M like other care interventions or programs that require a systematic approach to assess, develop the playlist, deliver, and monitor consistently; and (3) offering incentives or education and training among direct care staff will be important, or integrate M&M into the care planning process.

BACKGROUND

This final report covers the project activities and findings related to the Evaluation of the Music and Memory Program among Nursing Home Residents with Dementia, a Civil Money Penalty (CMP) Funds grant. The grant was awarded by the Wisconsin Department of Health Services (WI DHS) to the University of Wisconsin-Milwaukee to evaluate the effect of the Music & Memory (M&M) program on outcomes for residents, staff, and family caregivers from nursing homes participating in the statewide M&M program initiative.

The Music and Memory (M&M) program has been increasingly adopted in nursing homes across the U.S. to support persons with dementia. M&M uses personalized music playlists delivered on digital music players set up and maintained by care staff trained in the program (Music and Memory, 2013). The underlying premise of M&M is that these musical favorites tap into deep memories not lost to dementia, thereby facilitating resident communication, engagement, and socialization. However, we are unaware of a rigorous evaluation of this popular non-pharmacologic alternative designed to improve behavioral outcomes and quality of life among residents with dementia.

The M&M evaluation had four parts: (1) a crossover study with 59 nursing home residents with dementia from 10 Wisconsin nursing home facilities, (2) a pre- and post- survey on medication use among 1500 residents who received M&M in 100 facilities participating in Phase 1 of the M&M statewide initiative, (3) a secondary data analysis of the Minimum Data Set (MDS) to compare nursing home resident outcomes between facilities that participated in the M&M at different time points, and (4) a key informant survey with administrators of Wisconsin nursing home facilities about implementation and sustainability of M&M.

Detailed information on the crossover study, pre- and post-survey on medication use, and key informant survey aspects of the evaluation was provided in previous interim reports. This final report includes a brief summary of the study design and results from these parts of the overall evaluation and describes in detail the design and results of the MDS data analysis. This report also describes a component of the crossover study that was added with supplemental funding from the WI DHS and Bader Philanthropies: the measurement of movements among residents during the crossover study of the M&M.

LITERATURE REVIEW

Dementia, and Agitation

In 2014, more than five million Americans, nearly 1 of every 9 older Americans, were diagnosed with Alzheimer's disease or another form of dementia¹. In cases of Alzheimer's, the most common form of dementia, impairments occur in cognitive ability, memory, language, reasoning, and judgment. Up to 90 percent of persons with dementia (PWDs) experience secondary behavioral or psychological symptoms, which become more prevalent in advanced stages^{2,3}. Among nursing home residents with dementia, secondary behavioral symptoms affect 75% of those with dementia⁴ with the most frequent problems being apathy (36%), depression (32%), and agitation/aggression (30%)⁴.

These problems are challenging and distressing to not only PWDs but also to family and professional caregivers, and are often cited as the key reason for institutionalization⁶⁻¹⁰. These behavioral symptoms are further associated with care-related stress by staff and increased costs of care in the nursing home environment.

Treatment Approaches to Agitation

A common approach to managing these symptoms, especially in nursing homes, is the use of psychotropic medication. One estimate suggests that 33% of residents with dementia receive such medication¹¹. In the past, typical antipsychotics such as haloperidol and thioridazine were the most commonly used treatments. However, meta-analyses of randomized, controlled trials showed modest efficacy of typical antipsychotic treatments at best for PWDs^{12,13}. Further, these treatments were known to have serious adverse side effects such as tardive dyskinesia and acute extrapyramidal symptoms¹¹⁻¹⁴.

Following the introduction of atypical antipsychotic agents such as olanzapine and risperidone, atypical agents have been increasingly used for the treatment of behavioral problems among PWDs¹⁵. As was the case with typical antipsychotics, however, meta-analysis showed that the modest clinical benefits of these drugs were counterbalanced by troublesome side effects including an increased risk of death, prompting calls for their discontinuation^{16,17}.

Given the evidence for limited efficacy and serious potential side effects of pharmacological treatments, there has been an increasing effort to develop and implement non-pharmacological interventions to address the behaviors targeted by medications. Approaches to reduce agitation and improve mood include staff/caregiver education and training; structured activities; stimulation-oriented treatments such as recreational activities; and therapies involving music, art, pets or programs that increase the number of pleasurable activities^{21,22}. The risks associated with these non-pharmacologic treatments, such as increased agitation for some residents, are less frequent and severe than those risks associated with anti-psychotic medications (e.g., mortality)⁷. One of the increasingly popular approaches being adopted in nursing home facilities is to use music, individualized music listening (IML) programs in particular, and our research aimed to test the efficacy of the Music and Memory (M&M) program, a type of IML.

Potential Benefits of Individualized Music Listening

Individualized music listening (IML) is a passive type of music intervention that involves PWDs listening to their preferred music with the goals of promoting relaxation and enhancing the emotional state. IML programs such as Music & Memory are increasingly used in long-term care facilities because of their low cost of implementation and ease of delivery. Indeed, IML has the potential to improve quality of life among PWDs and the care practices of direct care staff. According to the Progressively Lowered Stress Threshold model³, the decreased ability of PWDs to receive and process sensory stimuli results in a progressive decline in their stress threshold, which in turn can lead to increases in their stress, anxiety, and agitation levels. The literature on quality of life and dementia documents the clinical benefits of increasing pleasant events in treating depression and improving quality of life.⁴

Moreover, the neuroscience literature supports the conclusion that music enable PWDs to retrieve memories, and eliciting positive emotions.⁵ Despite the progressive decline of cognitive functions, receptivity to music among PWDs appears to remain until the late phases of dementia²³. Studies have reported that people with moderate to severe dementia²⁴ are able to correctly perceive the pitch and melody of music²⁵⁻²⁷, recognize the titles of familiar songs²⁸ and also recall familiar lyrics²⁹. Largely based on studies of normally functioning individuals, several explanations have been offered as to how music may affect the cognitive, emotional, and behavioral experiences of PWDs. A study by Wilkins, Hodges, Laurienti, Steen, Burdette³⁰ showed that preferred music or favorite musical pieces altered the connectivity between the auditory areas and the hippocampus, which is involved in memory and social emotional consolidation. The study findings suggest that while listening to favorite selections, the brain retrieves memories rather than encoding emotion-laden and episodic memories. Pereira, Teixeira, Figueiredo, Xavier, Castro³¹ tested self-professed “music lovers” who listened to music regularly but had limited music training and found that familiarity with a piece was crucial for eliciting emotional engagement. Janata³² found that the medial prefrontal cortex was activated when emotionally salient, episodic memories were triggered by familiar songs from an individual’s past. Overall, the neuroscience literature suggests that for PWDs, the key functions of music are likely to be retrieving memories, and eliciting emotion. As such, preferred music listening may have important therapeutic benefits.

Thus, IMLs based on the PWD’s autobiographical memory and musical preferences can function as a pleasant sensory stimulation that helps trigger retrieval of pleasant memories, shifts attention away from stressful environmental stimuli, increases attention, improves mood, and reduces agitation. As a result of observing such positive behavioral changes, direct care staff relationships with and attitudes towards PWDs can improve, which are central to PWDs’ quality of life.⁶

Evidence Base for IML

Despite the substantial body of literature concerning therapeutic effects of music, surprisingly few rigorous empirical studies to date aimed to test the efficacy of IML in reducing behavioral problems associated with dementia. A comprehensive review of empirical research on music therapy or listening programs with PWDs by Vink, Bruinsma, Scholten³³ found only ten randomized controlled trials (RCTs) that met their selection criteria for rigorous research design. This review was built on two previous literature reviews on the same topic, and three reviews together identified over 500 published articles that had reference to music therapy and dementia. The vast majority of these articles were anecdotal reports or case studies, while only 60 studies were some type of empirical research and 10 studies were RCTs that met their review criteria. Moreover, only three of the ten studies examined the effects of IML^{34,35}. Since the publication of the 2011 review by Vink, only one study Sakamoto, Ando, Tsutou³⁶ was published which utilized an RCT design to examine the effect of IML. Overall, the combined evidence from these eleven studies support that the claim that IML and active group music therapy are more effective than no intervention in reducing agitation and aggression^{33,36}. Methodological limitations of the small number of RCTs, however, preclude definitive conclusions regarding efficacy of IML.

Music & Memory

The limited evidence-base that is comprised of relatively older studies on IML programs motivated this evaluation. The evaluation described in this report is one of the first large, comprehensive evaluations of a particular IML program, Music & Memory (M&M). To date, M&M has been adopted in over 1,000 nursing homes in the U.S. alone to support persons with dementia³⁷. The program uses personalized music playlists delivered on iPods or other digital devices which are set up by care staff who are trained in the program³⁷.

According to the resources and training materials available on the M&M website, M&M defines the “individualized” music playlist following Gerdner³⁵, who stated that: “[Individualized music] is defined as music that has been integrated into the person’s life and is based on personal preference. The musical selection must have specific meaning to the person’s life” (p. 51). The M&M program emphasizes creating a playlist based on music that has personal meaning. The

program suggests that persons with dementia (if they can communicate) or family members are the best source for identifying an individual's music preferences and songs significant to that person's life experience. The program also suggests that in case a person is no longer communicative and family members have little information about their relative's music preferences, caregivers can play music popular from the time the individual was a child or young adult, including music played on the radio or in popular television shows, and judge what is preferred based on the individual's reaction to the music.

Implementing M&M (from *How to Create a Personalized Playlist for Your Loved One at Home*³⁷) includes the following steps:

1. Create a regular schedule/system for delivering individualized playlists such as "three 30-minute listening sessions—morning, afternoon and evening".
2. Deliver the music at certain times throughout the day (but the manual does not specify when). For persons with Alzheimer's disease, the manual emphasizes that "timing is very important. You can greatly reduce or head off agitation by playing music to distract and calm".
3. If an individual becomes more agitated while listening to music, try changing the music selection.

EVALUATION DESIGN

The M&M evaluation has four parts: (1) a crossover study with 59 nursing home residents with dementia from 10 Wisconsin nursing home facilities, (2) a pre- and post- survey on medication use among 1500 residents who received M&M in 100 facilities participating in Phase 1 of the M&M statewide initiative, (3) a secondary data analysis of the Minimum Data Set (MDS) to compare nursing home resident outcomes between facilities that participated in the M&M at different time points, and (4) a key informant survey with administrators of Wisconsin nursing home facilities about implementation and sustainability of M&M. The research design of these four parts of the evaluation is summarized in the Table 1, and the summary of the findings from these parts are available in Table 2.

1. CROSSOVER STUDY

Design

The crossover study was conducted to examine the efficacy of the M&M program improving resident, family and staff outcomes with 59 residents from 10 nursing homes who were followed over a 14-week observation period.

Sample

Stratified random sampling was used to select 10 nursing homes from among all nursing homes in Milwaukee, Ozaukee, Racine and Waukesha counties. Strata were formed based on the size of facility, urban/rural and public/private ownership status. Within each facility, 6 long-term nursing home residents with moderate or advanced dementia were randomly selected out of the pool of all eligible residents.

To be included in the study, the resident had to meet all of the following criteria:

1. Be randomly selected from a pool of 15 or more potential participants from each of the 10 participating nursing home facilities ,
2. Have a confirmed diagnosis of moderate or advanced stage dementia or Alzheimer's disease, AND
3. Be a long-term resident (not rehab or other short-term stay at one of 10 participating nursing home facilities – should have stayed in the nursing home for more than 30 days or have been determined as a long-term stay resident by the nursing home.

Family members and direct care staff members for the participating residents were also contacted and recruited for the pre- (baseline) and post- (end of the study) survey.

Group Assignment

Residents were randomly assigned to one of the two conditions, Conditions 1 and 2. Condition 1 received treatment as usual (TAU) plus the M&M intervention for a six-week period (Phase I) followed by a two-week washout period during which the M&M treatment was withdrawn, followed by a third period (Phase II) during which only TAU was provided for 6 weeks. Condition 2 received only TAU during Phase I and the washout period but participated in the M&M program and TAU during Phase II.

Measures

Resident Outcomes. Agitation and related behavioral problems were measured by the Cohen-Mansfield Agitation Inventory^{38,39}. We used the Neuro-Psychiatric Inventory-Nursing Home (NPI-NH)⁴⁰, which assesses 11 symptom categories including: delusions, hallucinations, agitation/aggression, depression, anxiety, elation/euphoria, apathy, disinhibition, irritability/liability, lability, aberrant motor behavior, and appetite changes. Progression of dementia was measured by the Clinical Dementia Rating (CDR) Scale^{41,42}. We used a standardized form to record medication use from chart reviews, detailing the dose and type of medication used. These data were gathered via review of the monthly medication reports.

Movement was measured using ActiGraph GT3X accelerometers, which measure tri-axial acceleration and have a sensitivity of $\pm 9G$ with a user-specified sampling rate of 30 Hz. An accelerometer is a device similar in size and shape to that of a large wrist watch which contains a sensor that detects acceleration along three axes. The primary data point used in our analysis is known as a vector magnitude and represents the square root of the sum of the squared acceleration values in the x, y, and z directions at a given point in time. Vector magnitudes are typically aggregated over one-second or greater intervals of time referred to as epochs. There are a number of attachment options with the newer accelerometers, e.g. the Actigraph GT3X can be attached at the wrist, waist or ankle with the non-dominant wrist being the attachment point selected for use in this study.

Music & Memory Exposure. Music exposure (dosage) was measured using an app written by Marquette University's UBICOMP Lab. This app was installed on the iPod Touch devices purchased for the study and each device was then individually labeled and assigned to a specific resident for their personal use. The app ran in the background for the full duration of the study continually recording events as the iPods were used. Specifically, the app entered a date/time stamp in a data file when the music player was started, the music was paused or stopped, and at the beginning of each song played. It further recorded the song title and name of the artist. From this information it was possible to track all use of the devices for music listening and calculate durations of use by date and time. Other music data, such as beats per minute and genre, were ascertained using through review by one of the PIs and two students enrolled as music composition at UWM.

Family Outcomes. To assess the quality of relationship between family-resident, we used two measures designed specifically for family caregiver-person with dementia dyads: Quality of Carer-Patient Relationships (QCPR) scale and composite measures of relationship quality developed by Adams, McClendon, Smyth⁴³ and Spruytte, Van Audenhove, Lammertyn, Storms⁴⁴.

Staff Outcomes. To measure attitudes toward persons with dementia, we used an 11-item inventory that assessed two domains of attitudes, "devalue," and "positive view" which were used in an evaluation study of a creative expression program for nursing home residents with dementia⁴⁵. Four items were used to measure the tendency to "devalue" dementia patients. Seven items are used to construct a measure of "positive" views of dementia patients.

Data Collection

The total length of the observation window for each resident was about 14 weeks. For residents, student researchers and direct care staff conducted collection of assessment data at each point of the study: baseline (Time 1), first follow-up at the end of the 6th week (Time 2), second follow-up after washout, at the end of the 8th week (Time 3), and third follow-up at the end of the 14th week (Time 4). At each point of the data collection, staff assessed and reported on resident behavioral outcomes using the Cohen-Mansfield Agitation Inventory, Neuropsychiatric Inventory-Nursing Home, and Clinical Dementia Rating (CDR) Scale.

Per each collection period, accelerometers were placed and fastened on the non-dominant wrist of each participating nursing home resident using a Velcro strap. To yield valid data, conservative estimates of 3 to 7 valid days of wearing have been reported as acceptable, with 2 valid days of measurement considered as the minimum number of necessary days to assess physical activities in daily life. For this reason, the residents in the cross-over study were asked to wear the devices for five consecutive days at four time points during the cross-over study: baseline (Time 1), first follow-up at the end of the 6th week (Time 2), second follow-up after washout, at the end of the 8th week (Time 3), and the third follow-up at the end of the 14th week (Time 4). Residents were expected to wear the accelerometer for 24 hours per day except when bathing/showering or during other activities in which the person was submerged in water. Accelerometer wear logs were maintained by direct care staff to record the times and dates that the accelerometers were placed and removed. Direct care staff were instructed to complete a paper log (in addition to any charting required) for data verification purposes. The log contained fields to indicate the start and stop times for accelerometer

wear each day of the five-day wear period, as well as fields to record notes for each day. The information contained in the logs was used to help verify the actual wear times for each resident. Data were downloaded for analysis using ActiGraph's proprietary ActiLife software.

We measured attitudes among direct care staff and families using a pre/post survey method before the intervention implementation at each nursing home (i.e., baseline), and after the study period (i.e., 14th week).

Analysis

All Data. Data summaries were created using descriptive statistical methods, including the calculation of means and standard deviations, simple frequencies, and percentages as appropriate. When dependent variables were normally and continuously distributed, the data were analyzed using General Linear and Generalized Linear Modeling methods where possible. Dependent variables that were non-normal but amenable to transformation were transformed using an appropriate power transformation prior to running the analyses. Tests of variables found not to respond well to normalizing transformations had their results confirmed using a randomization test based on a resampling approach. Binary dependent variables were analyzed using a logit model and ordinally scaled variables with the Wilcoxon Signed-ranks tests when time was the only effect.

Accelerometer Data. Accelerometer wear time validation involved a complex process to determine valid accelerometer wear time data. We created day time and sleep time categories. All consecutive 0 counts that lasted for 1 hour or more were eliminated. This is because there is a good chance that the accelerometer is not being worn if there is absolutely no movement for 60 minutes straight. If there was a valid log completed, we eliminated all data that were not recorded in the log. If the remaining data span more than 6 dates starting from the first date, we eliminated all dates beyond 6 dates starting from the first date as well as all data prior to the start date and time. By date, we mean specific calendar dates. For example, if we have data on 8/20, 8/21, 8/22, 8/23, 9/20, then we eliminated 9/20. Even though the total number of dates is less than 6, 9/20 is too far away from the first valid date. Vector magnitudes served as the primary unit of analysis and were averaged over residents for each Phase of the cross-over study. The accelerometer data were analyzed using a General Linear Mixed Model with fixed effects representing music exposure (exposure vs. no exposure), time (pretest, posttest), and treatment condition.

2. PRE- AND POST-RESIDENT SELECTION SURVEYS

Design

The main purpose of the pre- and post- resident selection surveys was to assess changes in anti-psychotic and anti-anxiety medication use as the result of exposure to the M&M program in the 100 nursing homes that participated in the first-phase rollout of the M&M program for the statewide initiative. Also measured were the reasons for selection of each resident, their stage of dementia, and information concerning the use of chair alarms and other forms of restraint. Phase I of the Music and Memory project implementation began in July 2013, when applications for participation in Phase I were solicited from nursing homes in the State of Wisconsin. Training in the Music and Memory program was conducted in October 2013 with the 100 nursing homes that were selected from the applicant homes. Equipment for the Music and Memory program was distributed to nursing homes starting December 2013 after the nursing home completed the Resident Selection Survey. A cover letter and the link to the resident selection surveys (pre- and post-) were emailed to the administrators or designated contact persons of the 100 nursing homes that took part in Phase I of the statewide implementation of M&M. Pre-surveys were completed between December 2013 and May 2014, while post-surveys were completed between February 2015 and January 2016.

Sample

These 100 facilities were not randomly selected by the research team or DHS. Residents who received M&M during Phase I in the 90 of the 100 facilities were not randomly selected to participate in the M&M program either. Instead, facilities were asked to identify residents who had a dementia diagnosis, behavioral problems, and/or were prescribed psychotropic medication, and who the facilities believed would benefit from the program. Of the 100 facilities, ten

nursing homes participated in the crossover study of the evaluation. At these ten nursing homes, six residents were randomly selected from the number of eligible residents at each facility. The remaining nine residents at each facility were then selected by the nursing home staff. For the 90 nursing homes that were not part of the crossover study, the nursing home staff determined which 15 residents would be participating in the program. No attempt was made to identify residents with similar characteristics to those who were to receive M&M to serve as a comparison group in subsequent analyses from any of the 90 nursing homes not involved in the crossover study nor for the nine residents chosen by the staff in the ten homes in the crossover study. One hundred percent (100%) of the 100 nursing homes completed the pre-survey for the residents who were initially enrolled in Phase I (n=1,500 residents), however, only 79 nursing homes (79%) completed the post-survey.

Measures

Covariates. At both pre- and post-surveys, we asked about dementia stage and reasons for selecting each resident for M&M program participation. Stage of dementia had three response categories, stage 1, 2, 3, with stage 3 being the most advanced. Reason for resident selection response categories included:

1. Reduce the need for frequent intervention
2. Relieve boredom or lack of stimulation
3. Reduce anxiety
4. Reduce agitation
5. Need for a low energy activity
6. Responds positively to music (sings, dances, claps, taps, etc.)
7. Displays signs of enjoyment or engagement with musical stimuli
8. Depression or other mental health concerns
9. Use as part of a pain management program
10. Provides distraction (i.e., during cares, baths, etc.)

For the purposes of analysis, we further collapsed these reasons into three conceptual categories as follows: (1) reasons for selection due to a resident exhibiting problem behaviors that are often addressed through the use of medication (need for frequent intervention, reduce anxiety, reduce agitation), (2) reasons representing relief of boredom or lack of stimulation or need for a low energy activity, and (3) reasons representing a resident's having an interest in music or responding positively to music (sings, dances, claps, taps, etc.), or displaying signs of enjoyment or engagement with musical stimuli.

Outcome Variables. At both pre- and post-surveys, we asked about the use of psychotropic medications. For each resident, up to 12 medications with dosage and frequency of use were indicated at each time point. After all data were collected, the data were cleaned and coded to determine which medications were used for anti-anxiety purposes and which were used as anti-psychotics. The anti-psychotic drugs included in the index to define the outcome were: Aripiprazole, Haloperidol Risperidone, Quetiapine, Olanzapine, Clozapine, Fluphenazine, Lurasidone, Paliperidone, Ziprasidone, Iloperidone, Thiothixene, Thioridazine and Chlorpromazine. The anti-anxiety medications included: Buspirone, Lorazepam, Trazodone, Alprazolam, Diazepam, Hydroxyzine and Chlordiazepoxide.

Survey respondents varied greatly in the manner in which they reported the prescribed medications with some reporting different dosages or times of administration of the same drug as separate medication types while others reported a single medication type and in a separate field the different dosages and times of administration. For this reason, new variables were created such that if the resident was taking at least one anti-psychotic drug, i.e. the count was 1 or greater, residents were scored as positive for receiving an anti-psychotic medication (prescribed = 1 and not prescribed = 0). The same procedure was used to create an index for the anti-anxiety medications. Thus, the final

outcome variables were two indicator variables of prescription status of anti-psychotic medications and anti-anxiety medications (Yes= 1, No= 0).

Analysis

Repeated measures generalized linear mixed models (GLMMs) and generalized linear models (GLMs) were run controlling for covariates including the residents' stage of dementia, and reasons for selection into the M&M program. Analyses were initially run for the full sample but some analyses using anti-anxiety as the dependent variable encountered problems with convergence failures and infinite likelihoods and a resampling approach was used for the analyses. For variables where both analyses could be run, no differences were noted in the results. All results are thus presented based on a complete case analysis.

3. MINIMUM DATA SET (MDS) ANALYSIS

Design and Data Source

The data sources for the analyses of the MDS data were Minimum Data Set (MDS) records for the state of Wisconsin from 2013 through 2015. We assumed that statewide implementation of M&M was done in three waves with 2014 as the implementation year for Phase 1, 2015 for Phase 2, and 2016 for Phase 3 (always used as a control). The analysis was conducted by the research team at the Center for Gerontology and Healthcare Research at Brown University who contracted with the UW-Milwaukee research team. Two sets of comparisons were run. In the first, Phase 1 homes were compared with the combined data from the Phase 2 and 3 homes with the latter serving as a comparison group and the Phase 1 homes receiving the treatment. A second set of analyses compared data from the Phase 2 homes with those from the Phase 3 homes with the Phase 3 homes serving as the untreated comparison.

Sample

To be included in the analysis, residents had to: (1) be a long-stay dementia resident; (2) have an ADL \leq 24 (0-28, higher worse); (3) a Cognitive Function Scale Score \geq 2¹; and (4) Not be comatose or on hospice.

Measures

Psychiatric medication use. Anti-anxiety days were calculated using an MDS item (Item N0410B) that indicated the number of days the resident received the anti-anxiety medication during the last 7 days. A second index of any anti-anxiety use was created by coding any anti-anxiety use as 1 and no use as 0. Similarly, anti-psychotic days were calculated using an MDS item (Item N0410A) that indicated the number of days the resident received the following medication during the last 7 days and these values used to create a second index of any anti-psychotic use where 1=any use and 0=no use.

Behavior problems. Behavioral problems that include rejection of care was calculated by summing the MDS items indicating frequency of physical, verbal, and other behavioral symptoms (Items, E0200A-C) and presence and frequency of rejection of care (Item E0800). Behavioral problems that excluded rejection of care was calculated by summing the MDS items indicating frequency of physical, verbal, and other behavioral symptoms (Items, E0200A-C). Rejection of care was calculated the MDS item Rejection of Care- Presence & Frequency (Item E0800).

Composite outcome. The composite outcome variable was defined as equal to improvement in either behavioral problems including rejection of care or anti-psychotic use.

Other outcomes. Communication was measured by an MDS item (Item B0700) on whether the resident makes self-understood. Mobility-Locomotion was measured by summing Section G ADLS locomotion on and off unit. Mobility-Walking was measured by summing Section G ADLS walking in room and corridor. Mobility-Overall was measured by

¹ Thomas et al. The Minimum Data Set 3.0 Cognitive Function Scale. *Medical Care* (2015).

using the walking score but when the resident is unable to walk (totally dependent on both component items) then this is set to the locomotion score. Mood was measured by PHQ-9 Severity Score (Item D0300), or Staff PHQ-9 Rating (Item D0600) when missing.

Analysis

Differences-in-difference analyses were done using fixed effects conditional logistic regression analyses with patient-level outcomes being modeled as a function of year (i.e., Wave of M&M statewide implementation), M&M status, and the interaction between year and M&M status. The parameter of interest is the coefficient on the interaction variable, which represents the effect of treatment in the implementation year. Change in the outcomes within each year (non-implementation, implementation) were measured for cases and controls. The baseline assessment for any given individual was the first assessment at which they met eligibility criteria during the year and follow-up assessment was the assessment closest to 6 months from the baseline. The scores were differenced to indicate the change in the outcome and recoded as a binary score indicating whether or not a person improved (1) or stayed the same or became worse (0). People who did not have the outcome at the baseline assessment were excluded for that outcome specific analysis. The differences-in-differences analysis thus represent aggregate differences in the change in improvement rates for cases and controls.

4. KEY INFORMANT SURVEY OF NURSING HOMES

Design

The purpose of the survey was to assess experiences of nursing homes that implemented Music and Memory (M&M) between 2014 and 2015, including, for example, questions asking about positive aspects and challenges in implementing and sustaining the program, and recommendations to address challenges or barriers.

Sample

The key informant survey was distributed to the administrators of 395 nursing homes in Wisconsin between September 2015 and December 2015. One hundred sixty-one nursing homes, or 41% of all WI nursing homes, that participated in the survey included Phase I and Phase II groups as well as facilities that did not participate in the M&M initiative. The majority of facilities were nursing home units within a CCRC or retirement communities (47.8%) and hospital-based skilled nursing facilities (33.5%).

Measures

Twenty-seven quantitative measures were included in the key informant survey in order to provide the research team with information regarding the facility characteristics and their experiences with M&M program implementation and medication use/reduction. Questions were asked about facility characteristics (e.g., type of facility (e.g., skilled nursing facility), number of beds in the facility, current daily census information, etc.), facilities' experiences with implementing M&M (e.g., M&M program implementation timeline, M&M implementation detail, satisfaction with M&M, and future plan for M&M), and information regarding the use of psychotropic medications with nursing home residents (e.g., whether the nursing home has reduced their use of medications, the reasons for medications being used as chemical restraints, whether or not the need to use medications as restraints decreased because of the M&M program, etc.).

Also included were eight open-ended questions regarding experiences with the M&M program including questions about what the residents liked about M&M, what residents did not like about M&M, barriers that made it difficult to provide M&M, facilitators that made it easier to provide M&M, reasons the facility decided to reduce the use of medication as a form of restraint, and opinions about the value of M&M.

Data Collection

The key informant survey was mailed to the administrators of each of the 395 nursing homes in the State of Wisconsin in August 2015, followed by a postcard reminder sent in November 2015. The list of nursing homes and administrators was obtained from the DHS website. The cover letter that was enclosed in the original mailing packet and the reminder postcard contained the link to an online version of the survey so that respondents could complete the survey by either mode. The overall response rate was 41% or 161 nursing homes. Completed surveys included in this report were received between September 2015 and December 2015.

Analysis

Descriptive analysis and content analysis were conducted.

FINDINGS

1. CROSSOVER STUDY

Sample Characteristics

At baseline, a total of 59 residents participated in the study with an average age of 86.9 years (see Table 3). The majority were female (77%), White (92%), widowed (67%), and housed in a memory unit in their respective facility (62%). The majority of the residents had adequate hearing or were able to hear with only minimal difficulty (83%) and were able to participate directly in the creation of their playlists as 67% of the sample were said to have clear speech and the 62% were able to make themselves understood and either understood others or usually understood others. The primary diagnoses at baseline included anxiety (52%) and depression (68%).

The 28 family members who responded to the survey were predominantly female (79%) and married (82%). Sixty-one staff members who participated in the baseline survey were on average 44 years; 98% of them were female and 87% were White. The majority of staff were either nurse assistants (35%) or identified themselves as being activity staff (27%). Table 3 (below) contains demographic characteristics for the resident sample by group. Tables 4-6 (see the Appendix) contain other detailed characteristics for residents, family, and staff.

Table 3. Demographic Characteristics of Residents

	Condition 1 M (SD), Range	Condition 2 M (SD), Range
Age in years	88.92 (5.41), 74-100	84.88 (8.62), 67-99
	N (%)	N (%)
Gender		
Male	9 (30.00)	4 (13.79)
Female	21 (70.00)	25 (86.21)
Race/ethnicity		
White	28 (93.33)	27 (93.10)
Black	0 (0.00)	1 (3.45)
Hispanic	0 (0.00)	1 (3.45)
Native American	0 (0.00)	0 (0.00)
Asian	2 (6.67)	0 (0.00)
Native Hawaiian	1 (3.33)	0 (0.00)
Other	0 (0.00)	0 (0.00)
Marital Status		
Divorced	2 (6.67)	4 (13.79)
Married	5 (16.67)	7 (24.14)
Never Married	0 (0.00)	1 (3.45)
Widowed	23 (76.67)	17 (58.62)
On memory unit		
No	10 (37.04)	6 (23.08)
Yes	17 (62.96)	20 (76.92)

Note: ¹ Condition 1 group received treatment as usual (TAU) plus M&M for a six-week period (Phase I) followed by a two-week washout period and no M&M for another 6 weeks (Phase II).

² Condition 2 group received TAU alone for the first six weeks (Phase I) followed by two-week washout period, and then received TAU combined with M&M for six weeks (Phase II).

Subsample of residents with movement data. A total of 49 participants agreed to participate in the movement data collection by wearing an accelerometer throughout the study period. At baseline, forty-one residents agreed and wore the accelerometer for at least one day during the first 5-day period. Over time, eight additional residents agreed and wore the device for at least one data collection point with a total of 49 participants from 10 sites wearing accelerometers for at least one observation point. On average, there were four residents per site who wore the device. Participants wore the accelerometers for the average of three out of four accelerometer data collection periods ($SD=0.7$; Range = 1-4). Thirty-one residents wore accelerometers at all of baseline and follow-up visits.

Key Findings

Overall, analyses of the resident outcome data showed that no statistically significant differences were found in key outcome areas including agitation as measured by the Cohen-Mansfield Agitation Inventory (CMAI), mood as measured by the Neuropsychiatric Inventory, and memory/cognition as measured by the Clinical Dementia Rating (CDR) Scale. No significant effect of M&M on reducing anti-psychotic medication over time was found. No differences in movement were found by time, condition or study phase.

Agitation measured by CMAI. For Phase I, all effects were not significant for the Cohen-Mansfield total score, physical aggressive, physical nonaggressive, verbal aggressive, verbal nonaggressive subscales and for the logit analyses of the dichotomized variables indicating proportions positive for aggressive behavior, nonaggressive behavior and verbal agitated behavior. For Phase II of the crossover study all tests were not significant for the CMAI. See the Appendix for detailed results. Frequencies and percentages of ratings for individual items for the CMAI are presented in Table 7. Table 8 and Table 9 contain the summary tables presenting the sample sizes (n), means, standard deviations, mean squares, Type III F-tests, p-values and the randomization F (if applicable) for the significance tests run for the Cohen-Mansfield subscales.

Mood measured by NPI-NH. Detailed descriptive and inferential test results are provided in the Appendix –Tables 10-12. Frequencies and percentages for individual items in the Neuropsychiatric Inventory are presented in Table 10. Results from the significance tests for the Neuropsychiatric Inventory are presented in Tables 11 and 12. In Phase I (as shown in Appendix Table 11), only a single condition by time interaction was significant for irritability. Condition 1 in Phase I (the listening group) showed increases over time on irritability while condition 2 showed decreases. For the indifference subscale, although the interaction was not significant, the p-value was .07. Both conditions showed decreases on indifference over time but greater decreases were noted for condition 2 (the non-listening group) than for condition 1. These results are contrary to what would be expected if the Music and Memory intervention were positively influencing these behaviors. For Phase II (as shown in Appendix Table 12), the condition by time interaction for the Neuropsychiatric Inventory depression subscale was significant with the cell means indicating an increase in depression over time for the persons in condition 1 (not listening) and a decrease in depression for condition 2 (listening in Phase II). Similar to the result in Phase I, the p-value for the interaction for indifference was equal to .08 but the cell means indicated a reverse pattern of change. In this analysis, condition 1 (not listening) showed a greater decrease over time than did condition 2 (listening group). A similar result was noted for the test of disinhibition (e.g., does the resident say or do things that are NOT usually done in public) which was significant in Phase II. Cell means showed that disinhibition decreased from times 3 to 4 for condition 1 (not listening) and increased for condition 2 (listening).

Memory and cognition measured by CDR. Detailed descriptive and inferential test results are provided in the Appendix – Tables 13-15. Table 13 lists the frequencies and percentages of responses in each response category on the Clinical Dementia Rating Scale subscales for the total sample by time. The statistical test results are summarized in Tables 14 and 15. For most variables, the results are consistent with an inference of no change over time in either phase of the

crossover study. However, significant average decreases were noted for memory and judgment and problem solving in Phase I for both conditions and for community affairs in Phase II.

Medication use. Patient chart data indicated that 214 different medications and supplements were prescribed to the 60 residents. For these analyses, several following subgroupings of medications were created:

- (1) the total number of medications including supplements of all kinds;
- (2) medication counts omitting dietary supplements and “supplements” used to treat constipation, hemorrhoids, dryness of eye and mouth, acid indigestion, diarrhea, flatulence, ear wax build-up, and stomach cramping;
- (3) medications associated with side effects such as delirium, confusional states, agitation, aggression, and other unwanted behavioral and psychological disorders;
- (4) medications specifically used to treat symptoms of dementia (Mernantine HCl, Rivastigmine Tartrate, Donepezil HCl); and
- (5) anti-psychotic medications (Aripiprazole, Haloperidol, Risperidone, Quetiapine Fumarate, Olanzapine).

See the Appendix for Table 16 for list of these medications by category and Table 17 for a complete listing of the medications and supplement frequencies and percentages of use by time separately for each treatment condition.

Table 18 provides the frequency distributions of the total counts of medications and supplements combined by condition and time. It is interesting to note that at baseline, nearly all residents were receiving 5 or more medications and supplements (91.67 percent) with 75.00 percent being prescribed 10 or more. When looking only at medications without the supplements, the baseline percentage of persons with a count of 5 or greater dropped to 68.33 and the percentage with a count of 10 or greater to 16.67 (Table 19). Tables 20 and 21 provide summaries of the significance tests for Phases I (Table 20) and II (Table 21) of the crossover study. None of the condition by time interaction effects reached significance for any of the five medication indexes described above.

Table 18: Total Medications and Supplements by Condition and Time

	Condition 1				Condition 2			
	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
0	1 (3.33)	2 (6.67)			2 (6.90)			
1								
2	1 (3.33)							
3					1 (3.45)			
4								
5	2 (6.67)	1 (3.33)	1 (6.45)	1 (4.00)	1 (3.45)			
6	1 (3.33)	1 (3.33)	1 (3.23)				1 (3.45)	
7			1 (3.23)		1 (3.45)	1 (3.85)	1 (3.45)	1 (4.00)
8	2 (6.67)	1 (3.33)	1 (6.45)	1 (4.00)	1 (3.45)	1 (3.85)		
9	2 (6.67)	2 (6.67)	1 (3.23)	1 (4.00)			2 (6.90)	2 (8.00)
10	2 (6.67)	3 (10.00)	5 (16.13)	3 (12.00)	1 (3.45)	3 (11.54)	2 (6.90)	
11	3 (10.00)	3 (10.00)	3 (9.68)	3 (12.00)	1 (3.45)	1 (3.85)	1 (3.45)	
12	1 (3.33)	2 (6.67)	1 (3.23)	2 (8.00)	1 (3.45)	2 (3.85)	2 (6.90)	2 (8.00)
13	3 (10.00)	3 (10.00)	3 (9.68)	1 (4.00)	3 (10.34)	2 (7.69)	4 (13.79)	1 (4.00)
14	1 (3.33)			3 (12.00)	2 (6.90)	2 (7.69)	2 (6.90)	7 (28.00)
15	3 (10.00)	2 (6.67)	2 (12.90)	1 (4.00)	2 (6.90)	2 (7.69)	3 (10.34)	2 (8.00)
16		3 (10.00)		1 (4.00)	3 (10.34)	3 (11.54)	7 (24.14)	6 (24.00)
17	6 (20.00)	2 (6.67)	2 (6.45)	3 (12.00)	3 (10.34)	5 (19.23)	1 (3.45)	3 (12.00)
18	1 (3.33)	3 (10.00)	3 (9.68)	2 (8.00)	3 (10.34)	2 (7.69)	2 (6.90)	1 (4.00)
19			2 (6.45)	1 (4.00)	4 (13.79)	2 (7.69)	1 (3.45)	
20	1 (3.33)	2 (6.67)	1 (3.23)	2 (8.00)				
N	30	30	28	25	29	26	29	25
Sum	355	369	360	341	382	371	395	355
Mean (SD)	11.83 (4.99)	12.30 (5.17)	12.86 (4.25)	13.64 (4.00)	13.17 (5.61)	14.27 (3.41)	13.62 (3.32)	14.20 (2.71)

Table 19: Total Medications Without Supplements by Condition and Time

	Condition 1				Condition 2			
	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
0	1 (3.33)	2 (6.67)			2 (6.90)			
1	1 (3.33)	1 (3.33)	1 (3.57)	1 (4.00)	1 (3.45)	1 (3.85)	1 (3.45)	
2	1 (3.33)				1 (3.45)		1 (3.45)	
3	5 (16.67)	3 (10.00)	3 (10.71)	2 (8.00)	4 (13.79)	1 (3.85)	3 (10.34)	2 (8.00)
4	2 (6.67)	4 (13.33)	5 (17.86)	4 (16.00)	2 (6.90)	3 (11.54)	2 (6.90)	2 (8.00)
5	4 (13.33)	2 (6.67)	3 (10.71)	3 (12.00)	3 (10.34)	3 (11.54)	5 (17.24)	4 (16.00)
6	4 (13.33)	3 (10.00)	4 (14.29)	4 (16.00)	2 (6.90)	4 (15.38)	3 (10.34)	5 (20.00)
7	2 (6.67)	3 (10.00)	2 (7.14)		3 (10.34)	2 (7.69)	1 (3.45)	1 (4.00)
8	2 (6.67)	2 (6.67)	2 (7.14)	1 (4.00)	3 (10.34)	2 (7.69)	5 (17.24)	3 (12.00)
9	4 (13.33)	3 (10.00)	2 (7.14)	4 (16.00)	1 (3.45)	4 (15.38)	6 (20.69)	4 (16.00)
10		2 (6.67)	2 (7.14)	2 (8.00)	3 (10.34)	2 (7.69)		2 (8.00)
11	2 (6.67)	1 (3.33)			1 (3.45)	1 (3.85)	1 (3.45)	1 (4.00)
12			1 (3.57)	1 (4.00)	2 (6.90)	3 (11.54)	1 (3.45)	1 (4.00)
13	1 (3.33)	3 (10.00)	1 (3.57)	1 (4.00)	1 (3.45)			
14	1 (3.33)		2 (7.14)	1 (4.00)				
15		1 (3.33)		1 (4.00)				
N	30	30	28	25	29	26	29	25
Sum	185	203	190	180	182	188	187	174
Mean (SD)	6.17 (3.43)	6.77 (3.93)	6.79 (3.50)	7.20 (3.70)	6.28 (3.66)	7.23 (2.97)	6.5 (.75)	6.96 (2.49)

Table 20: Medication Count Comparisons Time 1 vs. Time 2 by Condition

	Num d.f.	Den d.f.	F	p
Total Medication + Supplement Count				
Condition	1	57	3.35	0.07
Time	1	54	1.31	0.26
Condition by Time	1	54	0.35	0.56
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		11.83 (4.99)		12.30 (5.17)
Condition 2		13.17 (5.61)		14.27 (3.41)
	Num d.f.	Den d.f.	F	p
Total Medication No Supplement Count				
Condition	1	57	0.04	0.83
Time	1	54	2.31	0.13
Condition by Time	1	54	0.02	0.88
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		6.17 (3.43)		6.77 (3.93)
Condition 2		6.28 (3.66)		7.23 (2.97)
	Num d.f.	Den d.f.	F	p
Medications with Delirium and other side effects				
Condition	1	57	1.04	0.31
Time	1	54	1.82	0.18
Condition by Time	1	54	0.90	0.35
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		2.40 (1.73)		2.47 (1.87)
Condition 2		2.66 (1.47)		3.08 (1.47)

Table 20: Medication Count Comparisons Time 1 vs. Time 2 by Condition

	Num d.f.	Den d.f.	F	p
Alzheimer's Specific Medications				
Condition	1	57	0.02	0.90
Time	1	54	0.61	0.45
Condition by Time	1	54	1.30	0.26
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		0.70 (0.84)		0.67 (0.80)
Condition 2		0.62 (0.82)		0.73 (0.87)
	Num d.f.	Den d.f.	F	p
Antipsychotic Medications				
Condition	1	57	0.85	0.36
Time	1	54	0.08	0.78
Condition by Time	1	54	1.43	0.24
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		0.27 (0.52)		0.30 (0.53)
Condition 2		0.45 (0.63)		0.38 (0.57)

Table 21: Medication Count Comparisons Time 3 vs. Time 4 by Condition

	Num d.f.	Den d.f.	F	p
Total Medication + Supplement Count				
Condition	1	53	0.48	0.49
Time	1	50	2.40	0.13
Condition by Time	1	50	0.21	0.65
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		12.86 (4.25)		13.64 (4.00)
Condition 2		13.62 (3.32)		14.20 (2.71)
	Num d.f.	Den d.f.	F	p
Total Medication No Supplement Count				
Condition	1	53	0.12	0.73
Time	1	50	3.20	0.08
Condition by Time	1	50	0.73	0.40
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		6.79 (3.50)		7.20 (3.70)
Condition 2		1.85 (2.75)		1.90 (2.49)
	Num d.f.	Den d.f.	F	p
Medications with Delirium and other side effects				
Condition	1	53	1.29	0.26
Time	1	50	5.34	0.03
Condition by Time	1	50	0.02	0.88
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		2.50 (1.77)		2.56 (1.85)
Condition 2		2.93 (1.33)		3.16 (1.28)
	Num d.f.	Den d.f.	F	p

Table 21: Medication Count Comparisons Time 3 vs. Time 4 by Condition

Alzheimer's Specific Medications				
Condition	1	53	0.09	0.77
Time	1	50	0.03	0.86
Condition by Time	1	50	1.33	0.25
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		0.61 (0.74)		0.60 (0.76)
Condition 2		0.59 (0.73)		0.76 (0.83)
	Num d.f.	Den d.f.	F	p
Antipsychotic Medications				
Condition	1	53	0.58	0.45
Time	1	50	1.06	0.31
Condition by Time	1	50	1.06	.31
Means		Time 1		Time 2
		Mean (SD)		Mean (SD)
Condition 1		0.36 (0.56)		0.28 (0.54)
Condition 2		0.45 (0.57)		0.44 (0.58)

Staff and Family Outcomes. The results of the significance tests for the items measuring staff feelings about their job and feelings about working with residents with dementia are given in Table 22. Although positive changes in the means were noted in some areas, none of the differences were significant. The results of the significance tests run on the family outcomes are listed in Table 23. From these data it can be seen that there was a significant decrease in the quality of the relationship from pretest to posttest but only for the family members of persons in condition 1. No differences over time were found for participating in care plan meetings, attending a training, providing of direct care discussing care with a staff member nor in their total satisfaction with their relatives' care.

Table 22: Direct Care Staff Questionnaire Composite Variable Analyses

Composite Variable Name	N	Pretest Mean (SD)	Posttest Mean (SD)	Mean Difference (Posttest – Pretest)	Signed Rank Test Value	P
Feelings about Job						
Burnout	61	6.33 (3.55)	5.65 (3.19)	-.69	-182.0	.08
Sense of accomplishment	63	17.40 (2.95)	17.38 (2.68)	-.02	-3.0	.97
Depersonalization	61	1.67 (2.06)	1.49 (2.23)	-.20	-33	.58
Commitment to working with persons with dementia	63	20.89 (4.24)	20.65 (4.40)	-.24	-50.0	.56
Coworker satisfaction	63	28.83 (4.10)	28.65 (5.08)	-.17	-33.5	.79
Overall satisfaction	63	17.43 (2.82)	17.40 (2.52)	-.03	-38.5	.68
Sense of accomplishment	63	17.40 (2.95)	17.38 (2.68)	-.02	-3.0	.97
Staff training and job support	63	24.78 (3.97)	24.57 (4.37)	-.21	-48.0	.67
Supervisor validation	62	8.26 (1.96)	8.43 (1.69)	.26	57.0	.30
Feelings about Working with Residents with Dementia						
Perspectives of capabilities of people with dementia	60	25.81 (2.57)	25.74 (2.76)	.07	69.5	.48
Willingness to care for people with dementia	60	16.61 (2.63)	16.97 (2.73)	.33	108.5	.17
Ability to Connect with people with dementia	60	11.21 (2.35)	11.31 (2.11)	.02	-25.5	.81

Table 23. Significance Test Results for Family Measures

	Condition 1			Condition 2		
	Mean Difference	Signed Rank	P	Mean Difference	Signed Rank	P
What is the quality of the current relationship with your relative?	-0.75	-10.5	0.03	0.22	1.5	0.50
Participated in a care plan meeting With staff members?	-0.17	-3.0	0.53	0.33	3	0.50
Attended a training session or Seminar for families?	0.08	1.5	1.00	0.00	-	-
Provided direct care for your relative By assisting with feeding, clothing, toileting and bathing?	0.79	1.0	1.00	-0.66	-7.5	0.19
Discussed the care of your relative With a staff member of the facility?	0.17	4.0	0.55	0.22	2.5	0.63
Total Satisfaction Score	0.42	3.5	0.75	-0.11	2.5	0.75

* Wilcoxon signed-rank test

Music Exposure. Summary data on music are presented in Tables 24-28, and Figures 1-3. Table 24 provides a summary of the iPod music listening data by resident and treatment condition. The residents in condition 1 used their iPods for 255 days out of a total of 1001 days available and those in condition 2 used their iPods for 242 days out of 796 days available. This translates into 458.85 total hours (SD=20.81) for condition 1 and 526.87 total hours (SD=27.58) for condition 2. The mean hours of listening per listening day was 1.57 hours (SD=1.40) for condition 1 during Phase I of the crossover study and 1.89 hours (SD=2.03) for condition 2 during Phase II of the crossover study. Although the mean hours per listening day values seem to represent a reasonable amount of time listening when the devices were used, the standard deviation values indicate considerable variability in mean hours listened and the average listening time varied considerably across residents ranging from a low of .07 hours to 4.85 hours in condition 1 and .56 hours to 5.92 hours in condition 2. The distributions are skewed and the mean values increased as a result of the fewer higher values. A more sobering view of the actual rates of use is given by the data in the columns labeled "Listening Days / Total Days Available" and "Hours Listening / Total Days Available." Here it can be seen that as a proportion of the total days the iPods were available, actual rates of use were quite low for the majority of the residents. The data in Table 24 make clear that **there is considerable variability in the rates at which the iPods were used across residents** and, although not presented here, it should be noted that a similar pattern was found between the nursing homes themselves but with the rates at most facilities being low.

The music playlists were similarly varied in terms of song titles, genres, and artists. See the appendix for Tables 25 and 26. Table 25 contains a breakdown of the musical genres by resident and Table 26 contains a listing of the codes used for each musical genre. From this table it can be seen that the musical genre preferences vary considerably across residents although a few genres such as jazz, then contemporary pop and big band are fairly uniform across residents highlighting the importance of incorporating resident preferences in song selection. The number of unique song titles ranged from 5 to 441 in condition 1 and from 9 to 267 in condition 2 (Table 24). The number of unique artists ranged from 2 to 168 in condition 1 and from 3 to 81 in condition 2. Musical genres covered on individual playlists varied considerably ranging from 3 to 20 in condition 1 and from 3 to 19 in condition 2.

Tables 27 and 28 show the distribution of hours of the day and days of the week during which the iPods were used, Figures 1-3 show the distribution of use by resident by hours of the day, days of the week and in Figure 3, the total hours by listening session for each resident. From the tables and Figures 1 and 2 we see that **the majority of the use of the iPods occurred from 9am to 4pm Monday through Friday** during the week. The devices were less often used outside of those times and less often used on weekends. From Figure 3 it can be seen that the total listening times were relatively short in duration for most of the residents, i.e., less than 3 hours and that the time listening increased beyond this only for a subset of the residents.

Table 24: iPod Use and Song Summary by Resident

Resident ID	Listening Days	Total Minutes	Total Hours	Mean Minutes Per Listening Day	Mean Hours Per Listening Day	Total Days iPod Available	Listening Days / Total Days Available	Hours Listening / Total Days Available (Time in Minutes)	Number of Unique Song Titles	Number of Unique Song Artists	Number of Musical Genres
Group 1											
1	10	1,572.95	26.22	157.30	2.62	36	.28	.73 (43.8)	189	130	20
2	10	957.13	15.95	95.71	1.60	36	.28	.44 (26.4)	55	40	15
3	8	1,255.33	20.92	156.92	2.62	36	.22	.58 (34.8)	138	58	12
4	3	210.68	3.51	70.23	1.17	34	.09	.10 (6.0)	171	85	18
5	4	249.05	4.15	62.26	1.04	34	.12	.12 (7.2)	116	62	11
6	3	90.73	1.51	30.24	.50	34	.09	.04 (2.4)	88	25	7
7	14	3,769.42	62.82	269.24	4.49	32	.44	1.96 (117.6)	157	70	6
8	16	5,032.70	83.88	314.54	5.24	32	.50	2.62 (157.2)	441	168	19
9	12	2,230.95	37.18	185.91	3.10	32	.38	1.16 (69.6)	257	79	14
10	11	301.53	5.03	27.41	0.46	40	.28	.13 (7.8)	65	29	10
11	14	584.43	9.74	41.75	0.70	40	.35	.28 (16.8)	48	14	10
12	5	428.27	7.14	85.65	1.43	40	.13	.18 (10.8)	64	12	11
13	6	194.62	3.24	32.44	0.54	31	.19	.10 (6.0)	43	9	6
14	12	515.02	8.58	42.92	0.72	31	.39	.28 (16.8)	62	4	5
15	14	2,255.83	37.60	161.13	2.69	31	.45	1.21 (72.6)	162	31	11
16	4	231.57	3.86	57.89	0.96	34	.12	.11 (6.6)	61	4	5
17	5	166.83	2.78	33.37	0.56	34	.15	.08 (4.8)	45	13	10
18	3	146.90	2.45	48.97	0.82	34	.09	.07 (4.2)	50	4	5

Table 24: iPod Use and Song Summary by Resident

Resident ID	Listening Days	Total Minutes	Total Hours	Mean Minutes Per Listening Day	Mean Hours Per Listening Day	Total Days iPod Available	Listening Days / Total Days Available	Hours Listening / Total Days Available (Time in Minutes)	Number of Unique Song Titles	Number of Unique Song Artists	Number of Musical Genres
19	7	2,035.57	33.93	290.80	4.85	34	.21	1.00 (60.0)	59	36	10
20	3	195.47	3.26	65.16	1.09	34	.09	.10 (6.0)	14	8	6
21	2	146.35	2.44	73.18	1.22	34	.06	.07 (4.2)	8	7	4
22	20	654.57	10.91	32.73	0.55	34	.59	.32 (19.2)	11	7	5
23	17	585.12	9.75	34.42	0.57	34	.50	.29 (17.4)	6	2	3
24	18	135.48	2.26	7.53	0.13	34	.53	.07 (4.2)	6	2	3
25	1	103.93	1.73	103.93	1.73	37	.03	.05 (3.0)	9	7	4
26	1	4.13	0.07	4.13	0.07	37	.03	.002 (0.1)	4	4	4
27	4	483.77	8.06	120.94	2.02	34	.12	.24 (14.4)	13	10	5
28	2	21.33	0.36	10.67	0.18	34	.06	.01 (0.6)	5	3	5
29	26	2,971.12	49.52	114.27	1.90	34	.76	1.46 (87.6)	119	38	13
Sum	255.00	27,530.78	458.85	2,731.64	45.57	1001.00	-	-	2,466.00	961.00	257.00
Mean	8.79	949.34	15.82	94.19	1.57	34.52	-	-	85.03	33.14	8.86
SD	6.53	1,248.35	20.81	84.00	1.40	2.46	-	-	95.04	40.80	4.92
Group 2											
30	6	726.23	12.10	121.04	2.02	34	.18	.36 (21.6)	28	25	10
31	9	485.05	8.08	53.90	0.90	34	.26	.24 (14.4)	104	60	15
32	7	885.67	14.76	126.52	2.11	34	.21	.43 (25.8)	17	15	7
33	5	365.83	6.10	73.17	1.22	33	.15	.18 (10.8)	34	17	6
34	13	1,573.48	26.22	121.04	2.02	33	.39	.79 (47.4)	130	48	11

Table 24: iPod Use and Song Summary by Resident

Resident ID	Listening Days	Total Minutes	Total Hours	Mean Minutes Per Listening Day	Mean Hours Per Listening Day	Total Days iPod Available	Listening Days / Total Days Available	Hours Listening / Total Days Available (Time in Minutes)	Number of Unique Song Titles	Number of Unique Song Artists	Number of Musical Genres
35	5	193.72	3.23	38.74	0.65	33	.15	.10 (6.0)	24	3	3
36	14	6,579.32	109.66	469.95	7.83	31	.45	3.54 (212.4)	267	81	16
37	13	4,617.70	76.96	355.21	5.92	31	.42	2.48 (148.8)	179	64	18
38	13	1,981.47	33.02	152.42	2.54	31	.42	1.07 (64.2)	96	37	12
39	6	353.28	5.89	58.88	0.98	34	.18	.17 (10.2)	78	29	7
40	11	455.30	7.59	41.39	0.69	34	.32	.22 (13.2)	46	12	8
41	8	672.52	11.21	84.07	1.40	34	.24	.33 (19.8)	81	32	13
42	5	296.73	4.94	59.34	1.00	46	.11	.11 (6.6)	51	4	5
43	10	458.57	7.64	45.86	0.75	35	.29	.22 (13.2)	69	9	7
44	11	750.25	12.50	68.20	1.14	35	.31	.36 (21.6)	61	4	5
45	10	926.90	15.45	92.69	1.54	34	.29	.45 (24.0)	220	60	19
46	2	74.20	1.24	37.10	0.62	34	.06	.04 (2.4)	52	20	10
47	19	2,026.22	33.77	106.64	1.78	33	.58	1.02 (61.2)	24	18	3
48	17	665.27	11.09	39.13	0.65	33	.52	.34 (20.4)	24	18	3
49	18	603.12	10.05	33.51	0.56	33	.54	.30 (18.0)	57	38	9
50	3	268.32	4.47	89.44	1.49	6	.5	.75 (45.0)	9	7	4
51	2	102.15	1.70	51.08	0.85	6	.33	.28 (16.8)	9	7	4
52	2	94.82	1.58	47.41	0.79	6	.33	.05 (3.0)	15	7	4
53	11	5,050.38	84.17	459.13	7.65	33	.33	2.55 (153.0)	16	12	7
54	11	968.13	16.14	88.01	1.47	33	.33	.49 (29.4)	63	20	13

Table 24: iPod Use and Song Summary by Resident

Resident ID	Listening Days	Total Minutes	Total Hours	Mean Minutes Per Listening Day	Mean Hours Per Listening Day	Total Days iPod Available	Listening Days / Total Days Available	Hours Listening / Total Days Available (Time in Minutes)	Number of Unique Song Titles	Number of Unique Song Artists	Number of Musical Genres
55	11	438.47	7.31	39.86	0.66	33	.33	.22 (13.2)	41	6	7
Sum	242.00	31,613.10	526.87	2,953.73	46.23	796.00	-	-	1,795.00	653.00	226.00
Mean	9.31	1,215.89	20.26	113.61	1.89	30.62	-	-	69.04	25.12	8.69
SD	4.86	1,654.60	27.58	121.54	2.03	9.46	-	-	65.36	21.56	4.71
Sum for Sample	497.00	59,143.88	985.72	5,685.37	94.80	1,797.00	-	-	4,261.00	1,614.00	483.00
Mean for Sample	9.04	1,075.34	17.92	103.37	1.72	32.67	-	-	77.47	29.35	8.78
SD for Sample	5.75	1,446.91	24.12	102.92	1.72	6.96	-	-	82.01	33.08	4.78

Table 27: Frequency Distribution of Hours of the Day During Which iPods Were Used –Total Sample

Time	N (%)
000	7 (1.44)
100	7 (1.44)
200	7 (1.44)
300	6 (1.24)
400	6 (1.24)
500	5 (1.03)
600	6 (1.24)
700	8 (1.65)
800	19 (3.92)
900	42 (8.66)
1000	47 (9.69)
1100	50 (10.31)
1200	40 (8.25)
1300	37 (7.63)
1400	38 (7.84)
1500	39 (8.04)
1600	31 (6.39)
1700	17 (3.51)
1800	23 (4.74)
1900	17 (3.51)
2000	9 (1.86)
2100	9 (1.86)
2200	8 (1.65)
2300	7 (1.44)

Table 28: Days of the Week During Which iPods Were Used –Total Sample

Day	N (%)
Monday	38 (15.70)
Tuesday	42 (17.36)
Wednesday	40 (16.53)
Thursday	39 (16.12)
Friday	44 (18.18)
Saturday	23 (9.50)
Sunday	16 (6.61)

Figure 1

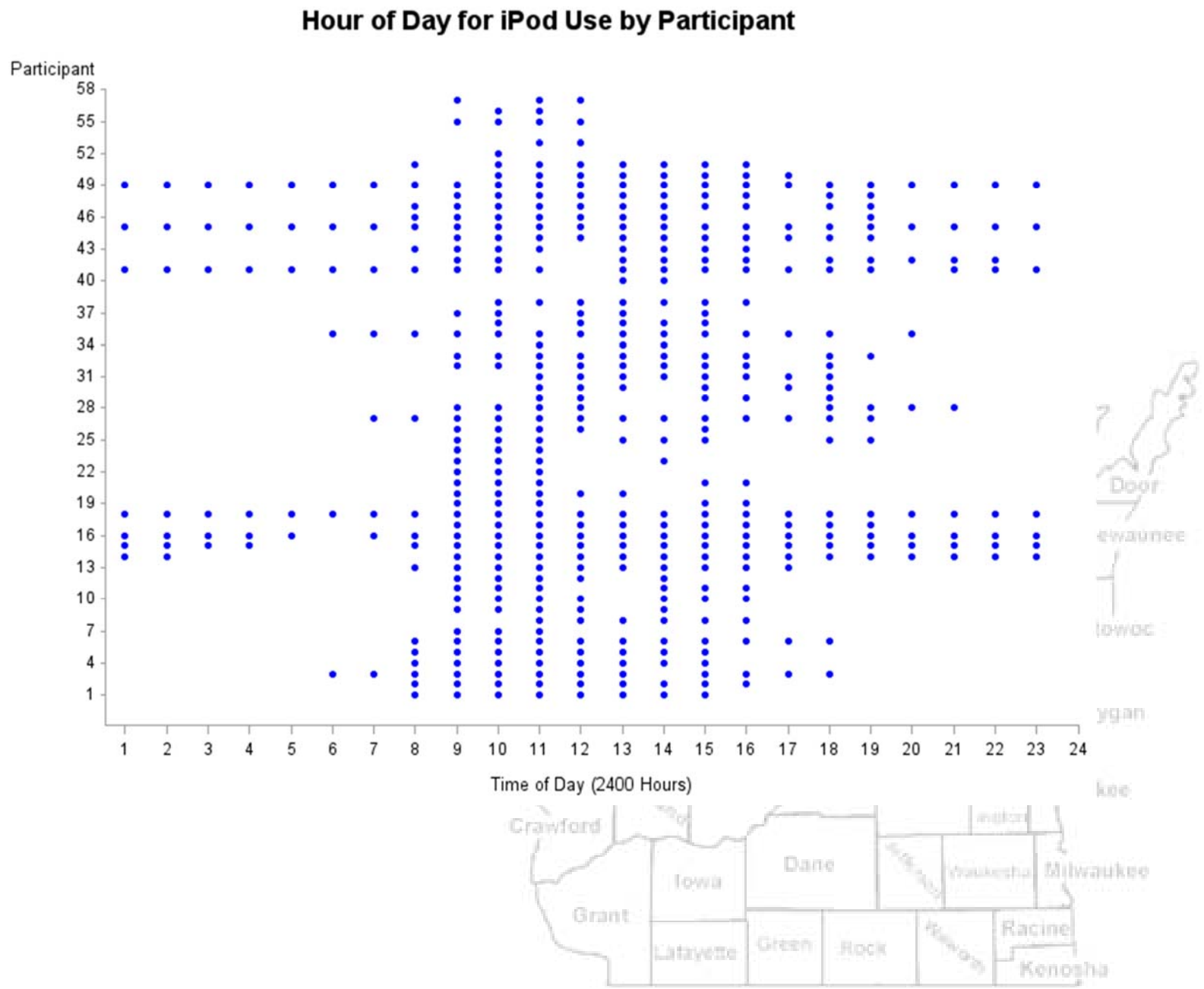
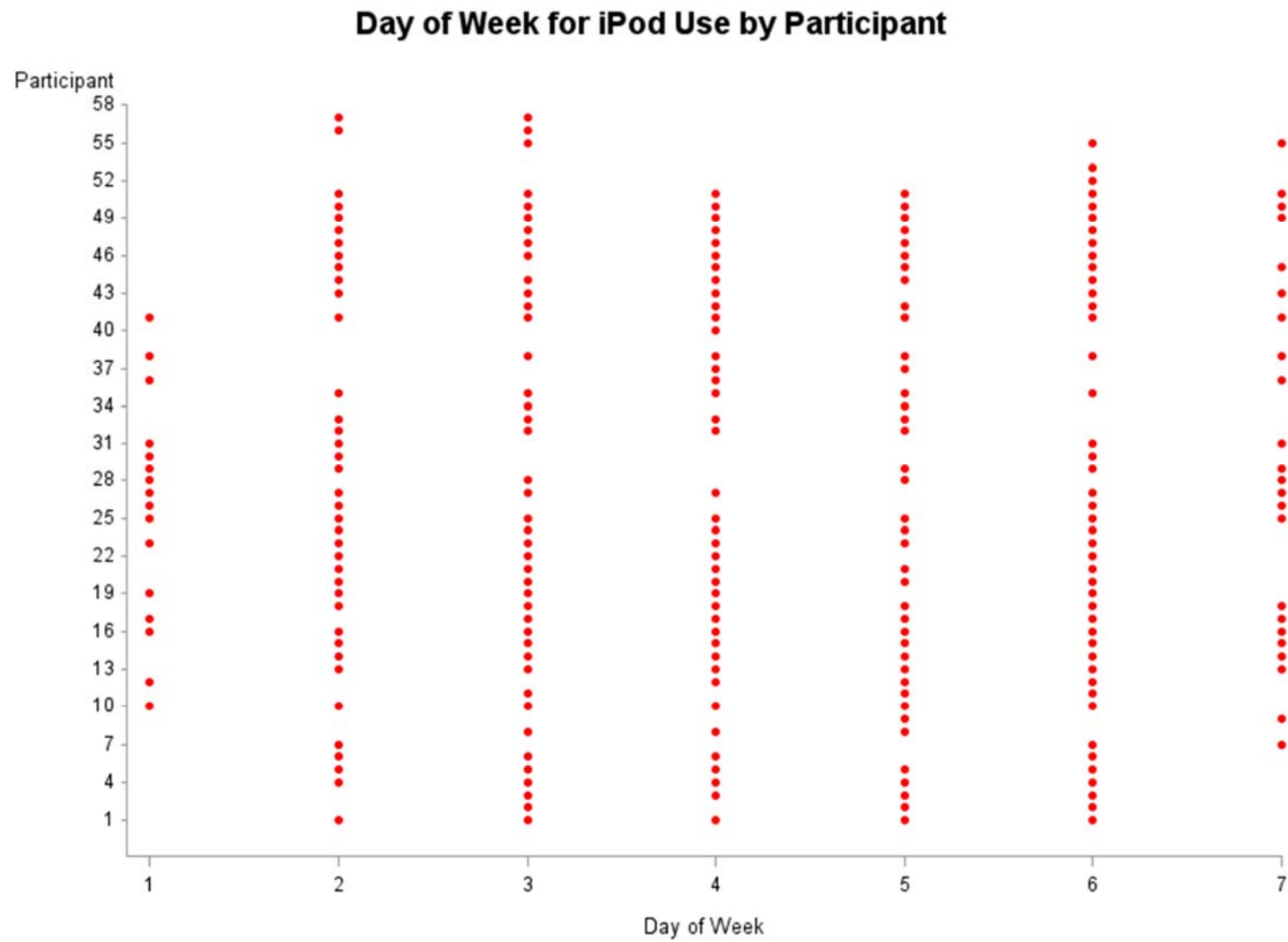


Figure 2



1 = Sunday

2 = Monday

3 = Tuesday

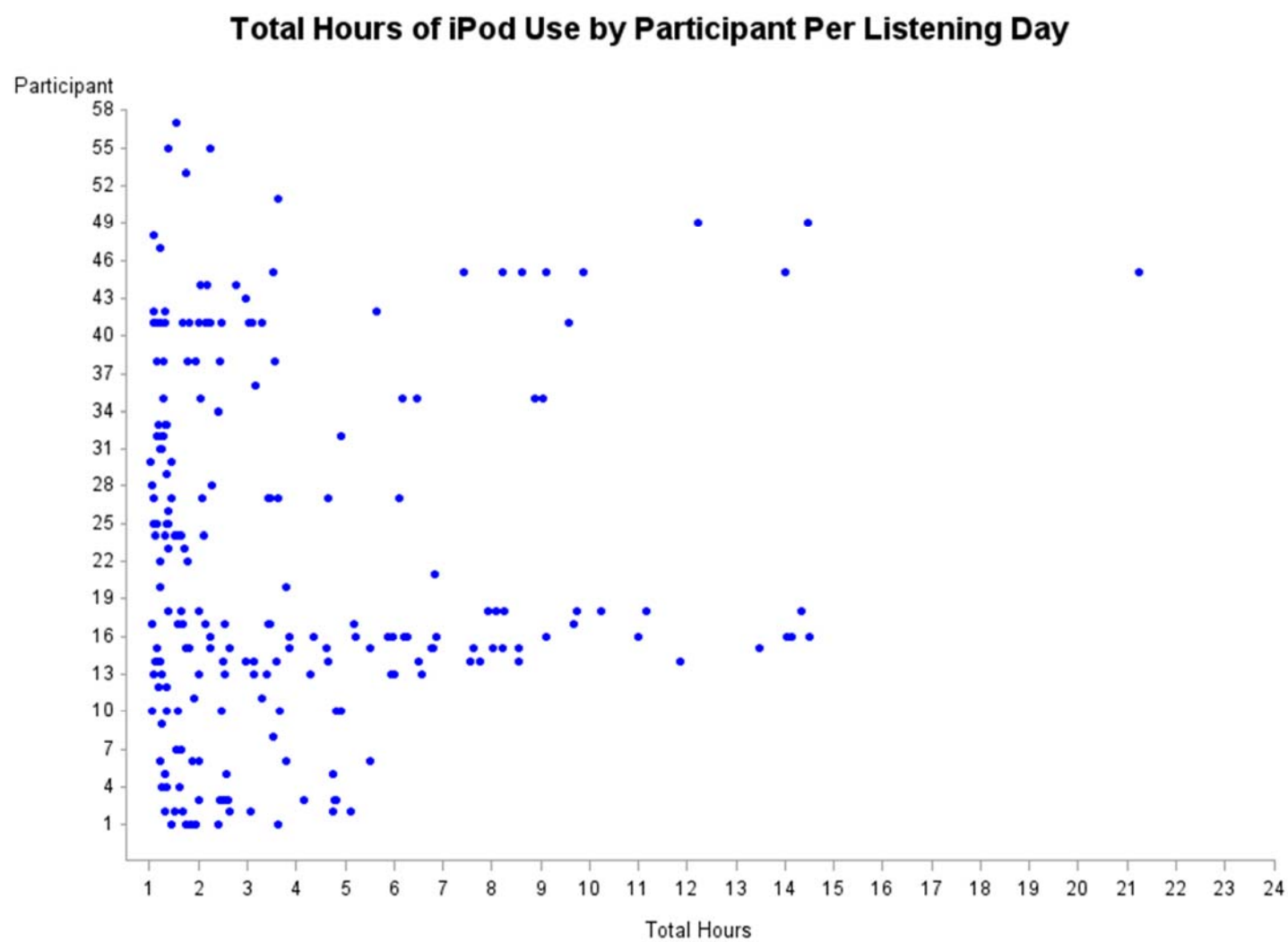
4 = Wednesday

5 = Thursday

6 = Friday

7 = Saturday

Figure 3



Movement Measured by Accelerometer

Day Time Movement Patterns

Table 29 provides summary of accelerometer wear by group and time. At baseline, residents wore the device for the average of 5.5 days with a total of 63 hours (SD=23.4). The average number of times the devices were taken off during this period was 6.5 (SD=4.2) times. These numbers were somewhat different between the groups and across time. For example, the average numbers of total hours the devices were worn at baseline were 68.5 (SD=18.2) and 55.5 (SD=27.1) for the Condition 1 and Condition 2 respectively, and these numbers decreased somewhat over time for both groups. Common reasons for taking off the accelerometers were bathing, residents not wanting to wear, or sleeping.

Table 30 shows the summary of movement counts by Condition and Time- average counts per second, proportion of counts at or over 1, proportion of counts at or over 10, and bouts per hour with minimum of 1 count and 1 second duration. Figure 4 shows the average counts per second by Condition by Time. Figure 5 shows number of bouts at or over 1 by Condition and Time and Figure 6 shows proportion of counts at or over 1 by Condition and Time. Table 31 shows the average counts per second per each of the time block. Figure 7 shows average counts by Condition and Time per time block.

For all participants at baseline, the average number of counts per second between 6am-10pm was 10.3 (SD=7.3) counts per second (Table 30). The proportion of counts at or over 1 for all participants were 21% (SD=13%), and the proportion of counts at or over 10 were 17% (SD=11%). Bouts per hour with minimum of 1 count and 1 second duration was 131.7 (SD=60.5) bouts per hour. When looking at the group differences on these measures, different trends are found between the Phase I and Phase II. **Similar to the results seen on agitation measured by CMAI, during Phase I, all movement counts decrease for the Condition 1 while they increase for the Condition 2. However, during Phase II, the movement counts increase for the Condition 2 while they decrease or remain same for the Condition 1.** These differences are also shown in Figures 4, 5 and 6. The average counts per second per each of the time block (Table 31 and Figure 7) show similar trends. The overall activity level for Condition 1 during Phase I decreases throughout the 9am-4pm period while it remains the same for the Condition 2 during Phase II.

Mean vector magnitude change by group and time.

Figure 8 shows the mean vector magnitude by group and time. For the Group 1 (Phase 1), which received M&M during the first six weeks, the mean vector magnitude was 8.2 at baseline, drops to 6.4 at 1st FU, and then remain at the similar level for 2nd and 3rd follow ups. For Group 2(Phase 2) which received M&M during the last 6 weeks of the study period, the mean vector magnitude remains pretty much the same from baseline to 3rd follow up, 9.5 and 8.8.

Figure 9 and Figure 10 show mean vector magnitude at no music, 15 minutes before and after M&M listening period, and during M&M listening period for Group 1 and Group 2. For the Group 1, both baseline and 1st follow up show similar trend in that mean vector magnitude was lowest when there was no music, and increases right before music, and slightly decreases during and after music listening. For the Group 2, trends are somewhat different. At baseline for Group 2 (i.e., at the 2nd follow up), mean vector magnitude was 10 which decreased to 5.3 at before music, further decreased to 4.7 during music, and then, increased to 6.9. At 3rd follow up, the mean vector magnitude remained pretty much the same when there was no music, and before the music, and increase somewhat to 9.7 during music and decrease slightly to 9.1 after music listening. Thus, patterns of movement appear to be different for Group 1 and Group 2.

Mixed Model Analysis

No significant differences in vector magnitudes were found over time, by condition, by level of music listening nor for any interactions between these effects (see Table 32).

Table 29. Summary of the Accelerometer Wear at Each Visit (Between 6am-10pm Only)

	Baseline	FU1	FU2	FU3
	M (SD)	M (SD)	M (SD)	M (SD)
Average number of total days accelerometer were worn				
All	5.5(1.0)	5.4(1.0)	4.8(1.3)	4.9(1.3)
Condition 1	5.5(1.0)	5.6(0.6)	4.7(1.3)	5.2(1.1)
Condition 2	5.5(1.0)	5.1(1.3)	4.9(1.4)	4.5(1.4)
Average number of total hours accelerometer were worn				
All	62.5(23.4)	55.4(24.4)	46.8(23.8)	46.4(23.2)
Condition 1	68.5(18.2)	57.4(24.0)	48.0(22.5)	46.5(24.3)
Condition 2	55.5(27.1)	53.0(25.1)	45.5(25.7)	46.3(22.7)
Average number of hours accelerometer were worn per day				
All	11.1(3.5)	10.1(4.0)	9.6(3.8)	9.5(3.8)
Condition 1	12.1(2.3)	10.2(4.1)	9.9(3.5)	9.1(4.2)
Condition 2	9.9(4.2)	10.0(4.1)	9.2(4.2)	9.9(3.5)
Average number of times accelerometers were taken off				
All	6.5(4.2)	6.9(3.9)	5.7(3.1)	5.6(3.3)
Condition 1	5.8(1.9)	7.6(3.5)	5.5(3.3)	6.6(3.5)
Condition 2	7.3(5.8)	6.0(4.3)	5.9(2.8)	4.6(2.8)

Table 30. Summary of Activity Counts (Between 6am-10pm Only)

	Baseline	FU1	FU2	FU3
Average counts per second				
All	10.3(7.3)	9.4(8.2)	9.0(7.4)	9.7(6.4)
Condition 1	10.5(7.0)	8.1(5.8)	9.0(6.2)	8.5(4.9)
Condition 2	10.2(7.9)	11.0(10.3)	8.9(8.7)	10.9(7.6)
Proportion of counts at or over 1				
All	0.21(0.13)	0.19(0.12)	0.18(0.12)	0.19(0.10)
Condition 1	0.22(0.14)	0.17(0.11)	0.18(0.12)	0.17(0.09)
Condition 2	0.19(0.12)	0.21(0.14)	0.17(0.13)	0.21(0.11)
Proportion of counts at or over 10				
All	0.17(0.11)	0.15(0.11)	0.15(0.11)	0.15(0.09)
Condition 1	0.18(0.12)	0.14(0.10)	0.15(0.11)	0.14(0.07)
Condition 2	0.16(0.11)	0.17(0.13)	0.14(0.11)	0.17(0.10)
Bouts per Hour with Minimum of 1 Count and 1 Second Duration				
All	131.7(60.5)	126.1(58.8)	124.9(60.4)	141.4(54.3)
Condition 1	133.2(57.6)	114.4(48.4)	122.2(63.4)	126.7(57.2)
Condition 2	130.0(65.2)	140.1(67.8)	127.9(58.3)	156.0(48.1)

Table 31. Activity Counts per Blocks of Time

	Baseline	FU1	FU2	FU3
	M (SD)	M (SD)	M (SD)	M (SD)
Average Counts per Second from 6am-9am				
All	8.0(7.0)	7.9(7.0)	7.2(5.7)	7.8(5.9)
Condition 1	7.3(4.6)	6.5(6.1)	6.9(4.6)	7.7(6.7)
Condition 2	8.8(9.2)	9.7(7.9)	7.5(6.9)	8.0(5.2)
Average Counts per Second from 9am-11am				
All	8.8(6.3)	8.7(7.3)	8.5(8.0)	8.0(5.5)
Condition 1	9.1(5.9)	8.1(6.8)	8.6(7.4)	7.7(4.9)
Condition 2	8.4(6.8)	9.4(8.1)	8.3(8.7)	8.4(6.2)
Average Counts per Second from 11am-1pm				
All	11.1(9.1)	10.0(10.2)	9.4(9.2)	9.8(7.9)
Condition 1	10.1(7.4)	8.0(7.7)	8.5(7.2)	8.6(5.9)
Condition 2	12.2(10.7)	12.6(12.5)	10.5(11.3)	11.1(9.5)
Average Counts per Second from 1pm-4pm				
All	10.7(9.6)	11.0(10.3)	9.8(9.3)	10.8(8.6)
Condition 1	11.4(8.9)	9.2(7.5)	10.5(8.3)	9.0(6.8)
Condition 2	10.0(10.5)	13.3(12.9)	9.1(10.4)	12.7(10.0)
Average Counts per Second from 4pm-6pm				
All	12.3(9.9)	10.2(10.7)	11.1(10.1)	11.8(9.2)
Condition 1	13.6(11.1)	8.3(6.3)	10.6(6.4)	10.9(7.6)
Condition 2	10.6(8.1)	12.6(14.4)	11.7(13.3)	12.6(10.6)
Average Counts per Second from 6pm-10pm				
All	9.9(8.4)	9.9(10.9)	9.5(10.0)	9.7(7.9)
Condition 1	9.6(7.7)	7.8(7.6)	9.3(9.6)	8.2(5.3)
Condition 2	10.2(9.4)	12.4(13.6)	9.8(10.6)	11.2(9.6)

Table 32. Mixed model results for analysis of vector magnitudes

Effect	Param	s.e.	d.f.	t	p
Music	0.30	0.48	122	0.63	0.53
Time	-0.72	0.47	122	-1.52	0.13
Condition	2.88	1.71	38	1.68	0.10

Figure 4. Counts per Second by Group and Time

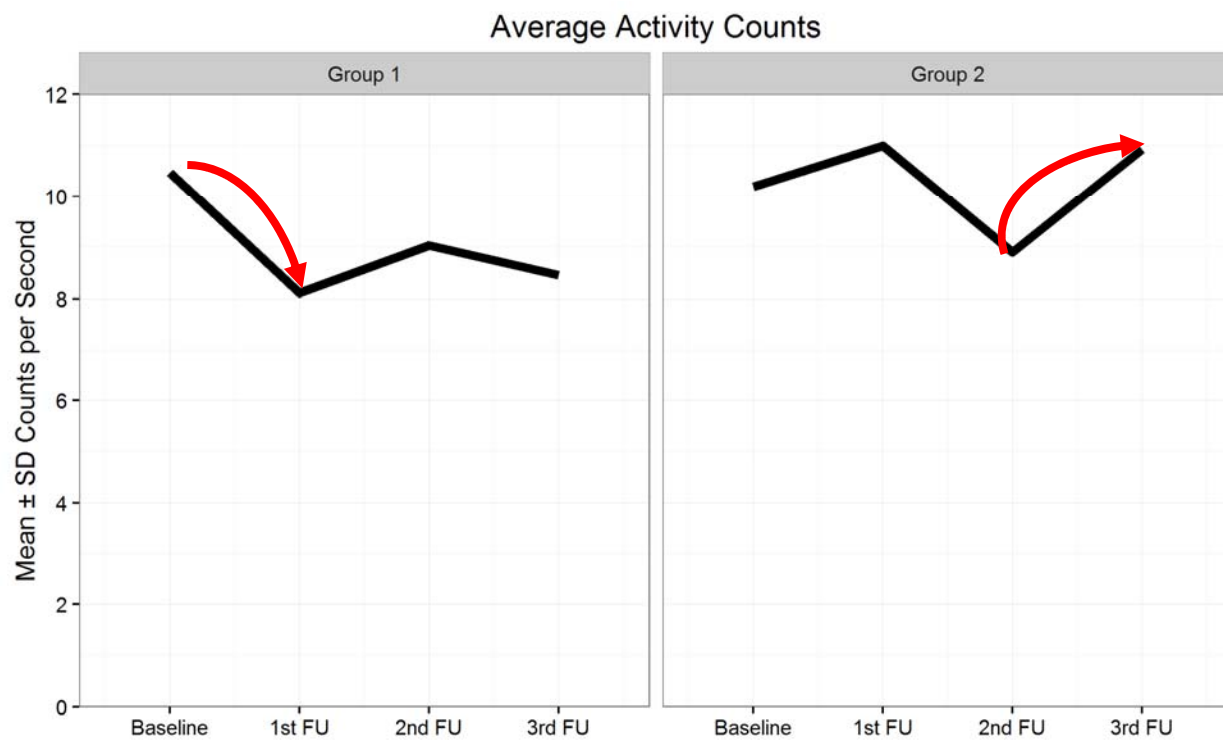


Figure 5. Number of Bouts at or over 1 by Group and Time

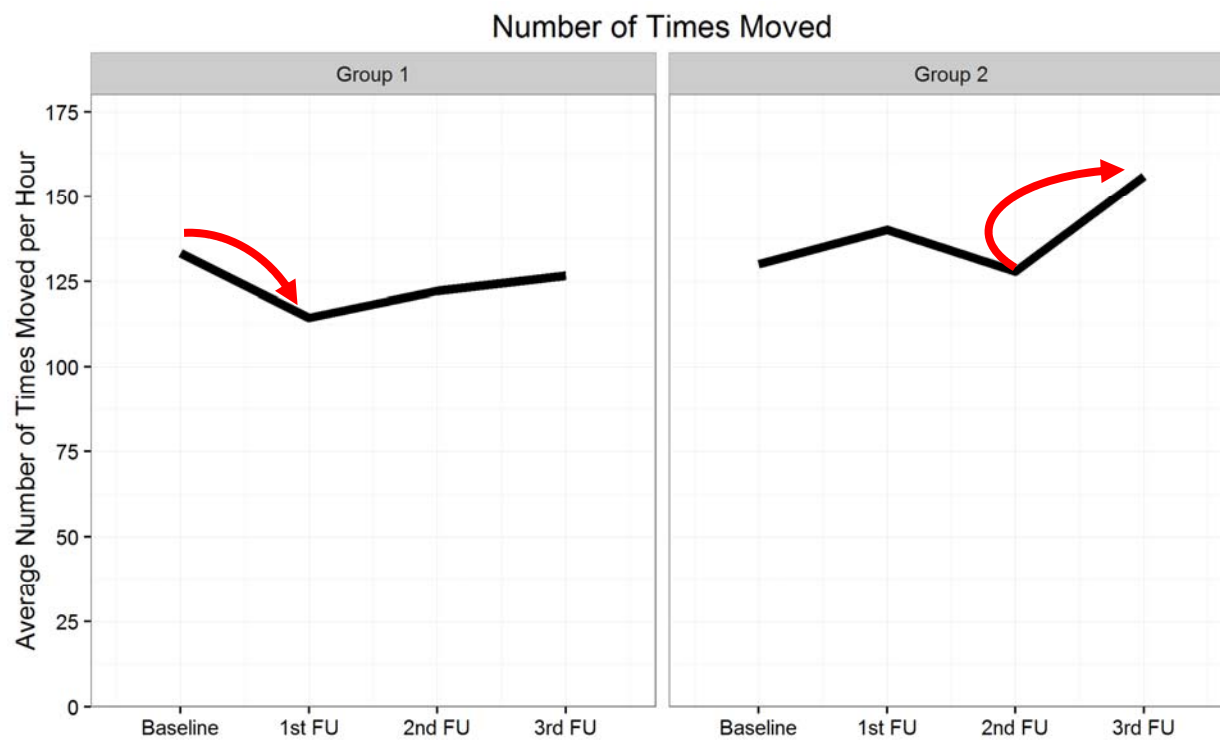


Figure 6. Proportion of Counts at or over 1 by Group and Time

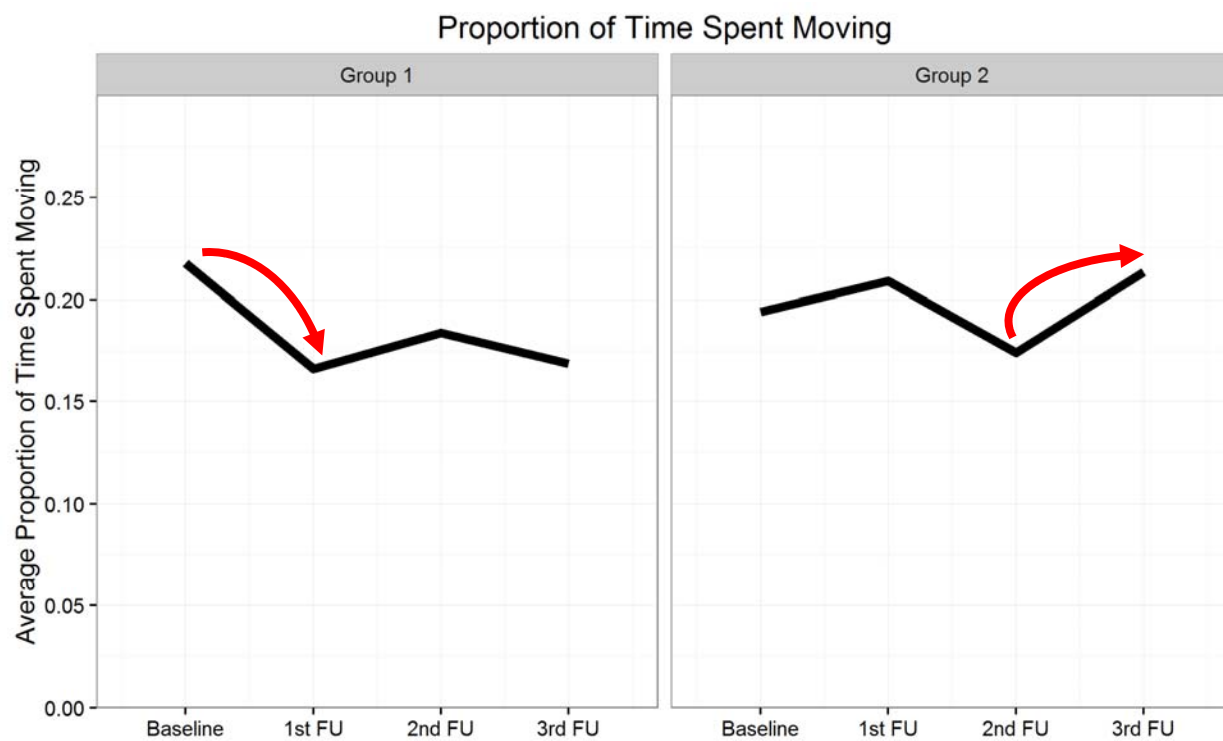


Figure 7. Activity Counts by Block of Time by Group and Time

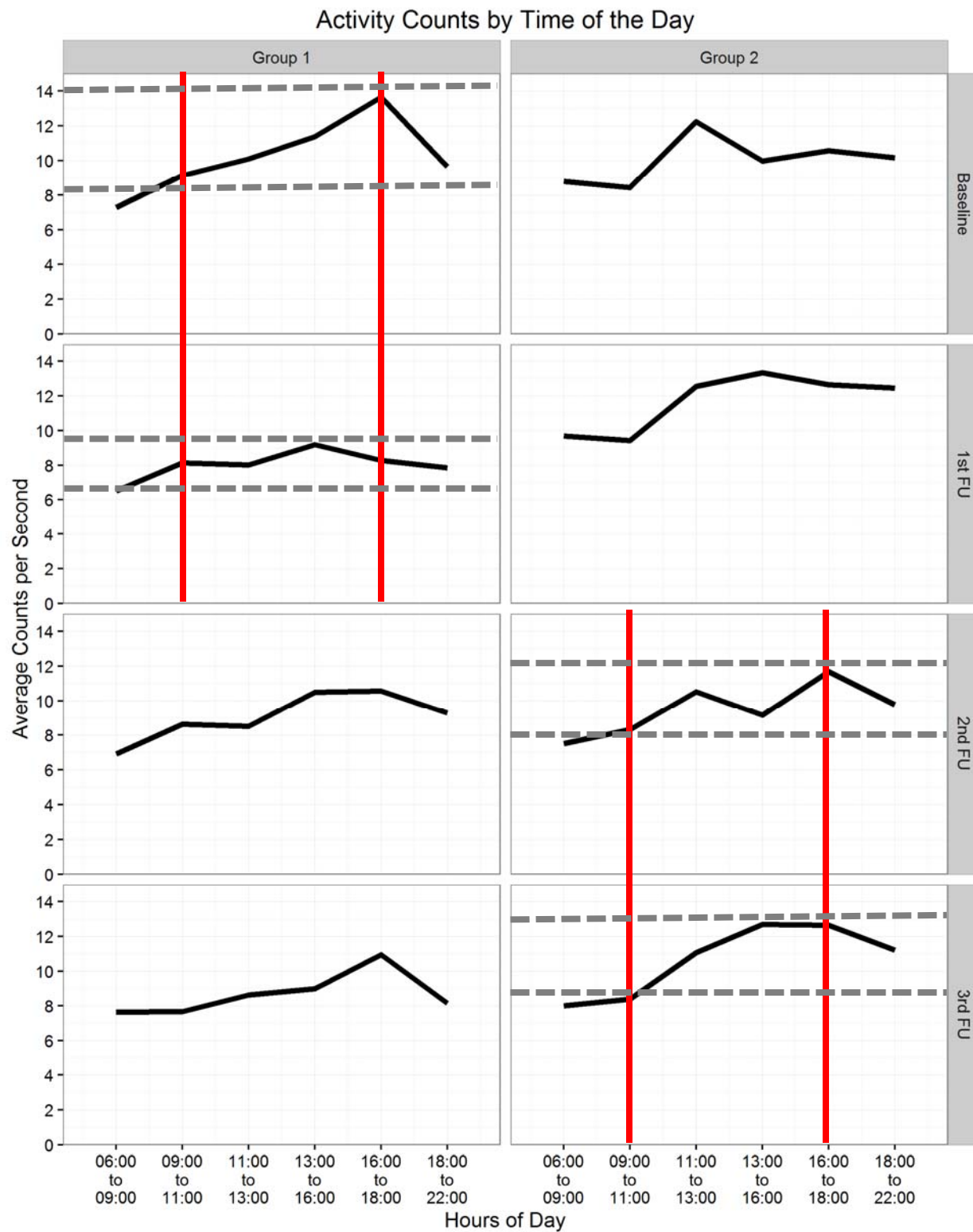


Figure 8. Mean Vector Magnitude by Group and Time

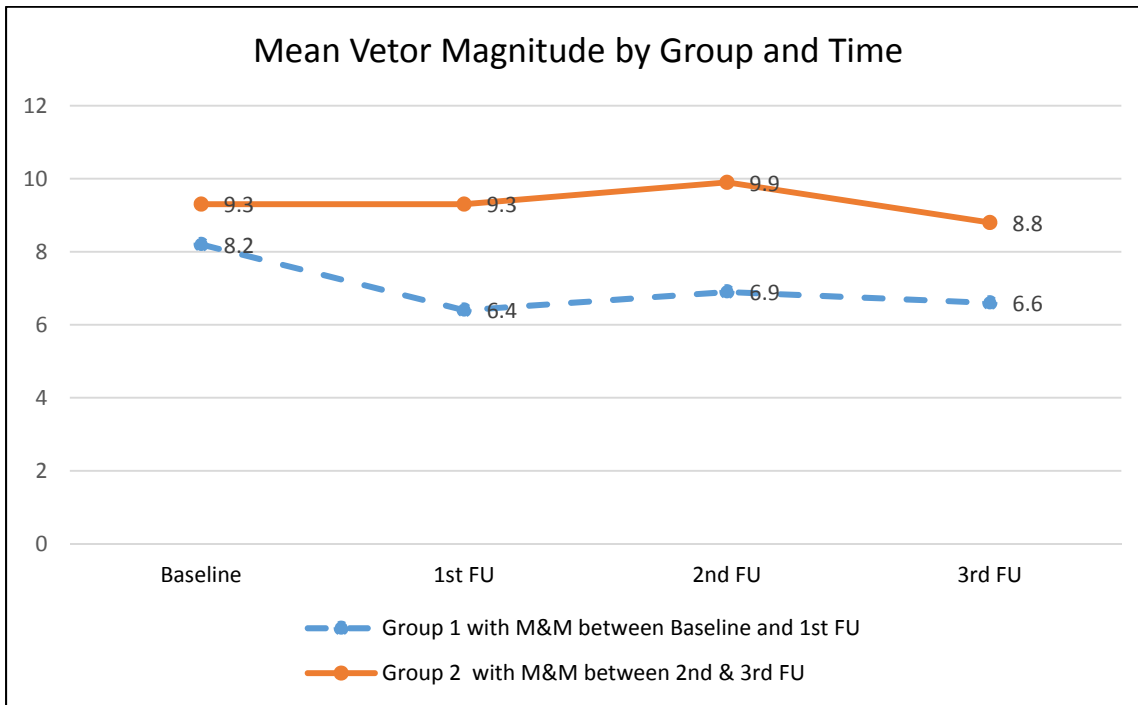


Figure 9. Mean Vector Magnitude for Group 1 at Pre- and Post- M&M Intervention

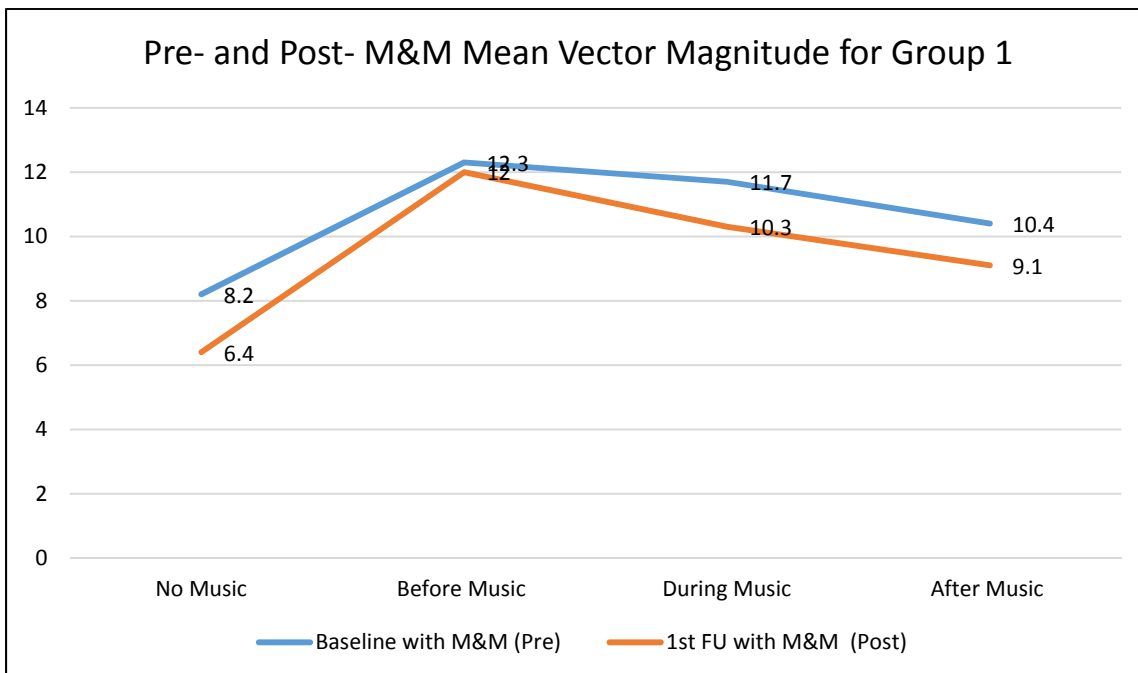
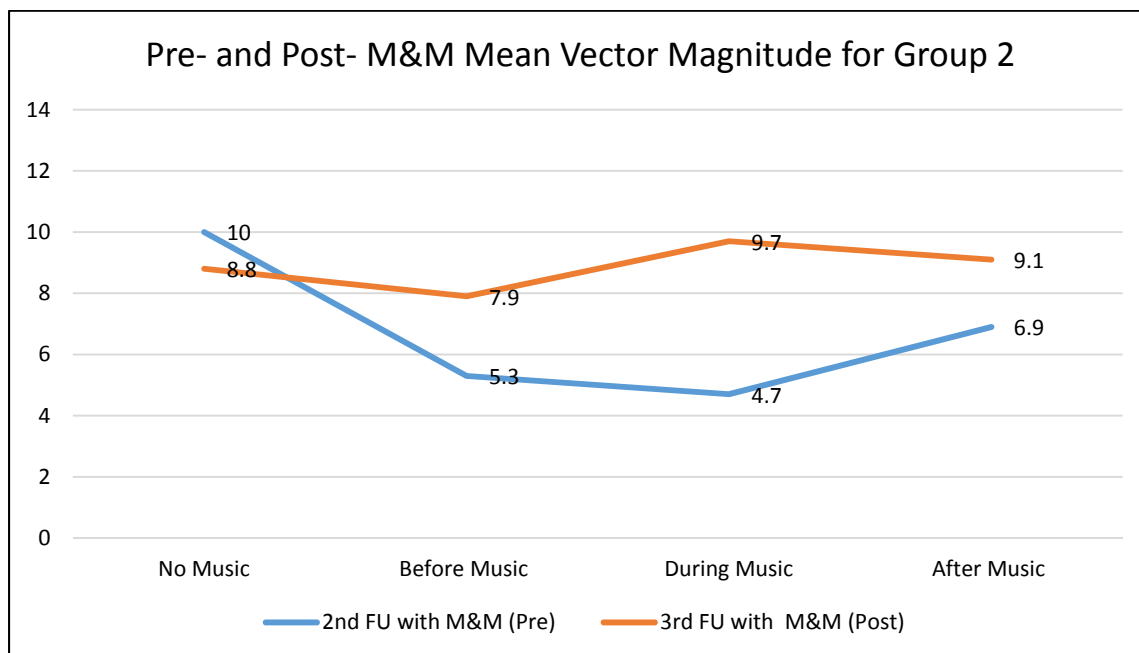


Figure 10. Mean Vector Magnitude for Group 2 at Pre- and Post- M&M Intervention



Summary

The results from the crossover study suggest that, contrary to our expectations, the M&M program had little or no effect on improving the types of resident outcomes in the areas of cognition, memory, agitation, mood, and medication, nor an effect on staff and family outcomes. No significant differences in vector magnitudes were found over time either. Hence, data from participants in the current study call into question the efficacy of the M&M program in affecting the outcomes measured for this evaluation as M&M is currently being implemented in the nursing homes. There are several possible explanations for lack of statistically significant results in this evaluation study. These potential explanations include methodological issues such as small sample size, use of global measures of functioning collected over several week intervals, and reliance on staff reports on key resident outcome measures, and M&M program related issues such as low fidelity to the guidelines recommended by the M&M program or that the M&M guidelines are insufficient when compared to the evidence-based practice guidelines on individualized music listening programs. Nevertheless, the overall findings from the current evaluation study and past research on music and dementia suggest that several improvements could be made to how the M&M program is implemented and monitored for its impact on resident well-being and quality of life. Specific recommendations include: (1) select individuals who are most likely to benefit from M&M; (2) assess, identify and set specific goals for the M&M intervention; (3) develop individualized playlists and listening schedules tailored to each individual person; and (4) implement a systemic process evaluation of the M&M program and incorporate M&M into a formal care planning process.

2. PRE- AND POST-RESIDENT SELECTION SURVEYS

Sample Characteristics

The residents in the sample ranged from 49 to 101 years of age with a mean age of 85.9 years (SD = 8.77 years). The mean resident age was lower for persons in stage 1 when compared to stages 2 and 3 of dementia (see Table 33). A slightly higher percentage of persons were found in stages 1 and 2 of dementia at the first observation point and fewer at stage 3. At follow-up, a greater percentage of the residents was found at stage 3 relative to stages 1 and 2 (see Table 34).

Table 33. Average age of residents and sample size by stage of dementia at Pretest

Stage of dementia	1	2	3
N	119	670	696
Mean	83.17	86.08	86.14
SD	10.08	8.43	9.79

Table 34. Percentage of residents in stage of dementia by time

Stage of dementia	1	2	3
Time 0	62.30	64.92	56.63
Time 1	37.70	35.08	43.37

Findings

Reasons for Resident Selection. The reasons for selection of the residents into the Music and Memory program included but were not limited to (see Table 35): displays signs of enjoyment or engagement with musical stimuli (66.8%), relieve boredom or lack of stimulation (59.7%) and responds positively to music (sings, dances, claps, taps, etc.) (57.6%).

Medication Use at Pre and Post Survey and Medication Use Controlling for Stage of Dementia. At the pre-test survey, 32% and 35% of residents received anti-psychotic and anti-anxiety medications accordingly. At the post-test survey, 24% and 27% of residents received anti-psychotic and anti-anxiety medications accordingly. The initial analysis for each medication class showed a small but significant average decrease in anti-psychotic and anti-anxiety medication use over time for the entire sample (See Table 36). No differences were noted in reductions in medication use across dementia stage categories and dementia stage did not interact with time.

A series of analyses were run controlling for sets of resident selection criteria that had been reported on the pretest survey to help determine if changes in the composition of the sample on these factors could offer a partial explanation of the change in use over time due to resident loss to follow-up: (1) reasons for selection due to a resident exhibiting problem behaviors that are often addressed through the use of medication (need for frequent intervention, reduce anxiety, reduce agitation); (2) reasons representing relief of boredom or lack of stimulation or need for a low energy activity; and (3) reasons representing a resident's having an interest in music or responding positively to music (sings, dances, claps, taps, etc.), or displaying signs of enjoyment or engagement with musical stimuli.

Our main hypothesis was that rates of anti-anxiety and anti-psychotic medication use among residents with behavioral problems (Selection Category 1) will decrease from the pre-test to post-test after controlling for covariates. Specifically, we hypothesized a significant main effect of Time as well as significant interaction effects between Time X Selection Category 1, and Time X Stage of Dementia. If differences in the rates of anti-psychotic and anti-anxiety medication use were attributable to the differences in the exhibition of problem behaviors at the time of selection for inclusion into the M&M program over time, the addition of Selection Category 1 could attenuate or reduce the size of the Time effect or result in a significant interaction with Time.

We also expected a significant main effect of Stage of Dementia in all three models but no significant main effects of Selection Category 2 and Selection Category 3. Stage of dementia was expected to have significant effects because residents in more advanced stages typically have medications prescribed more often than those in less advanced stages and later stage residents were more likely to be lost to follow-up. Category 2 (i.e., to relieve boredom or provide stimulation or a low energy activity) would have no effect because anti-anxiety or anti-psychotic medications are not used address these issues. Similarly, we hypothesized that there would be no significant effect of Selection Category 3 (i.e., due to a resident's having an interest in music or responding positively to music or displaying signs of enjoyment or engagement with musical stimuli) because there is no indication that anti-anxiety or anti-psychotic medications are typically used for reasons associated with enjoyment of musical stimuli. By adding each of these covariates into separate analyses, we expected to see a pattern where changes in Selection Categories 2 and 3 would have little, if any, effect on the reduction of medication use over time since they are not reasons for prescribing medications.

Controlling for the selection criteria (1), to reduce need for frequent intervention, reduce anxiety, and reduce agitation, the time effects for the models with anti-psychotic and anti-anxiety medication as the dependent variables became nonsignificant. Significant effects in the model for anti-psychotic medications included reduced need for intervention, reduced agitation and stage of dementia. Significant effects in the model for anti-anxiety included reduce need for intervention, reduced anxiety, reduced agitation, and the two-way interaction between reduced anxiety and time. Specifically, the means associated with the significant reduced anxiety by time interaction for anti-anxiety medications showed no change over time for persons in the group not chosen due to problems with anxiety but a decrease over time for persons in the group of persons with anxiety symptoms. In other words, when residents were selected for the program due to a need to reduce anxiety, the use of anti-anxiety medication for those individuals decreased over time compared to those who were not selected to reduce anxiety. These findings suggest that part of the time effect may be attributable to change in the composition of the samples over time but allow for the possibility that Music and Memory may have some impact on resident medication use.

Controlling for the selection criteria (2), to relieve boredom or to address the need for stimulation or a low energy activity, none of the covariates was significant for the models with anti-psychotic and anti-anxiety medication as the dependent variables. This is in line with our hypothesis that we would not see any changes in medication use due to these reasons for selection. See Tables 35-38 for the results of these analyses.

Controlling for the selection criteria (3), a resident's having an interest in music or responding positively to music (sings, dances, claps, taps, etc.), or displaying signs of enjoyment or engagement with musical stimuli, the effects of Enjoyment & Engagement, Time, and Enjoyment, Engage X Time were significant for the models with anti-psychotic and anti-anxiety medication as the dependent variables. Those who enjoyed music were less likely to use medication at post-survey. There was also a significant time effect: over time, medication use decreased.

Table 35. Reasons for selection of residents

	No	Yes
	Freq (%)	Freq (%)
Reduce the need for frequent intervention	991 (66.73)	494 (33.27)
Relieve boredom or lack of stimulation	598 (40.27)	887 (59.73)
Reduce anxiety	725 (48.82)	760 (51.18)
Reduce agitation	813 (54.75)	672 (45.25)
Need for a low energy activity	974 (65.59)	511 (34.41)
Responds positively to music (sings, dances, claps, taps, etc.)	629 (42.36)	856 (57.64)
Displays signs of enjoyment or engagement with musical stimuli	493 (33.20)	992 (66.80)
Depression or other mental health concerns	883 (59.46)	602 (40.54)
Use as part of a pain management program	1,324 (89.16)	161 (10.84)
Provides distraction (i.e., during cares, baths, etc.)	997 (67.14)	488 (32.86)

Table 36: Type III significance tests, means and standard deviations

Effect	Num d.f.	Den d.f.	F	P
Anti-psychotics				
Stage of dementia	2	613	1.75	0.17
Time	1	613	3.98	0.05*
Stage of Dementia x Time	2	613	0.25	0.78
Stage of dementia	1	2	3	
N	191	1,032	1,229	
Mean/SD	0.28 (0.45)	0.30 (0.46)	0.28 (0.45)	
Time*	0	1		
N	1,485	967		
Mean/SD	0.32 (0.47)	0.24 (0.43)		
Stage of Dementia				
Stage of Dementia x Time				
Time 0	1	2	3	
N	119	670	696	
Mean/SD	0.34 (0.47)	0.33 (0.47)	0.31 (0.46)	
Time 1	1	2	3	
N	72	362	533	
Mean/SD	0.19 (0.40)	0.25 (0.43)	0.24 (0.43)	
Anti-anxiety				
Stage of dementia	2	613	1.61	0.20
Time	1	613	4.27	0.04*
Stage of Dementia x Time	2	613	1.27	0.28
Stage of dementia	1	2	3	
N	191	1,032	1,229	
Mean/SD	0.24 (0.43)	0.31 (0.46)	0.34 (0.47)	
Time*	0	1		
N	1,485	967		
Mean/SD	0.35 (0.48)	0.27 (0.44)		
Stage of Dementia x Time				
Time 0	1	2	3	
N	119	670	696	
Mean/SD	0.27 (0.45)	0.35 (0.48)	0.36 (0.48)	
Time 1	1	2	3	
N	72	362	533	
Mean/SD	0.18 (0.39)	0.23 (0.42)	0.31 (0.46)	

Table 37. Type III significance tests after controlling for baseline reasons for selection

Effect	Num d.f.	Den d.f.	F	P
Anti-psychotic (Covariates: need for frequent intervention, reduce anxiety, reduce agitation)				
Reduce need for int	1	610	3.84	0.05*
Reduce anxiety	1	610	0.78	0.38
Reduce agitation	1	610	22.91	<0.0001*
Stage of dementia	2	610	3.56	0.03*
Time	1	610	2.04	0.15
Reduce need for int x Time	1	610	0.52	0.47
Reduce anxiety x Time	1	610	0.09	0.76
Reduce agitation x Time	1	610	0.01	0.92
Stage of Dementia x Time	2	610	0.17	0.84
Means for significant effects:				
Reduce need for int	0	1		
Mean/SD	0.25 (0.43)	0.39 (0.49)		
Reduce agitation	0	1		
Mean/SD	0.20 (0.40)	0.40 (0.49)		
Stage of dementia	1	2	3	
Mean/SD	0.35 (0.48)	0.34 (0.47)	0.26 (0.44)	
Anti-anxiety (Covariates: need for frequent intervention, reduce anxiety, reduce agitation)				
Reduce need for int	1	610	3.73	0.05*
Reduce anxiety	1	610	44.89	<0.0001*
Reduce agitation	1	610	6.28	0.01*
Stage of dementia	2	610	1.35	0.26
Time	1	610	3.46	0.06
Reduce need for int x Time	1	610	1.35	0.25
Reduce anxiety x Time	1	610	13.29	0.0003*
Reduce agitation x Time	1	610	0.82	0.37
Stage of Dementia x Time	2	610	0.75	0.47
Means for significant effects:				
Reduce need for int	0	1		
Mean/SD	0.24 (0.43)	0.43 (0.50)		
Reduce anxiety	0	1		
Mean/SD	0.16 (0.36)	0.44 (0.50)		
Reduce agitation	0	1		
Mean/SD	0.21 (0.41)	0.41 (0.49)		
Reduce anxiety x Time	0,0	0,1	1,0	1,1
Mean/SD	0.14 (0.35)	0.17 (0.37)	0.52 (0.50)	0.38 (0.48)

Table 38. Type III significance tests after controlling for baseline reasons for selection

Effect	Num d.f.	Den d.f.	F	P
Anti-psychotic (Covariates: resident's having an interest in music or responding positively to music (sings, dances, claps, taps, etc.), or displaying signs of enjoyment or engagement with musical stimuli)				
Responds pos. to music	1	611	0.21	0.65
Enjoyment, engagement	1	611	4.28	0.04*
Stage of dementia	2	611	1.79	0.17
Time	1	611	7.09	0.008*
Responds pos. music x Time	1	611	0.96	0.33
Enjoyment, engage x Time	1	611	6.00	0.01*
Stage of Dementia x Time	2	611	0.27	0.76
Means for significant effects:				
Enjoyment, engag	0	1		
Mean/SD	0.36 (0.48)	0.27 (0.44)		
Time	0	1		
Mean/SD	0.33 (0.47)	0.26 (0.44)		
Enjoyment, eng x Time	0,0	0,1	1,0	1,1
Mean/SD	0.44 (0.50)	0.28 (0.45)	0.28 (0.45)	0.25 (0.44)
Effect	Num d.f.	Den d.f.	F	P
Anti-anxiety (Covariates: resident's having an interest in music or responding positively to music (sings, dances, claps, taps, etc.), or displaying signs of enjoyment or engagement with musical stimuli)				
Responds pos. to music	1	611	0.59	0.44
Enjoyment, engagement	1	611	0.41	0.52
Stage of dementia	2	611	1.59	0.21
Time	1	611	1.73	0.19
Responds pos. music x Time	1	611	0.00	0.98
Enjoyment, engage x Time	1	611	0.15	0.69
Stage of Dementia x Time	2	611	1.31	0.27

Summary

Statistically significant mean reductions in anti-psychotic and anti-anxiety use were observed for the total sample over the course of the study period. It is unclear from these data whether Music & Memory was solely responsible for this reduction or, if a contributor, how much was its relative contribution due to the lack of inclusion of a control or comparison group in the analyses. When one considers other factors such as the State and Federal mandates to reduce medication use, the self-selection of most nursing homes into the Phase 1 group and the selection of the majority of the residents by the nursing homes rather than both levels having been selected at random, administration and staff being better informed about the consequences of the use of medications for restraint on resident health and quality of life, as well as alternatives to the use of medications it can be seen that a large number of alternative explanations for the change cannot be ruled out. It is clear that most of the responding nursing homes have made some attempt in recent years to reduce the use of medications as a form of restraint for individuals with dementia under their care.

3. MINIMUM DATA SET (MDS) ANALYSIS

Sample Characteristics

The majority of the homes opting into M&M were for not-for-profit in each Phase of the M&M rollout, had more beds, slightly higher occupancy rates but lower admission rates per bed, a lower percentage of persons under age 65 and slightly higher rates of residents with Alzheimer's or another form of dementia. For the first comparison (Phase 1 vs. Phases 2 and 3), the Phase 1 homes had a lower percentage of facilities for which Medicare was the primary payer. No difference in percentages on this variable were observed for the second comparison. Average ratings and total staffing did not differ in either comparison.

Resident characteristics (see Table 39) were highly similar over the three years of data included in the analyses in terms of age, gender and length of stay. A slight increase in the proportion of non-white residents was noted from 2014 to 2015.

Key Findings

A breakdown of the MDS outcome variables by Phase and year is given in Table 40. Any anti-anxiety use decreased from 2013 to 2015 for homes in each Phase whereas Anti-anxiety days stayed approximately the same for homes in Phases 1 and 2 but, after an increase from 2013 to 2014, decreased from 2014 to 2015 for the homes in Phase 2. Any anti-psychotic medication use and Anti-psychotic medication days increased over time for homes in Phases 1 and 3 but Any-anti-psychotic use decreased for homes in Phase 2 while Anti-psychotic use days increased for homes in Phase 2. As can be seen in the Table, similar patterns were observed for the remaining MDS variables.

The differences in difference analyses run on the full sample including Medicaid and non-Medicaid residents were significant only for the variables Anti-psychotic days and Any use of anti-psychotics in the comparison of Phase 1 with Phases 2 and 3 homes. Unfortunately, these comparisons were in the opposite direction of what was expected with the Phase 1 (M&M) homes demonstrating a decrease in the number of persons improved while the control homes (Phases 2 and 3) showed increases in the number of persons improved.

When looking only at the Medicaid residents, the differences in difference analyses were significant for the Phase 1 vs. Phases 2 and 3 comparisons for the variables Any anti-psychotic use and Rejection of care. For Any anti-psychotic use, the Phase 1 homes showed a decrease in number of persons improved over time while the control Phase 2 and 3 homes showed an increase; again a result opposite to what was expected. Rejection of care showed the opposite effect with the Phase 1 rates decreasing while the rates in the Phase 2 and 3 homes increased.

For the Medicaid resident only analyses and the Phase 2 vs. Phase 3 home comparisons, significant effects were noted for the variables Anti-anxiety days and Any anti-anxiety use. Once again these were in the opposite direction with Phase 2 homes showing lower rates of improvement than the Phase 3 homes. See Tables 41-44 for the results.

Summary. It is difficult to know what to conclude on the basis of these analyses. Generally speaking, the nursing homes showed improvement over time on when one looks at the descriptive data. However, the nursing homes in the control groups generally improved more than those receiving M&M. The majority of the evidence collected in other parts of this evaluation suggest that M&M was not effectively implemented in many of the nursing homes and that the program had a small or no effect on the many variables observed in the different components of the study. It seems equally unlikely that M&M can be responsible for the negative findings in the analyses of the MDS data. A more likely explanation lies in the overwhelming selection bias inherent in the process by means of which nursing homes were recruited into the three phases of the State rollout plan. At this time, we do not have sufficient information on the basis of which to offer an adequate explanation as to why these results were found.

Table 39. Demographic information on the cases, by condition and time

Characteristics	Year		
	2013	2014	2015
<i>Wave 1</i>	<i>n=3809</i>	<i>n=4070</i>	<i>n=3170</i>
Age, mean years (sd)	85.4 (8.6)	85.5 (8.5)	85.7 (8.6)
Female sex, n (%)	2639 (69.3)	2764 (67.9)	2141 (67.5)
Non-White race, n (%)	97 (2.5)	127 (3.1)	90 (2.8)
LOS in Nursing Home, mean years (sd)	1.9 (2.7)	1.9 (2.6)	2.1 (2.6)
<i>Wave 2</i>	<i>n=3725</i>	<i>n=3924</i>	<i>n=3101</i>
Age, mean years (sd)	85.7 (8.6)	85.8 (8.7)	86.0 (8.5)
Female sex, n (%)	2641 (70.9)	2742 (69.9)	2177 (70.2)
Non-White race, n (%)	214 (5.7)	276 (7.0)	244 (7.9)
LOS in Nursing Home, mean years (sd)	1.8 (2.2)	1.8 (2.2)	2.0 (2.4)
<i>Wave 3</i>	<i>n=3239</i>	<i>n=3233</i>	<i>n=2461</i>
Age, mean years (sd)	85.0 (9.0)	85.3 (8.9)	85.5 (8.9)
Female sex, n (%)	2349 (72.5)	2291 (70.9)	1771 (72.0)
Non-White race, n (%)	277 (8.6)	324 (10.0)	265 (10.8)
LOS in Nursing Home, mean years (sd)	1.8 (2.3)	1.8 (2.2)	1.9 (2.1)

Table 40: Outcomes, by Phase and year

Outcome Improvement Rate (n/N %)	Year		
	2013	2014	2015
Phase 1			
Any Antianxiety use	140/775 (18.1)	134/842 (15.9)	99/623 (15.9)
Antianxiety Days	197/775 (25.4)	196/842 (23.3)	150/623 (24.1)
Any Antipsychotic use	113/1020 (11.1)	91/965 (9.4)	90/742 (12.1)
Antipsychotic use Days	142/1020 (13.9)	127/965 (13.2)	119/742 (16.0)
Behavior Problems (inc. rej care)	646/1239 (52.1)	715/1373 (52.1)	540/1081 (50.0)
Behavior Problems (exc. rej care)	508/984 (51.6)	585/1122 (52.1)	458/898 (51.0)
Communication	189/2096 (9.0)	208/2191 (9.5)	148/1730 (8.6)
Mobility-Walking	442/3350 (13.2)	418/3589 (11.6)	326/2827 (11.5)
Mobility-Locomotion	701/3429 (20.4)	684/3663 (18.7)	539/2859 (18.9)
Mobility-Overall	654/3312 (19.7)	642/3546 (18.1)	533/2789 (19.1)
Mood	1145/2265 (50.6)	1176/2435 (48.3)	909/1823 (49.9)
Rejection of Care	337/740 (45.5)	370/742 (49.9)	238/542 (43.9)
Composite Outcome	739/1743 (42.4)	788/1824 (43.2)	608/1419 (42.8)
Phase 2			
	2013	2014	2015
Any Antianxiety use	136/712 (19.1)	141/748 (18.9)	82/560 (14.6)
Antianxiety Days	194/712 (27.2)	214/748 (28.6)	131/560 (23.4)
Any Antipsychotic use	99/818 (12.1)	91/770 (11.8)	69/590 (11.7)
Antipsychotic use Days	118/818 (14.4)	119/770 (15.5)	90/590 (15.3)
Behavior Problems (inc. rej care)	470/856 (54.9)	460/872 (52.8)	383/691 (55.4)
Behavior Problems (exc. rej care)	364/661 (55.1)	380/705 (53.9)	290/530 (54.7)
Communication	155/1686 (9.2)	162/1847 (8.8)	143/1535 (9.3)
Mobility-Walking	473/3341 (14.2)	472/3549 (13.3)	343/2849 (12.0)
Mobility-Locomotion	724/3254 (22.2)	707/3480 (20.3)	557/2806 (19.9)
Mobility-Overall	731/3262 (22.4)	724/3481 (20.8)	547/2801 (19.5)
Mood	1063/2116 (50.2)	1041/2172 (47.9)	787/1613 (48.8)
Rejection of Care	249/446 (55.8)	248/447 (55.5)	203/338 (60.1)
Composite Outcome	549/1349 (40.7)	538/1329 (40.5)	438/1065 (41.1)

Table 40: Outcomes, by Phase and year

Outcome Improvement Rate (n/N %)	<u>Year</u>		
	2013	2014	2015
Phase 3	2013	2014	2015
Any Antianxiety use	111/555 (20.0)	86/523 (16.4)	71/405 (17.5)
Antianxiety Days	140/555 (25.2)	128/523 (24.5)	102/405 (25.2)
Any Antipsychotic use	89/795 (11.2)	104/710 (14.6)	67/479 (14.0)
Antipsychotic use Days	113/795 (14.2)	134/710 (18.9)	86/479 (18.0)
Behavior Problems (inc. rej care)	459/797 (57.6)	403/735 (54.8)	302/582 (51.9)
Behavior Problems (exc. rej care)	351/614 (57.2)	333/595 (56.0)	250/462 (54.1)
Communication	214/1552 (13.8)	262/1569 (16.7)	158/1156 (13.7)
Mobility-Walking	428/2885 (14.8)	427/2942 (14.5)	309/2257 (13.7)
Mobility-Locomotion	616/2805 (22.0)	567/2861 (19.8)	426/2209 (19.3)
Mobility-Overall	622/2816 (22.1)	616/2898 (21.3)	469/2226 (21.1)
Mood	878/1722 (51.0)	797/1680 (47.4)	587/1206 (48.7)
Rejection of Care	234/425 (55.1)	179/352 (50.9)	139/263 (52.9)
Composite Outcome	534/1291 (41.4)	486/1184 (41.0)	356/871 (40.9)

Table 41. Comparison of Phase 1 (M & M Homes) versus Phases 2 & 3 (Controls) in 2013 to 2014 (Intervention Year): All Residents

Outcome	Phase 1 (N=99)					Phase 2/3 (N=246)					Diff in Diff (p)
	Baseline (2013)		Remeasurement (2014)			Baseline (2013)		Remeasurement (2014)			
	n/N	Improved	n/N	Improved	Diff	n/N	Improved	n/N	Improved	Diff	
Antianxiety Days	197/775	25.42	196/842	23.28	-2.14	334/1267	26.36	342/1271	26.91	0.55	-0.155 (0.315)
Any Antianxiety use	140/775	18.06	134/842	15.91	-2.15	247/1267	19.49	227/1271	17.86	-1.63	-0.010 (0.955)
Antipsychotic Days	142/1020	13.92	127/965	13.16	-0.76	231/1613	14.32	253/1480	17.09	2.77	-0.364 (0.035)
Any use of Anti-psychotics	113/1020	11.08	91/965	9.43	-1.65	188/1613	11.66	195/1480	13.18	1.52	-0.452 (0.019)
Behavior Problems (inc. rej care)	646/1239	52.14	715/1373	52.08	-0.06	929/1653	56.2	863/1607	53.7	-2.5	0.072 (0.516)
Behavior Problems (exc. rej care)	508/984	51.63	585/1122	52.14	0.51	715/1275	56.08	713/1300	54.85	-1.23	0.035 (0.780)
Communication	189/2096	9.02	208/2191	9.49	0.47	369/3238	11.4	424/3416	12.41	1.01	-0.014 (0.919)
Composite Outcome	739/1743	42.4	788/1824	43.2	0.8	1083/2640	41.02	1024/2513	40.75	-0.27	0.036 (0.696)
Mobility-Locomotion	701/3429	20.44	684/3663	18.67	-1.77	1340/6059	22.12	1274/6341	20.09	-2.03	0.002 (0.984)
Mobility-Walking	442/3350	13.19	418/3589	11.65	-1.54	901/6226	14.47	899/6491	13.85	-0.62	-0.099 (0.271)
Mobility-Overall	654/3312	19.75	642/3546	18.1	-1.65	1353/6078	22.26	1340/6379	21.01	-1.25	-0.025 (0.743)
Mood	1145/2265	50.55	1176/2435	48.3	-2.25	1941/3838	50.57	1838/3852	47.72	-2.85	0.036 (0.635)
Rejection of Care	337/740	45.54	370/742	49.87	4.33	483/871	55.45	427/799	53.44	-2.01	0.270 (0.088)

Table 42. Comparison of Phase 2 (M & M Homes) versus Phases 3 (Controls) in 2014 to 2015 (Intervention Year): All Residents

Outcome	Phase 2 (N=123)					Phase 3 (N=121)					Diff in Diff (p)
	Baseline (2014)		Remeasurement (2015)		Diff	Baseline (2014)		Remeasurement (2015)		Diff	
	n/N	Improved	n/N	Improved		n/N	Improved	n/N	Improved		
Antianxiety Days	214/748	28.61	131/1167	11.23	-17.38	128/523	24.47	102/823	12.39	-12.08	-0.378 (0.055)
Any Antianxiety use	141/748	18.85	82/1167	7.03	-11.82	86/523	16.44	71/823	8.63	-7.81	-0.457 (0.051)
Antipsychotic Days	119/770	15.45	90/1181	7.62	-7.83	134/710	18.87	86/945	9.1	-9.77	-0.010 (0.962)
Any use of Anti-psychotics	91/770	11.82	69/1181	5.84	-5.98	104/710	14.65	67/945	7.09	-7.56	0.028 (0.911)
Behavior Problems (inc. rej care)	460/872	52.75	383/1429	26.8	-25.95	403/735	54.83	302/1184	25.51	-29.32	0.188 (0.191)
Behavior Problems (exc. rej care)	380/705	53.9	290/1131	25.64	-28.26	333/595	55.97	250/946	26.43	-29.54	0.110 (0.501)
Communication	162/1847	8.77	143/3174	4.51	-4.26	262/1569	16.7	158/2386	6.62	-10.08	0.161 (0.345)
Composite Outcome	538/1329	40.48	438/2150	20.37	-20.11	486/1184	41.05	356/1751	20.33	-20.72	0.016 (0.893)
Mobility-Locomotion	707/3480	20.32	557/5632	9.89	-10.43	567/2861	19.82	426/4468	9.53	-10.29	0.015 (0.876)
Mobility-Walking	472/3549	13.3	343/5746	5.97	-7.33	427/2942	14.51	309/4539	6.81	-7.7	-0.040 (0.715)
Mobility-Overall	724/3481	20.8	547/5652	9.68	-11.12	616/2898	21.26	469/4481	10.47	-10.79	-0.047 (0.609)
Mood	1041/2172	47.93	787/3326	23.66	-24.27	797/1680	47.44	587/2417	24.29	-23.15	-0.056 (0.548)
Rejection of Care	248/447	55.48	203/677	29.99	-25.49	179/352	50.85	139/565	24.6	-26.25	0.142 (0.509)

Table 43. Comparison of Phase 1 (M & M Homes) versus Phases 2 & 3 (Controls) in 2013 to 2014 (Intervention Year): Medicaid Residents

Outcome	Phase 1 (N=99)					Phase 2/3 (N=243)					Diff in Diff (p)
	Baseline (2013)		Remeasurement (2014)		Diff	Baseline (2013)		Remeasurement (2014)		Diff	
	n/N	Improved	n/N	Improved		n/N	Improved	n/N	Improved		
Antianxiety Days	150/616	24.35	137/611	22.42	-1.93	261/1024	25.49	235/908	25.88	0.39	-0.163 (0.367)
Any Antianxiety use	104/616	16.88	89/611	14.57	-2.31	189/1024	18.46	155/908	17.07	-1.39	-0.114 (0.586)
Antipsychotic Days	109/822	13.26	87/713	12.2	-1.06	188/1321	14.23	193/1116	17.29	3.06	-0.376 (0.062)
Any use of Anti-psychotics	84/822	10.22	58/713	8.13	-2.09	153/1321	11.58	146/1116	13.08	1.5	-0.491 (0.034)
Behavior Problems (inc. rej care)	499/992	50.3	499/972	51.34	1.04	744/1327	56.07	607/1158	52.42	-3.65	0.172 (0.180)
Behavior Problems (exc. rej care)	392/780	50.26	408/787	51.84	1.58	578/1020	56.67	512/938	54.58	-2.09	0.129 (0.376)
Communication	145/1653	8.77	134/1531	8.75	-0.02	290/2543	11.4	312/2407	12.96	1.56	-0.148 (0.371)
Composite Outcome	567/1406	40.33	548/1310	41.83	1.5	866/2141	40.45	728/1851	39.33	-1.12	0.095 (0.366)
Mobility-Locomotion	559/2725	20.51	455/2569	17.71	-2.8	1068/4808	22.21	895/4494	19.92	-2.29	-0.037 (0.673)
Mobility-Walking	355/2667	13.31	277/2507	11.05	-2.26	713/4933	14.45	612/4622	13.24	-1.21	-0.116 (0.271)
Mobility-Overall	530/2634	20.12	430/2473	17.39	-2.73	1067/4808	22.19	928/4529	20.49	-1.7	-0.067 (0.457)
Mood	923/1826	50.55	810/1705	47.51	-3.04	1525/3050	50	1284/2733	46.98	-3.02	0.008 (0.932)
Rejection of Care	258/601	42.93	251/527	47.63	4.7	379/699	54.22	286/564	50.71	-3.51	0.405 (0.029)

Table 44. Comparison of Phase 2 (M & M Homes) versus Phases 3 (Controls) in 2014 to 2015 (Intervention Year): Medicaid Residents

Outcome	Phase 2 (N=121)					Phase 3 (N=118)					Diff in
	Baseline (2014)		Remeasurement (2015)		Diff	Baseline (2014)		Remeasurement (2015)		Diff	
	n/N	Improved	n/N	Improved		n/N	Improved	n/N	Improved		Diff (p)
Antianxiety Days	150/534	28.09	79/775	10.19	-18	85/374	22.73	63/526	11.98	-10.75	-0.589 (0.018)
Any Antianxiety use	99/534	18.54	55/775	7.1	-11	56/374	14.97	46/526	8.75	-6.22	-0.570 (0.051)
Antipsychotic Days	91/571	15.94	67/830	8.07	-7.9	102/545	18.72	63/638	9.87	-8.85	-0.029 (0.909)
Any use of Anti-psychotics	68/571	11.91	52/830	6.27	-5.6	78/545	14.31	50/638	7.84	-6.47	0.025 (0.930)
Behavior Problems (inc. rej care)	306/617	49.59	252/966	26.09	-24	301/541	55.64	202/769	26.27	-29.37	0.308 (0.078)
Behavior Problems (exc. rej care)	262/505	51.88	193/781	24.71	-27	250/433	57.74	162/608	26.64	-31.1	0.236 (0.238)
Communication	120/1236	9.71	98/2020	4.85	-4.9	192/1171	16.4	106/1634	6.49	-9.91	0.126 (0.535)
Composite Outcome	364/960	37.92	295/1475	20	-18	364/891	40.85	242/1156	20.93	-19.92	0.063 (0.652)
Mobility-Locomotion	492/2397	20.53	393/3658	10.74	-9.8	403/2097	19.22	274/3000	9.13	-10.09	0.095 (0.404)
Mobility-Walking	315/2467	12.77	228/3758	6.07	-6.7	297/2155	13.78	190/3060	6.21	-7.57	0.060 (0.659)
Mobility-Overall	507/2412	21.02	383/3684	10.4	-11	421/2117	19.89	299/3014	9.92	-9.97	0.004 (0.969)
Mood	723/1511	47.85	522/2152	24.26	-24	561/1222	45.91	390/1601	24.36	-21.55	-0.117 (0.302)
Rejection of Care	158/307	51.47	123/426	28.87	-23	128/257	49.81	96/352	27.27	-22.54	0.0 .000)

4. KEY INFORMANT SURVEY OF NURSING HOMES

Sample Characteristics

The majority of the respondents to the survey were in the categories of activity program coordinator /director/ supervisor (49.6%) or administrator/chief operating officer of facilities (28.7%). See Table 45 for the summary of facility characteristics. The majority of facilities were Nursing Home / Unit within a CCRC or Retirement Community (47.8%) and Hospital-based Skilled Nursing Facility (SNF) (33.5%). Almost all facilities (99.4%) were Medicare certified. Approximately 46% of facilities were for-profit facilities (45.9%) while 37% were private non-profit facilities. Fifty-six percent of facilities had between 26-75 beds available, 27.9% with 76-125 beds, and 15.5% with more than 125 beds available. The total number of nursing home residents based on their most recent daily census was between 0-75 for 68% of the facilities; 36.6% of facilities had special units for Alzheimer's and related dementia.

Table 45. Facility Characteristics

	Freq (%)
Job Title of person completing survey	
Activity Coordinator / Director / Supervisor	76 (49.6)
Activity Specialist / Assistant	1 (0.7)
Administrator / Chief Operating Officer	44 (28.7)
Administrative Assistant	4 (2.5)
Dementia Care Coordinator	1 (0.7)
Director of Nursing	2 (1.3)
Education and Training Director	1 (0.7)
Life Enrichment Director / Coordinator	11 (7.2)
Life Enrichment Assistant	1 (0.7)
Quality Assurance Coordinator	1 (0.7)
Rehabilitation Counselor	1 (0.7)
Social Worker	8 (5.2)
Volunteer coordinator	2 (1.3)
Facility Type (check all that apply)	
Continuing Care Retirement Community (CCRC) or Retirement Community	9 (5.6)
Nursing Home / Unit within a CCRC or Retirement Community	77 (47.8)
Hospital	1 (0.6)
Hospital-based Skilled Nursing Facility (SNF)	54 (33.5)
Other	28 (17.4)
Medicare certified skilled nursing facility (SNF)	
Yes	158 (99.4)
No	1 (0.6)
Profit vs. Nonprofit Status	
For profit	73 (45.9)
Private Nonprofit	59 (37.1)
City / County government	21 (13.2)
State government	1 (0.6)
Other	5 (3.1)
Number of Available Beds	
0-25	4 (2.5)
26-50	48 (30.5)
51-75	37 (23.5)
76-100	25 (15.9)
101-125	19 (12.0)
126-150	14 (8.9)
151-175	5 (3.1)
>176	5 (3.5)
Total number of residents based on most recent daily census	
0-25	8 (5.1)
26-50	62 (40.0)
51-75	36 (23.2)

Table 45. Facility Characteristics

	Freq (%)
76-100	22 (14.1)
101-125	15 (9.6)
126-150	6 (3.8)
151-175	3 (1.9)
>176	3 (2.2)
Any special units available (Check all that apply):	
Alzheimer's and related dementias	59 (36.6)
AIDS / HIV	0 (0)
Behavior unit (non-Alzheimer's)	5 (3.1)
Disease specific (e.g., dialysis, brain injury etc.)	3 (1.9)
Children with disabilities, mentally retarded / developmentally disabled	0 (0)
Hospice	13 (8.1)
Rehabilitation (cardiac, functional)	64 (39.8)
Respite care	9 (5.6)
Sub-acute care	14 (8.7)
Ventilator / pulmonary	2 (1.2)
Other	6 (3.7)
No special care units	62 (38.5)

Findings

Resident Selection Criteria and Characteristics. The key informant survey revealed that the majority of residents who took part in the M&M program appeared to be appropriately selected in terms of the needs for the M&M program (e.g., residents having dementia, behavioral problems, psychotropic medication). Similarly, the reasons for selection of 1,500 residents into the M&M program at pre-resident selection survey included but were not limited to: residents displaying signs of enjoyment or engagement with musical stimuli (66.8%), responding positively to music (57.6%), and for staff to relieve resident boredom or to provide stimulation (59.7%). See the Appendix for the full list of Qualitative responses to the question about Key Reasons for Selecting Residents to Participate in the M&M (Table 46).

Music & Memory Implementation. Most nursing home facilities involved activity directors or activity staff, and resident's immediate family or relatives of the resident in creating music playlist. It was not clear if the residents themselves were actively involved in the process. The majority of facilities (60%) reported using Apple iPods or iPod Shuffles only while 21% were using both iPod / iPod Shuffles and non-Apple portable music players to deliver M&M. See the Appendix for the full list of details on M&M Implementation process (Tables 47 and 48).

Sundown, before or after meals, and peak times for behavioral problems were cited as common times/days of the week they offered M&M. Some residents had a fixed schedule for M&M delivery and some had varying time depending on the mood of the resident as well as availability of staff to deliver M&M. Length of the delivery varied from 15 minutes per session to unlimited time per session. To some extent, nursing home staff were attempting to provide M&M at times that would assist with curbing behavioral problems, however the duration of M&M delivery varied considerably, and it is unclear how routinely the program implementation guidelines were followed.

Value of Music & Memory. The majority of respondents valued the program, noting improvements they observed in residents such as enjoyment and improved mood. Respondents also emphasized that the personalized nature of the music was key to enjoyment, triggering memories, and improved mood. Also observed were the calming effect of M&M when the respondents enjoyed music, and the positive effect of headphones blocking noise and allowing each individual resident to listen to the music they prefer.

However, the vast majority of respondents observed that wearing headphones did not work for some residents, stating that some residents simply did not like wearing headphones or earphones, and instead speakers had to be used. Moreover, they noticed that the M&M program or music as a therapeutic form in general does not work for everyone.

Hence, selecting the residents who are most likely to benefit from the program and selecting appropriate music for playlists are critical to avoid the possibility of increasing agitation or discomfort among residents with dementia. Further, some found that iPod devices are not necessarily dementia friendly which means that most of them will have to rely on staff to use it, making it labor intensive. See the Appendix for the full list of Details on the Value of M&M (Tables 49-53).

Implementation Barriers and Challenges. Respondents clearly identified two key barriers to consistently and effectively delivering M&M for target residents: a lack of buy-in from all levels of care staff and management and a lack of or limited time by staff to implement and maintain the program. Although M&M is a relatively easy and simple program to implement compared to other type of music interventions, for many activity and direct care staff, the time commitment required is not minimal. Other barriers included technology and cost as additional cost will be incurred to replace existing equipment and buy new songs. See the Appendix for the full list of details on the Implementation Barriers and Recommendations (Tables 54-55).

Recommendations. Buy-in may be increased by helping staff to recognize any positive impacts of M&M on residents. Another way to facilitate buy-in would be to approach M&M like other care interventions or programs that require a systematic approach to assess, develop the playlist, deliver, and monitor consistently. To make this possible, facilities may offer incentives or education and training among direct care staff will be important, or integrate M&M into the care planning process.

Residents who are most likely to benefit from M&M would be residents who experience agitation, enjoy listening to music, and can tolerate headphones being placed over their ears. Residents who does not like wearing headphone can still be accommodated by using speakers while in his or her room instead of using headphones. Another recommendation is that care should also be taken in the selection of music and modification of playlists, especially when residents are not able to clearly communicate preferences for music. In addition, care should be taken to use devices for delivery of music that will not result in increased frustration for the residents, which could lead to problem behaviors and/or increased labor for staff beyond regular M&M program implementation requirements.

Efforts by Facilities to Reduce Use of Medication to Manage Behavioral Problems. Most of the facilities that responded to the key informant survey reported that the facility had started to reduce the use of medication as a physical restraint between 2013 and 2015, or at some point during Phase I of the M&M program roll out, while the other facilities started the reduction earlier. Over half of the homes that reported reducing medications as a form of restraint attributed some level of that reduction to use of M&M. On the other hand, 41% of nursing homes did not attribute any reduction in medication use to M&M. See the Appendix for Table 56 for detailed responses.

Summary

Overall, results suggest that while the majority of nursing homes value and intend to continue implementation of the program, a few barriers remain that need to be addressed. First and foremost, buy-in from direct care staff and management is essential to the effective implementation of the program. Second, the staff that are responsible for the implementation of the program need to be supported with the time and human resources necessary to develop and maintain individualized playlists for the residents. Third, not all residents are suitable candidates for the program in its current form of implementation, specifically residents who cannot tolerate headphones or do not enjoy listening to music. Last, cost remains an issue for the widespread implementation of the program.

DISCUSSION

This evaluation is one of the most comprehensive evaluations of the M&M program to date, which included a randomized controlled study, pre- and post-survey of medication use across 100 nursing homes, comparison of nursing home resident outcomes using MDS data, and key administrative survey with nursing homes in the state of Wisconsin. Also, a wide range of measures and outcomes were evaluated. We hypothesized that the M&M program would improve residents' quality of life by increasing experience of pleasant activities and minimizing behavioral problems and depressive symptoms in residents. We also expected that improved mood of residents would lead to more positive attitudes toward residents by staff and family. We further expected that positive changes in resident behaviors and mood would lead to decreased prescription of anti-psychotic and anti-anxiety medication by NH staff. In this evaluation, we also explored the perceptions of nursing home facilities on the value of M&M, and barriers and challenges in implementing and sustaining M&M in Wisconsin nursing homes.

Effects of M&M on Resident Outcomes

Overall Effectiveness of M&M in Improving Resident Outcomes. The results from the crossover study suggest that, contrary to our expectations, the M&M program had little or no effect on improving the types of resident outcomes in the areas of cognition, memory, agitation, mood, movement and medication use. The analysis of the MDS data on nursing home resident further support the main findings from the crossover study, that there was no statistically significant differences in resident outcomes, behavioral problems, communication, mobility, and mood. The MDS analysis, while showing decreases in medication use also indicated that the decreases were greater in the nursing homes not using M&M relative to the homes that had implemented M&M between 2014 and 2015. The pre- and post-survey findings suggest, however, that the implementation of the M&M program may have had a small effect on the reduction of the use of anti-anxiety medications among residents who were selected to participate in the program. There are several possible methodological issues related to the evaluation design and the M&M program related explanations for such findings.

Potential Explanations for the Findings. In interpreting these results, several possible evaluation design limitations and program related issues should be considered. Limitations of the crossover study include the smaller sample size, use of global measures of functioning collected over several week intervals, reliance on staff reports on key resident outcome measures, and missing and incomplete data from accelerometers, which may have led to reduced effect size, and reduced reliability and validity of key measures. Lack of randomization (despite matching) and reliance on staff report on key resident outcome measures in the MDS data limit internal and external validity of the findings. Similarly, pre- and post-survey lacked random sampling of residents and facilities, and random assignment (i.e., no control group) making it difficult to determine the cause of any observed, alternative explanations due to potential confounds.

Several M&M program related issues should also be discussed. Music listening data from the crossover study and key informant survey with nursing home facilities data suggest either low fidelity to the guidelines recommended by the M&M program or that the M&M guidelines are insufficient when compared to the evidence-based practice guidelines on individualized music listening programs. Indeed, education and training by the Music and Memory Program highlights the mechanisms for implementation far more than the care-based protocol that is needed to support the research base for success. Two notable areas of low fidelity are: (1) improper development of the individualized playlist based on the principles of familiarity and autobiography, and (2) inconsistent and targeted use of the devices.

First, according to Gerdner's research and additional studies by Cuddy, Duffin⁴⁶, Janata³², Sakamoto, Ando, Tsutou³⁶, and Wilkins, Hodges, Laurienti, Steen, Burdette³⁰, familiarity is the first key to establishing an emotional connection with a piece or eliciting an autobiographical connection from the past. Some playlists from the crossover study showed potential for careful selection based on their placement into genre categories of patriot material which may connect to an individual's service in the military, songs of faith (Gospel, hymns and Jewish melodies in particular), movie and Broadway songs from particular eras, and general listening material that would have been popular during the time when individuals were 20-50 years old. Further investigation of the specific pieces, however, showed that many would not

have been used as listening choices by individuals in the years before the onset of dementia which is critical for memory connectivity^{30,31,47}. Those songs with copyright in the past 10-20 years would likely have limited familiarity before progression of the disorder, depending on the age of the subject. Also, it was clear that at least one facility essentially cloned a music list using it in common across the residents, violating the stricture of a personalized music list.

Second, the approach that Gerdner, Schoenfelder⁴⁸ outline calls for identification of specific periods of agitation for each participant to be addressed through the listening intervention. In the crossover study, indicators for periods of music listening often did not appear to be linked to individual needs but rather to a common time, or time when staff were available to start the music for residents. Data suggest that times of day and days of the week during which the music was played was often not targeted but left up to the staff to determine based, in part, on their having time to get and provide the iPods to the residents. Music data revealed that there was a great variability in the amount and frequency of music listening. The key informant survey respondents identified sundown, before or after meals, and peak times for behavioral problems as common times/days of the week they offered M&M. Some residents had a fixed schedule for M&M delivery and some had varying time depending on the mood of the resident as well as availability of staff to deliver M&M. To some extent, nursing home staff were attempting to provide M&M at times that would assist with curbing behavioral problems, however the duration of M&M delivery varied considerably, and it is unclear how routinely the program implementation guidelines were followed. Overall, the iPods did not appear to have been made available for use in some of the facilities either a sufficient amount or at the times of day when they may have provided the greatest benefit.

Resident Outcomes M&M Likely to Improve Most. The overall evaluation results suggest minimal or modest effects of M&M in improving agitation, mood, and medication use. Still, the majority of key informant survey respondents valued the program. Respondents noted observing improved mood and enjoyment among residents, and emphasized that the personalized nature of the music was the key to enjoyment, triggering memories, and improving mood. Also noted were the calming effect of M&M, and the positive effect of headphone blocking noise and allowing each individual resident to listen to the music they prefer.

Therefore, M&M appears to function as a pleasant event to have at least short-term (i.e., within a few hours of listening to music) effects of eliciting positive mood and relieving boredom at least among residents who respond to music positively. Indeed, the literature on quality of life and dementia documents the clinical benefits of increasing pleasant events in treating depression and improving quality of life.⁴ Moreover, the neuroscience literature supports the effects of music in enabling PWDs to retrieve memories, and eliciting positive emotions.⁵ Thus, if the M&M playlist is developed based on the resident's autobiographical memory and musical preferences, and delivered to residents who have past connections with music, and respond positively to listening to music, M&M has the potential to increase attention, improve mood and reduce agitation at least for short-term.

Subset of Residents Most Likely to Benefit from M&M. The M&M program is intended to be used with individuals who have a past connection to music listening in their lives. Case studies such as Cuddy, Duffin⁴⁶ and the EDGE Project in New York⁴⁹ demonstrate that individuals with an appreciation for, enjoyment of or experience with music have the strongest potential to benefit from this intervention. Anecdotally, the research team was told that some residents cherished their time listening and that more than one resident was said to be upset anytime the iPods were taken away from them. Other residents were said to have little or no interest in their use or to dislike their use outright. A similar observation was made by the majority of key informant survey respondents who observed that the M&M program or music as a therapeutic form in general does not work for everyone. Moreover, wearing headphones did not work for some residents, and instead speakers had to be used for some residents. Lastly, although reasons are not clear, Medicaid residents receiving M&M experienced improvements in overall behavioral problems and rejection of care.

Effects of M&M on Family Outcomes

Pre/post survey results generally did not indicate any significant changes in family satisfaction with care or relationship quality between the family members and residents. For those families with residents assigned to Condition 1, there was a significant decrease noted in the responses provided to the question “What is the quality of the current relationship with your relative?”, but no other significant changes were found. It is also important to note that the sample size for these analyses was quite small (Condition 1, $n=17$; Condition 2, $n=11$), and as such, results should be interpreted with caution. In addition, it is unclear how often the family member had opportunities to visit and observe residents during the study period. It is also quite possible that the decrease in the perceived relationship quality, and/or the lack of changes in other measured outcomes, could be due to a variety of different types of errors or biases inherent in survey data collected from a small non-random sample with a low response rate.

Effects of M&M on Direct Care Staff Outcomes

Direct care staff ($n=63$) who completed both the pre- and post-survey regarding feelings about their jobs and about working with residents with dementia did not indicate any significant changes in those perceptions between the beginning and end of the data collection period (about 14 weeks in duration). While some positive changes were noted in some areas, those differences were not statistically significant. This finding, however, is not surprising. Key informant survey found that lack of buy-in from all levels of care staff and limited time to be trained, implement and maintain the program were major barriers to sustaining M&M in facilities. These findings suggest that not all direct care staff had opportunities to observe positive changes in residents or to learn about the M&M program. With limited exposure to the program, the effects of M&M on direct care staff is also likely to be minimal. Moreover, numerous factors are related to job satisfaction and burnout, and it is likely that other factors experienced by the respondents (such as changes in management) have a greater effect on the examined outcome variables than a single intervention or protocol.

Value of M&M

The key informant survey with administrators of Wisconsin nursing home facilities was a cross-sectional descriptive survey with a response rate of 40% from Wisconsin nursing homes. These limitations notwithstanding, the survey found that the majority of key informant survey respondents valued the program and viewed the M&M program favorably such as its ease of use, fit for helping residents experience and maintain personhood, and better social interactions and engagement. Respondents noted that M&M had effects of improving mood and enjoyment among residents if the program was implemented consistently. Also noted were the calming effect of M&M, and the positive effect of headphone blocking noise and allowing each individual resident to listen to the music they prefer.

Barriers and Challenges in Implementing and Sustaining M&M in Nursing Homes

Two key barriers to consistently and effectively delivering M&M for target residents were: a lack of buy-in from all levels of care staff and management and a lack of or limited time available to staff to implement and maintain the program. Lack of buy-in affected all steps of the process of implementing and maintaining the program. Although M&M is a relatively easy and simple program to implement compared to other type of music interventions, for many activity and direct care staff, the time commitment required is not minimal. For example, developing a truly individualized music playlist does take time to interview not only residents but also family members. In fact, key informant survey respondents reported identifying preferred songs as a barrier because not all families know and often residents are not communicative. Hence, there will be trial and error to create an optimal playlist and delivery schedule. Moreover, monitoring listening by the residents during the delivery and at the end of session also requires serious commitment on the part of staff. With residents located at different wings or floors with different direct care staff with varying schedules (and high turnover) in nursing home environment, implementing M&M in a way that will maximize therapeutic benefits and result in concrete results is not easy.

Other barriers included difficulties in understanding the operation of the music devices, issues in identifying an accessible and secure location for storage and charging, problems understanding how the devices interfaced with computers and issues associated with the costs of replacing broken equipment, purchasing additional new equipment and purchasing new songs. Respondents acknowledged the grant from the state to be a valuable resource to initiate and implement the program. However, a remaining concern was sustainability of the program- how they will continue the

program for existing and new residents as additional cost will be incurred to replace existing equipment and buy new songs.

Summary

Some important methodological limitations of the evaluation notwithstanding, results from all components of the evaluation lead to a similar conclusion, that the efficacy of M&M as it was carried out in Wisconsin during the statewide implementation period was minimal or modest at best with no or minimal effect on nursing home resident behavioral outcomes, and very modest effect on psychotropic medication use. Moreover, the evaluation data suggest that such results may be in part due to lack of a standardized process of implementation and fidelity checks, which are evidenced by substantial variability in the music listening time duration and frequency across residents and facilities. To some extent, nursing home staff were attempting to provide M&M at times that would assist with curbing behavioral problems, however it is unclear how routinely the program implementation guidelines were followed.

Furthermore, many facilities viewed the M&M program as valuable noting improvements observed in residents such as enjoyment and improved mood with caveats that neither the M&M program (or music) as a therapeutic form, nor using headphone or iPhone, work for everyone. Lastly, two key barriers to consistently and effectively delivering M&M for target residents that facilities identified were: a lack of buy-in from all levels of care staff and management and a lack of or limited time by staff to implement and maintain the program.

RECOMMENDATIONS

The overall findings from the current evaluation and past research on music and dementia suggest that several improvements could be made to how the M&M program is implemented and monitored to increase its impact on resident well-being and quality of life. Moreover, the current evaluation findings provide implications for how future research may help understand ways to maximize the therapeutic benefits of such non-pharmacologic, person-centered approach to dementia care. Specific recommendations to improve efficacy of M&M program include: (1) select individuals who are most likely to benefit from M&M; (2) assess, identify and set specific goals for the M&M intervention; (3) develop individualized playlists and listening schedules tailored to each individual person; and (4) implement a systemic process evaluation of the M&M program and incorporate M&M into a formal care planning process. We also recommend that more efforts to be made for sustainability of the program by increasing buy-in from all involved in the process and develop and test training programs for volunteers such as students to implement the M&M program.

Recommendations to Improve Efficacy of M&M

1. Select individuals who are most likely to benefit from M&M. The M&M program is intended to be used with individuals who have a past connection to music listening in their lives. Feedback from the key informant survey suggest that residents who are experiencing agitation, enjoy listening to music, and can tolerate headphones being placed over their ears are likely to benefit from the M&M program. Conversely, residents who do not necessarily experience enjoyment from listening to music or who do not tolerate headphones well may experience increased agitation from participating in the M&M program. This is not to say that the conditions cannot be altered to accommodate some of these issues- it may be possible, for instance, for a resident to listen to music over speakers while in his or her room instead of using headphones. In addition, residents not experiencing agitation may also enjoy listening to individualized music playlists, but they may not have the same behavioral problems that the use of M&M is supposed to ameliorate. Regardless, residents who do not enjoy listening to music should not participate in the program, as participation may increase anxiety or agitation symptoms and could increase problem behaviors.

The Personal Music Assessment form, or something similarly designed at each facility should be a crucial factor in the decision-making process. Gerdner, Schoenfelder ⁴⁸ clearly outline that the first consideration for placement in this intervention is assessing the importance of music in the individual's background. Monitoring of their response to the intervention is also important to address increases in agitation if they occur. While a benefit of this intervention is a

“lack of side effects”⁵⁰, the neurocognitive connections outlined do have the potential to elicit negative as well as positive connections. In addition, it is helpful to keep in mind that persons with different forms of dementia may react differently to music. For example, the study by Hsieh, Hornberger, Piguet, Hodges⁵¹ found persons with Alzheimer’s disease are more likely to maintain some ability to attach emotional meaning to facial expressions or music when listening to familiar music than persons with semantic. Facilities interested in integrating M&M or a similar program might consider collecting autobiographical information from each resident at the time of intake including, for example, personal interests in listening to music, specific listings of favorite songs, key autobiographical events with a music association, favorite genres and artists, etc. This information can be used to identify persons appropriate for this type of listening intervention and allow for a more appropriate structuring of playlists at a future point in time.

2. Assess, identify and set specific goals for the M&M intervention. Notable non-pharmacologic interventions that have been shown to have positive effects are those that are directed at single behaviors such as agitation. They typically involve a comprehensive assessment of the behavior to identify sources of the behavioral problem and develop an intervention plan to address the behavior by modifying exposures to the sources and/or offering distractions from such sources²². Persons with dementia will manifest varying types and degrees of challenging symptoms. Some persons with dementia may have more reserved memory and cognitive abilities than others and for those, improving or maintaining cognitive function may be the desirable outcome. For others with a more advanced stage of dementia, the targeted areas may be agitation, aggression, anxiety, depression or apathy. The key is to identify and target one or two key symptoms that seem to affect the individual the most. Hence, identifying the key target areas of M&M intervention will be a crucial step before developing the individualized playlist and music listening schedule. For example, the playlist for a resident with agitation or aggression symptoms may need to be developed with the goal to help the resident relax and increase positive mood, while the playlist for a resident who are emotionally or socially withdrawn may be need to focused on the goal to help the resident be energized and actively engaged with the environment.

3. Develop individualized playlist and listening schedule tailored to each individual person. Care should also be taken in the selection of music and modification of playlists, especially when residents are not able to clearly communicate preferences for music. Care should also be taken to use devices for delivery of music that will not result in increased frustration for the residents, which could lead to problem behaviors and/or increased labor for staff beyond regular M&M program implementation requirements. The literature on music and dementia overwhelmingly suggests that the individual’s familiarity of the music that he/she listened to and autobiographical connection between the person and music are essential for the M&M program to positively affect the outcomes. The premise of this listening approach to therapeutic music is that the naturalistic task of music listening requires low retrieval demands making it accessible even as Alzheimer’s progresses. The rate of atrophy in the medial prefrontal cortex for Alzheimer’s is slower than other forms of dementia, allowing this region (which is responsible for associating music, emotions and memory) to be preserved longer and able to recognize musical structure which is key to memory retrieval cues^{30,32,47,51,52}. As cognition decreases in Alzheimer’s, the familiarity of musical works is crucial to activate prior connections^{53,54}. Therefore, it is critical for staff or volunteers to identify some key autobiographical events and specific pieces of music or musical genre that might be associated with such events by interviewing residents as well as families.

Another critical element to successful M&M intervention would be to timing and amount of exposure to music listening. Persons with dementia have different time of the day or events or tasks that may trigger agitation such as meal time, late afternoon, or bathing. Observation and assessment of specific agitation which impacts an individual’s quality of life or activities of daily living can help staff to identify the period for targeted music listening. Also, according to listening guidelines, at least 30 minutes of listening from the individualized playlist should be utilized prior to the identified period to reduce the symptoms of anxiety and agitation^{36,48}.

4. Implement a systemic process evaluation of the M&M program and incorporate M&M into a formal care planning process. The Music and Memory program might best be utilized as a treatment intervention similarly to other specific therapeutic approaches, whether administered by a music therapist under specific prescription, or identified by a care

team that involves a resident's family members. Specific goals for reduction of physical, emotional or psychological disturbances should be identified as desired outcomes among persons with advanced dementia. Moreover, ongoing monitoring for success should be formalized and recorded⁴⁸.

Review of the M&M training contents and tools suggests that the current M&M training highlights the mechanisms for implementation such as how to use iTunes and iPod devices far more than the care-based protocol that is needed to enhance the efficacy of the program. The protocol for developing individualized musical playlists, auditing the process for use designed around specific periods of agitation and ongoing assessment criteria should be clearly presented to facilities participating in training and demonstration. Lastly, the initial and ongoing assessment and development of goals, and progress should be discussed and coordinated with other care team members routinely with facilities.

Recommendations for Sustainability

To sustain the program, it is essential to have buy-in from everyone – residents, family members, direct care staff, activity staff, music therapists, IT staff, administrators, and volunteers. Buy-in may be increased by helping staff to recognize any positive impacts of M&M on residents. Another way to facilitate buy-in would be to approach M&M like other care interventions or programs that require a systematic approach to assess, develop the playlist, deliver and monitor consistently. To make this possible, offering incentives or education and training among direct care will be important or integrating M&M into care plans. Respondents described M&M as a program that heavily relies on direct care staff to deliver to residents especially during evening and night time. Although activity and recreational staff may develop the playlist and set up a schedule, they also rely on direct care staff to deliver the iPod/headphone as needed and based on a set schedule even during day time. At the same time, care staff reported that while the program enhanced the quality of life of PWDs, developing individualized playlists was too time consuming for staff, making it a significant barrier for the program to be sustained over time. Therefore, developing strategies to involve and train residents' families as well as volunteers to develop playlists and deliver the music will help reduce burden on direct care staff. Several programs have indicated increased success in supporting their existing program through the recruitment of volunteers to help distribute the devices to the residents, track their use, maintain the playlists and music devices and by raising money for new equipment by reaching out to community-based groups including service societies, local schools and other volunteer groups.

In conclusion, efficacy studies should continue to review individual outcomes across the program in multiple facilities to determine the generalizability of the program's success. The literature concerning the use of music-based interventions with dementia afflicted persons suggests that there is the potential for such interventions to provide pleasure and aid in the remediation of undesirable behavioral symptoms. There is little reason to believe that the M&M program cannot achieve greater impact if carefully implemented.

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APPENDIX

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Table 4: Diagnoses at Baseline (T1), 6th Week (T2), 8th Week (T3), and 14th Week (T4)

	Condition 1				Condition 2			
	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
Diagnoses								
Anxiety	15 (50.00)	12 (40.00)	14 (50.00)	13 (52.00)	16 (55.17)	11 (42.31)	12 (41.38)	12 (48.00)
Depression	18 (60.00)	17 (56.67)	17 (60.71)	16 (64.00)	23 (79.31)	19 (73.08)	21 (72.41)	16 (64.00)
Bipolar	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	3 (10.34)	3 (11.54)	3 (10.34)	3 (12.00)
Psychotic disorder	0 (0.00)	0 (0.00)	0 (0.00)	1 (4.00)	2 (6.90)	3 (11.54)	2 (6.90)	2 (8.00)
Schizophrenia	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
PTSD	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (3.85)	1 (3.45)	1 (4.00)

Note: Condition 1 group received treatment as usual (TAU) plus M&M for a six-week period between T1 and T2 and no M&M after T2.

Condition 2 group received TAU alone for the first six weeks between T1 and T3, and then received TAU combined with M&M for six weeks between T3 and T4.

Table 5. Family Respondent Demographic Characteristics

	Condition 1 N (%)	Condition 2 N (%)
Gender		
Male	2 (11.76)	4 (36.36)
Female	15 (88.24)	7 (63.64)
Highest Level of Education		
Attended HS	1 (5.88)	1 (9.09)
Completed HS	3 (17.65)	1 (9.09)
Vocational Training (after HS)	4 (23.53)	0 (0.00)
Attended College (did not graduate)	3 (17.65)	4 (36.36)
College Graduate	2 (11.76)	3 (27.27)
Graduate School	4 (23.53)	2 (18.18)
Marital Status		
Single (never married)	0 (0.00)	2 (18.18)
Married	16 (94.12)	7 (63.64)
Widowed	1 (5.88)	2 (18.18)
Household Income		
Under \$10,000	0 (0.00)	1 (10.00)
\$15,000-\$24,999	2 (14.29)	0 (0.00)
\$25,000-\$34,999	2 (14.29)	1 (10.00)
\$35,000-\$49,999	1 (7.14)	1 (10.00)
\$50,000-\$74,999	2 (14.29)	2 (20.00)
More than \$75,000	7 (50.00)	5 (50.00)
Relationship of Respondent to Resident		
Wife	0 (0.00)	1 (10.00)
Husband	3 (17.65)	0 (0.00)
Mother	10 (58.82)	6 (60.00)
Father	4 (23.53)	2 (20.00)
Sister	0 (0.00)	1 (10.00)

Table 6: Frequencies and percentages of job titles of nursing home staff

	N (%)
What is your highest certification or degree you have received?	
Certified Nursing Assistant (CNA)	22 (36.07)
Registered Nurse (RN)	7 (11.48)
Certified Music Therapist (MT-BC)	3 (4.92)
Other (specify):	26 (42.62)
I have not received any special certifications or degrees	3 (4.92)
Job Title	
Nurse Assistant	22 (34.92)
Nurse	9 (14.29)
Activities Staff	17 (26.98)
Other (specify)	15 (23.81)
Activity Therapy Director	1 (6.25)
Health Care Coordinator	1 (6.25)
Chaplain	1 (6.25)
Director of Therapeutic Activities	1 (6.25)
Household/Hospitality Coordinator	1 (6.25)
Art Therapist	1 (6.25)
Music Therapist	1 (6.25)
Music Therapy Intern	1 (6.25)
Nurse Manager	2 (12.50)
Rehabilitation Supervisor	1 (6.25)
Social Worker	4 (25.00)

Table 7: Frequencies and Percentages of Ratings for the Cohen-Mansfield Agitation Inventory

	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
Physically Aggressive Behaviors				
Hitting (including self)				
Never	35 (64.81)	40 (72.73)	40 (75.47)	35 (71.43)
< 1x / week	8 (14.81)	5 (9.09)	7 (13.21)	9 (18.37)
1-2x/week	8 (14.81)	5 (9.09)	5 (9.43)	2 (4.08)
Several times/week	1 (1.85)	1 (1.82)	0 (0.00)	2 (4.08)
1-2x/day	1 (1.85)	3 (5.45)	1 (1.89)	1 (2.04)
Several times/day	1 (1.85)	1 (1.82)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Mean (SD)	1.67 (1.12)	1.64 (1.25)	1.40 (0.82)	1.47 (0.92)
Kicking				
Never	40 (75.47)	45 (81.82)	44 (83.02)	43 (87.86)
< 1x / week	7 (13.21)	1 (1.82)	5 (9.43)	3 (6.12)
1-2x/week	5 (9.43)	5 (9.09)	3 (5.66)	2 (4.08)
Several times/week	0 (0.00)	2 (3.64)	0 (0.00)	1 (2.04)
1-2x/day	1 (1.89)	2 (3.64)	0 (0.00)	1 (2.04)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Mean (SD)	1.40 (0.82)	1.45 (1.05)	1.28 (0.74)	1.20 (0.61)
Grabbing on to people				
Never	38 (70.37)	40 (72.73)	36 (67.92)	38 (77.55)
< 1x / week	9 (16.67)	5 (9.09)	8 (15.09)	4 (8.16)
1-2x/week	1 (1.85)	3 (5.45)	5 (9.43)	2 (4.08)
Several times/week	3 (5.56)	3 (5.45)	1 (1.89)	2 (4.08)
1-2x/day	0 (0.00)	0 (0.00)	2 (3.77)	0 (0.00)
Several times/day	2 (3.70)	4 (7.27)	1 (1.89)	3 (6.12)
Several times/hour	1 (1.85)	0 (0.00)	0 (0.00)	0 (0.00)
Mean (SD)	1.67 (1.39)	1.73 (1.46)	1.64 (1.18)	1.59 (1.35)
Pushing				
Never	48 (88.89)	50 (92.59)	48 (90.57)	44 (89.80)
< 1x / week	6 (11.32)	1 (1.85)	3 (5.66)	4 (8.16)
1-2x/week	0 (0.00)	3 (5.56)	1 (1.89)	1 (2.04)
Several times/week	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/day	0 (0.00)	0 (0.00)	1 (1.89)	0 (0.00)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Mean (SD)	1.11 (0.32)	1.13 (0.48)	1.17 (0.64)	1.12 (0.39)
Throwing Things				
Never	46 (86.79)	50 (90.91)	46 (86.79)	45 (91.84)
< 1x / week	6 (11.32)	2 (3.64)	3 (5.66)	2 (4.08)
1-2x/week	0 (0.00)	1 (1.82)	2 (3.77)	1 (2.04)
Several times/week	0 (0.00)	1 (1.82)	0 (0.00)	1 (2.04)
1-2x/day	1 (1.89)	0 (0.00)	2 (3.77)	0 (0.00)
Several times/day	0 (0.00)	1 (1.82)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Mean (SD)	1.19 (0.62)	1.22 (0.83)	1.25 (0.70)	1.14 (0.54)
Biting				
Never	51 (94.44)	54 (98.18)	49 (92.45)	45 (91.84)
< 1x / week	2 (3.70)	1 (1.82)	2 (3.77)	3 (6.12)

Table 7: Frequencies and Percentages of Ratings for the Cohen-Mansfield Agitation Inventory

	Time 1	Time 2	Time 3	Time 4
	N (%)	N (%)	N (%)	N (%)
1-2x/week	1 (1.85)	0 (0.00)	2 (3.77)	1 (2.04)
Several times/week	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.07 (0.33)</i>	<i>1.02 (0.13)</i>	<i>1.11 (0.42)</i>	<i>1.10 (0.37)</i>
Scratching				
Never	46 (85.19)	47 (85.45)	46 (86.79)	42 (85.71)
< 1x / week	2 (3.70)	3 (5.45)	3 (5.66)	4 (8.16)
1-2x/week	3 (5.56)	1 (1.82)	2 (3.77)	1 (2.04)
Several times/week	1 (1.85)	2 (3.64)	1 (1.89)	1 (2.04)
1-2x/day	0 (0.00)	2 (3.64)	1 (1.89)	0 (0.00)
Several times/day	2 (3.70)	0 (0.00)	0 (0.00)	1 (2.04)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.39 (1.11)</i>	<i>1.35 (0.97)</i>	<i>1.26 (0.79)</i>	<i>1.29 (0.89)</i>
Spitting				
Never	49 (90.74)	51 (92.73)	51 (96.23)	46 (93.88)
< 1x / week	5 (9.26)	4 (7.27)	1 (1.89)	2 (4.08)
1-2x/week	0 (0.00)	0 (0.00)	0 (0.00)	1 (2.04)
Several times/week	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/day	0 (0.00)	0 (0.00)	1 (1.89)	0 (0.00)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.09 (0.29)</i>	<i>1.07 (0.26)</i>	<i>1.09 (0.56)</i>	<i>1.08 (0.34)</i>
Hurting Self or Others				
Never	44 (81.48)	51 (92.73)	49 (92.45)	46 (93.88)
< 1x / week	9 (16.67)	3 (5.45)	3 (5.66)	2 (4.08)
1-2x/week	1 (1.85)	1 (1.82)	1 (1.89)	1 (2.04)
Several times/week	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.20 (0.45)</i>	<i>1.09 (0.35)</i>	<i>1.09 (0.35)</i>	<i>1.08 (0.34)</i>
Tearing things or destroying property				
Never	49 (90.74)	49 (90/74)	48 (90/57)	43 (87.76)
< 1x / week	2 (3.70)	1 (1.85)	0 (0.00)	2 (4.08)
1-2x/week	1 (1.85)	3 (5.56)	3 (5.66)	1 (2.04)
Several times/week	1 (1.85)	1 (1.85)	2 (3.77)	2 (4.08)
1-2x/day	1 (1.85)	0 (0.00)	0 (0.00)	1 (2.04)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.20 (0.74)</i>	<i>1.22 (0.82)</i>	<i>1.23 (0.72)</i>	<i>1.29 (0.87)</i>
Making physical sexual advances				
Never	51 (72.22)	42 (76.36)	40 (75.47)	38 (77.55)
< 1x / week	0 (0.00)	0 (0.00)	1 (1.89)	2 (4.08)
1-2x/week	1 (1.85)	2 (3.64)	1 (1.89)	0 (0.00)
Several times/week	2 (3.70)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)

Table 7: Frequencies and Percentages of Ratings for the Cohen-Mansfield Agitation Inventory

	Time 1	Time 2	Time 3	Time 4
	N (%)	N (%)	N (%)	N (%)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.15 (0.63)</i>	<i>1.07 (0.38)</i>	<i>1.06 (0.30)</i>	<i>1.04 (0.20)</i>
Physical Nonaggressive Behaviors				
Pacing, aimless wandering				
Never	39 (72.22)	42 (76.36)	40 (75.47)	38 (77.55)
< 1x / week	4 (7.41)	1 (1.82)	3 (5.66)	4 (8.16)
1-2x/week	3 (5.56)	4 (7.27)	4 (7.56)	3 (6.12)
Several times/week	3 (5.56)	2 (3.64)	3 (5.66)	1 (2.04)
1-2x/day	1 (1.85)	2 (3.64)	1 (1.89)	1 (2.04)
Several times/day	3 (5.56)	2 (3.64)	2 (3.77)	1 (2.04)
Several times/hour	1 (1.85)	2 (3.64)	0 (0.00)	1 (2.04)
<i>Mean (SD)</i>	<i>1.81 (1.59)</i>	<i>1.82 (1.68)</i>	<i>1.64 (1.32)</i>	<i>1.57 (1.34)</i>
Inappropriate dress or disrobing				
Never	49 (90.74)	47 (87.04)	51 (96.23)	43 (87.76)
< 1x / week	3 (5.56)	2 (3.70)	1 (1.89)	3 (6.12)
1-2x/week	1 (1.85)	5 (9.26)	1 (1.89)	1 (2.04)
Several times/week	1 (1.85)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/day	0 (0.00)	0 (0.00)	0 (0.00)	1 (2.04)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	1 (2.04)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.15 (0.53)</i>	<i>1.22 (0.60)</i>	<i>1.06 (0.30)</i>	<i>1.29 (0.96)</i>
Trying to get to a different place				
Never	31 (57.41)	35 (64.81)	38 (71.70)	36 (73.47)
< 1x / week	9 (16.67)	8 (12.96)	4 (7.55)	2 (4.08)
1-2x/week	5 (9.26)	4 (7.41)	6 (11.32)	5 (10.20)
Several times/week	2 (3.70)	2 (3.70)	2 (3.77)	3 (6.12)
1-2x/day	2 (3.70)	3 (5.56)	1 (1.89)	0 (0.00)
Several times/day	4 (7.41)	3 (5.56)	2 (3.77)	3 (6.12)
Several times/hour	1 (1.85)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>2.09 (1.66)</i>	<i>1.89 (1.51)</i>	<i>1.68 (1.30)</i>	<i>1.73 (1.43)</i>
Intentional falling				
Never	53 (98.15)	54 (98.18)	53 (100.00)	49 (100.00)
< 1x / week	1 (1.85)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/week	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/week	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/day	0 (0.00)	1 (1.82)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.02 (0.14)</i>	<i>1.09 (0.67)</i>	<i>1.00 (0.00)</i>	<i>1.00 (0.00)</i>
Eating/drinking inappropriate substances				
Never	52 (96.30)	53 (96.36)	52 (98.11)	49 (100.00)
< 1x / week	1 (1.85)	2 (3.64)	0 (0.00)	0 (0.00)
1-2x/week	0 (0.00)	0 (0.00)	1 (1.89)	0 (0.00)
Several times/week	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
1-2x/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/day	1 (1.85)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.11 (0.69)</i>	<i>1.04 (0.19)</i>	<i>1.04 (0.27)</i>	<i>1.00 (0.00)</i>
Handling things inappropriately				

Table 7: Frequencies and Percentages of Ratings for the Cohen-Mansfield Agitation Inventory

	Time 1	Time 2	Time 3	Time 4
	N (%)	N (%)	N (%)	N (%)
Never	42 (79.25)	49 (89.90)	47 (88.68)	42 (85.71)
< 1x / week	4 (7.55)	2 (3.64)	3 (5.66)	2 (4.08)
1-2x/week	3 (5.66)	4 (7.27)	0 (0.00)	1 (2.04)
Several times/week	2 (3.77)	0 (0.00)	2 (3.77)	2 (4.08)
1-2x/day	0 (0.00)	0 (0.00)	1 (1.89)	1 (2.04)
Several times/day	2 (3.77)	0 (0.00)	0 (0.00)	1 (2.04)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.49 (1.17)</i>	<i>1.18 (0.55)</i>	<i>1.24 (0.81)</i>	<i>1.39 (1.10)</i>
Hiding things				
Never	48 (84.21)	48 (84.21)	42 (79.25)	41 (85.42)
< 1x / week	1 (1.75)	4 (7.02)	4 (7.55)	0 (0.00)
1-2x/week	2 (3.51)	1 (1.75)	2 (3.77)	3 (6.25)
Several times/week	3 (5.26)	1 (1.75)	2 (3.77)	1 (2.08)
1-2x/day	1 (1.75)	2 (3.51)	0 (0.00)	1 (2.08)
Several times/day	2 (3.51)	1 (1.75)	2 (3.77)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	1 (1.89)	2 (4.17)
<i>Mean (SD)</i>	<i>1.49 (1.26)</i>	<i>1.39 (1.08)</i>	<i>1.57 (1.38)</i>	<i>1.52 (1.43)</i>
Hoarding things				
Never	47 (83.93)	49 (85.96)	46 (86.79)	40 (83.33)
< 1x / week	2 (3.57)	3 (5.26)	1 (1.89)	3 (6.25)
1-2x/week	1 (1.79)	0 (0.00)	2 (3.77)	0 (0.00)
Several times/week	3 (5.36)	2 (3.51)	1 (1.89)	1 (2.08)
1-2x/day	0 (0.00)	2 (3.51)	1 (1.89)	1 (2.08)
Several times/day	3 (5.36)	1 (1.75)	2 (3.77)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	3 (6.25)
<i>Mean (SD)</i>	<i>1.50 (1.31)</i>	<i>1.44 (1.17)</i>	<i>1.42 (1.20)</i>	<i>1.58 (1.60)</i>
Performing repetitious mannerisms				
Never	34 (62.96)	41 (71.93)	39 (73.58)	33 (68.75)
< 1x / week	4 (7.41)	2 (3.51)	5 (9.43)	2 (4.17)
1-2x/week	6 (11.11)	5 (8.77)	4 (7.55)	1 (2.08)
Several times/week	2 (3.70)	4 (7.02)	1 (1.89)	5 (10.42)
1-2x/day	1 (1.85)	1 (1.75)	2 (3.77)	2 (4.17)
Several times/day	4 (7.41)	1 (1.75)	2 (3.77)	3 (6.25)
Several times/hour	3 (5.56)	3 (5.26)	0 (0.00)	2 (4.17)
<i>Mean (SD)</i>	<i>2.19 (1.91)</i>	<i>1.89 (1.70)</i>	<i>1.64 (1.32)</i>	<i>2.13 (1.90)</i>
General restlessness				
Never	18 (31.58)	27 (47.37)	31 (58.49)	37 (56.25)
< 1x / week	15 (26.32)	11 (19.30)	5 (9.43)	3 (6.25)
1-2x/week	9 (15.79)	6 (10.53)	8 (15.09)	6 (12.50)
Several times/week	5 (8.77)	7 (12.28)	4 (7.55)	5 (10.42)
1-2x/day	5 (8.77)	2 (3.51)	2 (3.77)	5 (10.42)
Several times/day	2 (3.51)	3 (5.26)	3 (5.66)	2 (4.17)
Several times/hour	3 (5.26)	1 (1.75)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>2.68 (1.75)</i>	<i>2.28 (1.62)</i>	<i>2.06 (1.52)</i>	<i>2.25 (1.64)</i>
Verbal Aggressive Behaviors				
Screaming				
Never	41 (73.21)	41 (71.93)	36 (69.23)	32 (66.67)
< 1x / week	5 (8.93)	5 (8.77)	5 (9.62)	7 (14.58)
1-2x/week	3 (5.36)	4 (7.02)	6 (11.54)	4 (8.33)

Table 7: Frequencies and Percentages of Ratings for the Cohen-Mansfield Agitation Inventory

	Time 1	Time 2	Time 3	Time 4
	N (%)	N (%)	N (%)	N (%)
Several times/week	4 (7.14)	4 (7.02)	1 (1.92)	2 (4.17)
1-2x/day	1 (1.79)	0 (0.00)	0 (0.00)	2 (4.17)
Several times/day	2 (3.57)	2 (3.51)	3 (5.77)	1 (2.08)
Several times/hour	0 (0.00)	1 (1.75)	1 (1.92)	0 (0.00)
<i>Mean (SD)</i>	<i>1.66 (1.31)</i>	<i>1.72 (1.42)</i>	<i>1.79 (1.51)</i>	<i>1.71 (1.25)</i>
Making verbal sexual advances				
Never	54 (94.74)	55 (98.21)	51 (96.23)	46 (95.83)
< 1x / week	0 (0.00)	0 (0.00)	1 (1.89)	1 (2.08)
1-2x/week	2 (3.51)	1 (1.79)	1 (1.89)	0 (0.00)
Several times/week	1 (1.75)	0 (0.00)	0 (0.00)	1 (2.08)
1-2x/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/day	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Several times/hour	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.12 (0.54)</i>	<i>1.04 (0.27)</i>	<i>1.06 (0.30)</i>	<i>1.08 (0.45)</i>
Cursing or verbal aggression				
Never	38 (66.67)	40 (70.18)	37 (69.81)	33 (68.75)
< 1x / week	7 (12.28)	5 (8.77)	5 (9.43)	5 (10.42)
1-2x/week	3 (5.26)	4 (7.02)	7 (13.21)	6 (12.50)
Several times/week	4 (7.02)	4 (7.02)	1 (1.89)	2 (4.17)
1-2x/day	4 (7.02)	3 (5.26)	1 (1.89)	2 (4.17)
Several times/day	1 (1.75)	0 (0.00)	2 (3.77)	0 (0.00)
Several times/hour	0 (0.00)	1 (1.75)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.81 (1.38)</i>	<i>1.75 (1.39)</i>	<i>1.68 (1.27)</i>	<i>1.65 (1.12)</i>
Verbal Nonaggressive Behaviors				
Repetitive sentences or questions				
Never	31 (54.39)	37 (64.91)	38 (71.70)	30 (63.83)
< 1x / week	7 (12.28)	3 (5.26)	2 (3.77)	2 (4.26)
1-2x/week	4 (7.02)	7 (12.28)	5 (9.43)	2 (4.26)
Several times/week	3 (5.26)	4 (7.02)	3 (5.66)	5 (10.64)
1-2x/day	3 (5.26)	0 (0.00)	1 (1.89)	5 (10.64)
Several times/day	7 (12.28)	5 (8.77)	2 (3.77)	3 (6.38)
Several times/hour	2 (3.51)	1 (1.75)	2 (3.77)	0 (0.00)
<i>Mean (SD)</i>	<i>2.46 (2.00)</i>	<i>2.05 (1.72)</i>	<i>1.89 (1.67)</i>	<i>2.19 (1.76)</i>
Strange noises (weird laughter or crying)				
Never	44 (77.19)	48 (84.21)	45 (84.91)	41 (85.42)
< 1x / week	1 (1.75)	3 (5.26)	1 (1.89)	1 (2.08)
1-2x/week	5 (8.77)	2 (3.51)	4 (7.55)	2 (4.17)
Several times/week	3 (5.26)	3 (5.26)	1 (1.89)	1 (2.08)
1-2x/day	0 (0.00)	0 (0.00)	1 (1.89)	2 (4.17)
Several times/day	3 (5.26)	0 (0.00)	1 (1.89)	1 (2.08)
Several times/hour	1 (1.75)	1 (1.75)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.72 (1.52)</i>	<i>1.49 (1.39)</i>	<i>1.40 (1.06)</i>	<i>1.44 (1.18)</i>
Complaining				
Never	37 (64.91)	38 (66.67)	40 (76.92)	32 (68.09)
< 1x / week	7 (12.28)	5 (8.77)	3 (5.77)	5 (10.64)
1-2x/week	5 (8.77)	6 (10.53)	2 (3.85)	4 (8.51)
Several times/week	3 (5.26)	2 (3.51)	3 (5.77)	2 (4.26)
1-2x/day	2 (3.51)	3 (5.26)	1 (1.92)	1 (2.13)
Several times/day	2 (3.51)	2 (3.51)	3 (5.77)	3 (6.38)

Table 7: Frequencies and Percentages of Ratings for the Cohen-Mansfield Agitation Inventory

	Time 1	Time 2	Time 3	Time 4
	N (%)	N (%)	N (%)	N (%)
Several times/hour	1 (1.75)	1 (1.75)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>1.88 (1.51)</i>	<i>1.89 (1.55)</i>	<i>1.67 (1.44)</i>	<i>1.81 (1.47)</i>
Negativism				
Never	38 (66.67)	41 (71.93)	40 (75.47)	32 (69.57)
< 1x / week	3 (5.26)	5 (8.77)	6 (11.32)	6 (13.04)
1-2x/week	5 (8.77)	5 (8.77)	2 (3.77)	4 (8.70)
Several times/week	5 (8.77)	2 (3.51)	1 (1.89)	2 (4.35)
1-2x/day	3 (5.26)	3 (5.26)	0 (0.00)	2 (4.35)
Several times/day	3 (5.26)	0 (0.00)	3 (5.66)	0 (0.00)
Several times/hour	0 (0.00)	1 (1.75)	1 (1.89)	0 (0.00)
<i>Mean (SD)</i>	<i>1.96 (1.57)</i>	<i>1.68 (1.34)</i>	<i>1.64 (1.47)</i>	<i>1.61 (1.11)</i>
Constant unwarranted request for attention or help				
Never	38 (66.67)	40 (70.18)	40 (75.47)	35 (72.92)
< 1x / week	5 (8.77)	7 (12.28)	2 (3.77)	4 (8.33)
1-2x/week	7 (12.28)	2 (3.51)	4 (7.55)	2 (4.17)
Several times/week	3 (5.26)	3 (5.26)	1 (1.89)	3 (6.25)
1-2x/day	1 (1.75)	1 (1.75)	2 (3.77)	1 (2.08)
Several times/day	2 (3.51)	2 (3.51)	3 (5.66)	2 (4.17)
Several times/hour	1 (1.75)	2 (3.51)	1 (1.89)	1 (2.08)
<i>Mean (SD)</i>	<i>1.84 (1.47)</i>	<i>1.81 (1.60)</i>	<i>1.79 (1.62)</i>	<i>1.77 (1.55)</i>

Table 8: Significance Tests the Cohen-Mansfield Agitation Inventory: Condition by Time (1 vs. 2)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Total Score									
Cond = 1									
T1	29	44.45 (16.80)	Cond	1	55	85.06	0.19	0.66	0.29
T2	29	39.31 (13.96)	Time	1	55	98.01	0.93	0.34	0.53
			Cond*Time	1	55	307.13	2.92	0.09	0.09
Cond = 2									
T1	28	42.89 (17.68)	Error		55	105.18			
T2	28	44.32 (17.58)	ID (Cond)		55	442.89			
Physical Aggressive									
Cond = 1									
T1	28	14.68 (5.57)	Cond	1	54	3.70	0.11	0.75	0.72
T2	27	13.63 (4.85)	Time	1	51	0.08	0.01	0.93	0.74
			Cond*Time	1	51	31.66	3.10	0.08	0.09
Cond = 2									
T1	26	13.46 (3.20)	Error		51	10.20			
T2	28	14.25 (5.12)	ID (Cond)		54	35.07			
Physical Nonaggressive									
Cond = 1									
T1	29	16.69 (8.55)	Cond	1	55	3.23	0.04	0.84	0.84
T2	29	14.45 (7.54)	Time	1	55	28.25	1.33	0.25	0.52
			Cond*Time	1	55	44.21	2.07	0.16	0.15
Cond = 2									
T1	28	15.11 (6.92)	Error		55	21.31			
T2	28	15.36 (5.52)	ID (Cond)		55	83.35			
Verbal Aggressive									
Cond = 1									
T1	29	4.38 (2.27)	Cond	1	55	10.78	1.06	0.31	0.32
T2	29	4.07 (1.69)	Time	1	55	0.12	0.05	0.83	0.60
			Cond*Time	1	55	1.70	0.64	0.43	0.42
Cond = 2									
T1	28	4.75 (2.94)	Error		55	2.66			
T2	28	4.93 (3.02)	ID (Cond)		55	10.14			
Verbal Nonaggressive									
Cond = 1									
T1	29	9.21 (4.84)	Cond	1	55	64.58	1.18	0.28	0.29
T2	29	8.10 (3.79)	Time	1	55	24.47	1.58	0.20	0.52

Table 8: Significance Tests the Cohen-Mansfield Agitation Inventory: Condition by Time (1 vs. 2)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
			Cond*Time	1	55	0.89	0.06	0.81	0.81
Cond = 2									
T1	28	10.54 (6.48)	Error		55	14.56			
T2	28	9.79 (7.75)	ID (Cond)		55	54.80			
Positive for aggressive behavior (Logit Model)									
Cond = 1									
T1	29	0.45 (.51)	Cond	1	55		0.00	0.97	NA
T2	29	0.24 (.44)	Time	1	55		2.14	0.15	NA
			Cond*Time	1	55		1.10	0.30	NA
Cond = 2									
T1	28	0.36 (.49)							
T2	28	0.32 (.48)							
Positive for nonaggressive behavior (Logit Model)									
Cond = 1									
T1	29	0.45 (.51)	Cond	1	55		0.03	0.86	NA
T2	29	0.31 (.47)	Time	1	55		1.60	0.21	NA
			Cond*Time	1	55		0.16	0.69	NA
Cond = 2									
T1	28	0.39 (.50)							
T2	28	0.32 (.48)							
Positive for verbal agitated behavior (Logit Model)									
Cond = 1									
T1	29	0.38 (.49)	Cond	1	55		0.38	0.54	NA
T2	29	0.28 (.45)	Time	1	55		1.04	0.31	NA
			Cond*Time	1	55		0.05	0.83	NA
Cond = 2									
T1	28	0.43 (.50)							
T2	28	.36 (.49)							

Table 9. Significance Tests the Cohen-Mansfield Agitation Inventory: Condition by Time (3 vs. 4)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Total Score									
Cond = 1									
T3	26	40.15 (17.09)	Cond	1	52	41.05	0.10	0.75	0.89
T4	23	41.43 (16.85)	Time	1	45	0.02	0.00	0.99	0.85
			Cond*Time	1	45	0.10	0.00	0.97	0.98
Cond = 2									
T3	27	41.37 (14.36)	Error		45	59.10			
T4	26	41.65 (13.94)	ID (Cond)		53	398.37			
Physical Aggressive									
Cond = 1									
T3	26	13.62 (6.11)	Cond	1	53	0.18	0.01	0.94	0.97
T4	23	13.52 (3.73)	Time	1	45	4.89	0.58	0.45	0.39
			Cond*Time	1	45	0.29	0.03	0.85	0.85
Cond = 2									
T3	27	13.56 (4.28)	Error		45	8.48			
T4	26	13.31 (4.24)	ID (Cond)		53	33.63			
Physical Nonaggressive									
Cond = 1									
T3	26	14.54 (8.06)	Cond	1	53	16.36	0.18	0.67	0.86
T4	23	16.39 (10.62)	Time	1	45	20.07	1.45	0.24	0.17
			Cond*Time	1	45	12.63	0.91	0.35	0.35
Cond = 2									
T3	27	14.15 (4.96)	Error		45	21.31			
T4	26	14.34 (5.29)	ID (Cond)		53	83.35			
Verbal Aggressive									
Cond = 1									
T3	26	4.04 (2.18)	Cond	1	53	13.02	1.56	0.22	0.56
T4	22	4.18 (2.11)	Time	1	44	1.39	0.82	0.37	0.76
			Cond*Time	1	44	0.22	0.13	0.72	0.72
Cond = 2									
T3	27	4.93 (2.63)	Error		44	1.69			
T4	26	4.65 (2.23)	ID (Cond)		53	8.33			
Verbal Nonaggressive									
Cond = 1									
T3	26	7.96 (5.05)	Cond	1	53	41.34	0.82	0.37	0.70
T4	22	7.86 (3.91)	Time	1	44	0.01	0.00	0.97	0.84
			Cond*Time	1	44	5.23	0.68	0.41	0.41

Table 9. Significance Tests the Cohen-Mansfield Agitation Inventory: Condition by Time (3 vs. 4)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Cond = 2									
T3	27	8.74 (6.09)	Error		44	14.56			
T4	26	9.35 (6.57)	ID (Cond)		53	54.80			
Positive for aggressive behavior (Logit Model)									
Cond = 1									
T3	26	0.27 (.45)	Cond	1	45		0.00	0.96	NA
T4	23	0.26 (.45)	Time	1	45		0.25	0.62	NA
			Cond*Time	1	45		0.10	0.76	NA
Cond = 2									
T3	27	0.30 (.47)							
T4	26	0.23 (.43)							
Positive for nonaggressive behavior (Logit Model)									
Cond = 1									
T3	26	0.27 (.45)	Cond	1	45		0.02	0.90	NA
T4	23	0.39 (.50)	Time	1	45		0.58	0.45	NA
			Cond*Time	1	45		0.44	0.51	NA
Cond = 2									
T3	27	0.33 (.48)							
T4	26	0.35 (.49)							
Positive for verbal agitated behavior (Logit Model)									
Cond = 1									
T3	26	0.27 (.45)	Cond	1	45		0.16	0.69	NA
T4	23	0.30 (.47)	Time	1	45		0.62	0.43	NA
			Cond*Time	1	45		0.03	0.86	NA
Cond = 2									
T3	27	0.30 (.47)							
T4	26	0.38 (.50)							

Table 10: Frequencies and Percentages of Ratings for the Neuropsychiatric Inventory

Variable	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
Delusions				
No	38 (70.37)	40 (70.18)	41 (77.36)	38 (77.55)
Yes	16 (29.63)	17 (29.82)	12 (22.64)	11 (22.45)
Rarely	5 (29.41)	3 (17.65)	3 (25.00)	3 (30.00)
Sometimes	5 (29.41)	5 (29.41)	2 (16.67)	2 (20.00)
Often	3 (17.65)	7 (41.18)	5 (41.67)	4 (40.00)
Very Often	4 (23.53)	2 (11.76)	2 (16.67)	1 (10.00)
Mild	4 (23.53)	3 (18.75)	2 (16.67)	1 (11.11)
Moderate	6 (35.29)	8 (50.00)	7 (58.33)	2 (22.22)
Severe	7 (41.18)	5 (31.25)	3 (25.00)	6 (66.67)
Hallucinations				
No	42 (76.36)	44 (77.19)	40 (75.47)	38 (79.17)
Yes	13 (23.64)	13 (22.81)	13 (24.53)	10 (20.83)
Rarely	5 (38.46)	3 (23.08)	3 (23.08)	4 (40.00)
Sometimes	2 (15.38)	3 (38.46)	6 (46.15)	1 (10.00)
Often	5 (38.46)	4 (30.77)	3 (23.08)	3 (30.00)
Very Often	1 (7.69)	1 (7.69)	1 (7.69)	2 (20.00)
Mild	5 (38.46)	3 (23.08)	3 (23.08)	3 (30.00)
Moderate	6 (46.15)	7 (53.85)	6 (46.15)	4 (40.00)
Severe	2 (15.38)	3 (23.08)	4 (30.77)	3 (30.00)
Agitation/Aggression				
No	28 (50.91)	32 (56.14)	34 (64.15)	29 (59.18)
Yes	27 (49.09)	25 (43.86)	19 (35.85)	20 (40.82)
Rarely	7 (25.00)	4 (16.00)	6 (31.58)	6 (30.00)
Sometimes	10 (35.71)	10 (40.00)	6 (31.58)	8 (40.00)
Often	8 (28.57)	6 (24.00)	4 (21.05)	4 (20.00)
Very Often	3 (10.71)	5 (20.00)	3 (15.79)	2 (10.00)
Mild	8 (28.57)	6 (24.00)	6 (31.58)	6 (30.00)
Moderate	15 (53.57)	10 (40.00)	6 (31.58)	7 (35.00)
Severe	5 (17.86)	9 (36.00)	7 (36.84)	7 (35.00)
Depression				
No	38 (67.86)	36 (63.16)	37 (71.15)	34 (69.39)
Yes	18 (32.14)	21 (36.84)	15 (28.85)	15 (30.61)
Rarely	5 (27.78)	6 (28.57)	3 (20.00)	2 (14.29)
Sometimes	4 (22.22)	9 (42.86)	6 (40.00)	5 (35.71)
Often	7 (38.89)	5 (23.81)	5 (33.33)	7 (50.00)
Very Often	2 (11.11)	1 (4.76)	1 (6.67)	0 (0.00)
Mild	6 (33.33)	6 (28.57)	4 (26.67)	5 (35.71)
Moderate	10 (55.56)	11 (52.38)	8 (53.33)	5 (35.71)
Severe	2 (11.11)	4 (19.05)	3 (20.00)	4 (28.57)
Anxiety				

Table 10: Frequencies and Percentages of Ratings for the Neuropsychiatric Inventory

Variable	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
No	36 (63.16)	42 (73.68)	39 (73.58)	38 (77.55)
Yes	21 (36.84)	15 (26.32)	14 (26.42)	11 (22.45)
Rarely	6 (28.57)	1 (6.67)	4 (30.77)	1 (9.09)
Sometimes	3 (14.29)	8 (53.33)	6 (46.15)	1 (9.09)
Often	7 (33.33)	4 (26.67)	1 (7.69)	6 (54.55)
Very Often	5 (23.81)	2 (13.33)	2 (15.38)	3 (27.27)
Mild	4 (20.00)	3 (23.08)	3 (27.27)	3 (27.27)
Moderate	12 (60.00)	8 (61.54)	5 (45.45)	5 (45.45)
Severe	4 (20.00)	2 (15.38)	3 (27.27)	3 (27.27)
Elation				
No	48 (84.21)	50 (87.72)	49 (92.45)	43 (87.76)
Yes	9 (15.79)	7 (12.28)	4 (7.55)	6 (12.24)
Rarely	2 (22.22)	2 (28.57)	0 (0.00)	2 (40.00)
Sometimes	2 (22.22)	4 (57.14)	3 (75.00)	2 (40.00)
Often	5 (55.56)	1 (14.29)	1 (25.00)	1 (20.00)
Very Often	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Mild	6 (66.67)	6 (85.71)	3 (75.00)	5 (100.00)
Moderate	3 (33.33)	1 (14.29)	1 (25.00)	0 (0.00)
Severe	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Indifference				
No	24 (59.65)	36 (63.16)	36 (67.92)	35 (71.43)
Yes	23 (40.35)	21 (36.84)	17 (32.08)	14 (28.57)
Rarely	0 (0.00)	2 (9.52)	0 (0.00)	0 (0.00)
Sometimes	4 (17.39)	3 (14.29)	4 (23.53)	6 (42.86)
Often	9 (39.13)	8 (38.10)	10 (58.82)	3 (21.43)
Very Often	10 (43.48)	8 (38.10)	3 (17.65)	5 (35.71)
Mild	13 (56.52)	14 (77.78)	12 (70.59)	12 (85.71)
Moderate	8 (34.78)	4 (22.22)	5 (29.41)	2 (14.29)
Severe	2 (8.70)	0 (0.00)	0 (0.00)	0 (0.00)
Disinhibition				
No	44 (77.19)	47 (82.46)	43 (81.13)	41 (83.67)
Yes	13 (22.81)	10 (17.54)	10 (18.87)	8 (16.33)
Rarely	2 (15.38)	1 (10.00)	1 (10.00)	0 (0.00)
Sometimes	4 (30.77)	5 (50.00)	4 (40.00)	4 (50.00)
Often	3 (23.08)	2 (20.00)	4 (40.00)	4 (50.00)
Very Often	4 (30.77)	2 (20.00)	1 (10.00)	0 (0.00)
Mild	3 (23.08)	4 (44.44)	3 (33.33)	2 (25.00)
Moderate	7 (53.85)	3 (33.33)	5 (55.56)	5 (62.50)
Severe	3 (23.08)	2 (22.22)	1 (11.11)	1 (12.50)
Irritability				
No	31 (54.39)	34 (59.65)	37 (69.81)	33 (67.35)

Table 10: Frequencies and Percentages of Ratings for the Neuropsychiatric Inventory

Variable	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
Yes	26 (45.61)	23 (40.35)	16 (30.19)	16 (32.65)
Rarely	4 (15.38)	3 (13.04)	2 (12.50)	1 (6.25)
Sometimes	6 (23.08)	6 (26.09)	5 (31.25)	7 (43.75)
Often	9 (34.62)	10 (43.48)	4 (25.00)	5 (31.25)
Very Often	7 (26.92)	4 (17.39)	5 (31.25)	3 (18.75)
Mild	8 (30.77)	5 (21.74)	1 (6.67)	4 (26.67)
Moderate	15 (57.69)	14 (60.87)	12 (80.00)	8 (53.33)
Severe	3 (11.54)	4 (17.39)	2 (13.33)	3 (20.00)
Abnormal Physical Behavior				
No	42 (73.68)	46 (80.70)	41 (78.85)	38 (77.55)
Yes	15 (26.32)	11 (19.30)	11 (21.15)	11 (22.45)
Rarely	1 (6.67)	0 (0.00)	0 (0.00)	1 (9.09)
Sometimes	0 (0.00)	2 (18.18)	3 (27.27)	3 (27.27)
Often	7 (46.67)	3 (27.27)	5 (45.45)	5 (45.45)
Very Often	7 (46.67)	6 (54.55)	3 (27.27)	2 (18.18)
Mild	6 (40.00)	4 (36.36)	8 (72.73)	8 (72.73)
Moderate	6 (40.00)	5 (45.45)	3 (27.27)	2 (18.18)
Severe	3 (20.00)	2 (18.18)	0 (0.00)	1 (9.09)
Sleep and Nighttime Disorders				
No	34 (72.34)	30 (71.43)	30 (83.33)	22 (70.97)
Yes	13 (27.66)	12 (28.57)	6 (16.67)	9 (29.03)
Rarely	0 (0.00)	0 (0.00)	0 (0.00)	1 (11.11)
Sometimes	7 (53.85)	5 (41.67)	2 (40.00)	4 (44.44)
Often	6 (46.15)	4 (33.33)	3 (60.00)	3 (33.33)
Very Often	0 (0.00)	3 (25.00)	0 (0.00)	1 (11.11)
Mild	4 (30.77)	4 (33.33)	1 (20.00)	4 (44.44)
Moderate	6 (46.15)	5 (41.67)	3 (60.00)	4 (44.44)
Severe	3 (23.08)	3 (25.00)	1 (20.00)	1 (11.11)
Appetite and Eating Changes				
No	29 (61.70)	30 (66.67)	34 (70.83)	32 (78.05)
Yes	18 (38.30)	15 (33.33)	14 (29.17)	9 (21.95)
Rarely	2 (11.11)	0 (0.00)	1 (7.14)	0 (0.00)
Sometimes	5 (27.78)	4 (28.57)	1 (7.14)	1 (12.50)
Often	5 (27.78)	3 (21.43)	3 (21.43)	2 (25.00)
Very Often	6 (33.33)	7 (50.00)	9 (64.29)	5 (62.50)
Mild	10 (55.56)	7 (50.00)	8 (57.14)	4 (50.00)
Moderate	7 (38.89)	5 (35.71)	5 (35.71)	3 (37.50)
Severe	1 (5.56)	2 (14.29)	1 (7.14)	1 (12.50)

Table 11: Significance Tests Neuropsychiatric Inventory: Condition by Time (1 vs. 2)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Delusions									
Cond = 1									
T1	10	3.80 (3.52)	Cond	1	19	75.02	5.65	0.03	0.02
T2	9	4.22 (1.92)	Time	1	10	0.01	0.00	0.96	0.97
			Cond*Time	1	10	3.34	1.04	0.33	0.35
Cond = 2									
T1	7	7.71 (2.63)	Error		10	3.21			
T2	7	7.57 (4.12)	ID (Cond)		19	13.27			
Hallucinations									
Cond = 1									
T1	5	1.95 (0.71)	Cond	1	17	0.01	0.02	0.88	0.85
T2	7	1.90 (0.32)	Time	1	5	0.16	0.58	0.48	0.14
			Cond*Time	1	5	0.61	2.24	0.19	0.14
Cond = 2									
T1	8	1.86 (0.78)	Error		5	0.27			
T2	6	2.15 (0.80)	ID (Cond)		17	0.51			
Agitation/Aggression									
Cond = 1									
T1	16	3.94 (2.82)	Cond	1	32	30.26	2.62	0.12	NA
T2	12	4.33 (2.99)	Time	1	17	1.34	0.22	0.65	NA
			Cond*Time	1	17	5.13	0.84	0.37	NA
Cond = 2									
T1	12	5.25 (2.96)	Error		17	6.10			
T2	13	6.85 (3.65)	ID (Cond)		32	11.56			
Depression									
Cond = 1									
T1	8	3.25 (2.38)	Cond	1	22	37.60	3.47	0.08	NA
T2	9	3.56 (1.74)	Time	1	13	8.02	1.99	0.18	NA
			Cond*Time	1	13	8.02	1.99	0.18	NA
Cond = 2									
T1	10	5.60 (3.34)	Error		13	4.03			
T2	12	4.58 (3.39)	ID (Cond)		22	10.86			
Anxiety									
Cond = 1									
T1	10	4.40 (2.22)	Cond	1	22	23.34	2.19	0.20	0.18
T2	5	3.20 (1.92)	Time	1	7	0.11	0.02	0.90	0.56

Table 11: Significance Tests Neuropsychiatric Inventory: Condition by Time (1 vs. 2)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Cond = 2			Cond*Time	1	7	0.11	0.02	0.90	0.86
T1	10	6.50 (4.35)	Error		7	6.62			
T2	8	5.75 (2.71)	ID (Cond)		22	10.68			
Elation									
Sample too small for analysis									
Indifference (square-root transformed)									
Cond = 1									
T1	12	2.06 (0.53)	Cond	1	27	0.04	0.08	0.78	NA
T2	13	1.95 (0.47)	Time	1	10	0.25	3.37	0.10	NA
			Cond*Time	1	10	0.30	3.99	0.07	NA
Cond = 2									
T1	11	2.32 (0.69)	Error		10	0.08			
T2	5	1.79 (0.69)	ID (Cond)		27	0.43			
Disinhibition									
Sample too small for analysis									
Irritability									
Cond = 1									
T1	16	3.63 (2.28)	Cond	1	31	49.89	5.64	0.02	NA
T2	10	5.30 (2.63)	Time	1	14	0.68	0.11	0.74	NA
			Cond*Time	1	14	26.93	4.51	0.05	NA
Cond = 2									
T1	10	8.20 (2.74)	Error		14	5.97			
T2	13	5.77 (3.54)	ID (Cond)		31	8.85			
Abnormal Physical									
Cond = 1									
T1	9	5.22 (3.27)	Cond	1	17	1.91	0.14	0.71	0.72
T2	2	4.50 (2.12)	Time	1	5	1.03	0.17	0.69	0.33
			Cond*Time	1	5	0.46	0.08	0.79	0.75
Cond = 2									
T1	6	7.83 (3.60)	Error		5				
T2	9	6.67 (3.61)	ID (Cond)		17				
Sleep Disorders									
Cond = 1									
T1	7	3.71 (2.50)	Cond	1	14	0.21	0.02	0.90	0.89
T2	4	6.25 (4.65)	Time	1	7	15.21	3.45	0.11	0.11
			Cond*Time	1	7	12.10	2.74	0.14	0.15

Table 11: Significance Tests Neuropsychiatric Inventory: Condition by Time (1 vs. 2)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Cond = 2									
T1	6	6.33 (2.25)	Error		7	4.41			
T2	8	5.50 (3.38)	ID (Cond)		14	12.62			
Appetite Change									
Cond = 1									
T1	11	1.97 (0.66)	Cond	1	21	0.01	0.02	0.89	0.89
T2	7	2.25 (0.77)	Time	1	7	0.04	0.06	0.82	0.33
			Cond*Time	1	7	0.22	0.33	0.58	0.59
Cond = 2									
T1	7	2.06 (0.63)	Error		7	0.67			
T2	7	2.20 (0.44)	ID (Cond)		21	0.33			

Cond = 1

T3	7	2.01 (0.32)
T4	7	1.78 (0.54)

Cond	1	21	0.02	0.13	0.78	0.23
Time	1	6	0.27	4.43	0.08	0.06
Cond*Time	1	6	0.27	4.43	0.08	0.09

Cond = 2

T3	10	1.82 (0.31)
T4	7	1.80 (0.22)

Error	6	0.06
ID (Cond)	21	0.15

Disinhibition

Cond = 1

T3	3	5.33 (4.04)
T4	3	4.33 (1.53)

Cond	1	8	0.49	0.06	0.82	0.87
Time	1	5	4.46	1.16	0.33	0.27
Cond*Time	1	5	4.46	1.16	0.33	0.02

Cond = 2

T3	6	4.50 (2.17)
T4	5	5.00 (2.65)

Error	5	3.85
ID (Cond)	8	8.70

Irritability

Sample too small for analysis

Abnormal Physical

Cond = 1

T3	4	3.50 (1.73)
T4	5	3.40 (1.52)

Cond	1	15	2.64	0.43	0.52	0.39
Time	1	3	2.03	0.53	0.52	0.18
Cond*Time	1	3	13.23	3.49	0.16	0.18

Cond = 2

T3	7	4.14 (2.19)
T4	6	4.33 (3.39)

Error	3	3.79
ID (Cond)	15	6.20

Sleep Disorders

Sample too small for analysis

Appetite Change

Cond = 1

T3	6	2.31 (0.90)
T4	3	2.43 (0.41)

Cond	1	16	0.03	0.06	0.81	0.84
Time	1	2	1.40	4.57	0.17	0.51
Cond*Time	1	2	0.03	0.09	0.81	0.75

Cond = 2

T3	8	2.16 (0.51)
T4	5	2.37 (0.98)

Error	2	0.31
ID (Cond)	16	0.59

Table 13: Frequencies and Percentages of Ratings on the Clinical Dementia Rating Scale

Count	Condition 1				Condition 2			
	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
Memory								
None	2 (7.14)	0 (0.00)	0 (0.00)	0 (0.00)	1 (3.57)	1 (3.57)	0 (0.00)	0 (0.00)
Questionable	3 (10.71)	4 (13.79)	4 (15.38)	3 (13.04)	4 (14.29)	3 (10.71)	1 (3.85)	3 (11.54)
Mild	6 (21.43)	4 (13.79)	5 (19.23)	4 (17.39)	8 (28.57)	8 (28.57)	8 (30.77)	6 (23.08)
Moderate	8 (28.57)	9 (31.03)	6 (23.08)	6 (26.09)	6 (21.43)	5 (17.86)	6 (23.08)	7 (26.92)
Severe	9 (32.14)	12 (41.38)	11 (42.31)	10 (43.48)	9 (32.14)	11 (39.29)	11 (42.31)	10 (38.46)
Mean (SD)	2.68 (1.25)	3.00 (1.07)	2.92 (1.13)	3.00 (1.09)	2.64 (1.19)	2.79 (1.20)	3.04 (0.96)	2.92 (1.06)
Orientation								
None	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Questionable	3 (10.71)	3 (10.34)	3 (11.54)	0 (0.00)	4 (14.29)	3 (10.71)	3 (11.54)	1 (3.85)
Mild	7 (25.00)	5 (17.24)	7 (26.92)	6 (26.09)	10 (35.71)	8 (28.57)	7 (26.92)	8 (30.77)
Moderate	11 (39.29)	9 (31.03)	6 (23.08)	8 (34.78)	4 (14.29)	7 (25.00)	8 (30.77)	8 (30.77)
Severe	7 (25.00)	12 (41.38)	10 (38.46)	9 (39.13)	10 (35.71)	10 (35.71)	8 (30.77)	9 (34.62)
Mean (SD)	2.79 (0.96)	3.03 (1.02)	2.88 (1.07)	3.13 (0.81)	2.71 (1.12)	2.86 (1.04)	2.81 (1.02)	2.96 (0.92)
Judgement and Problem Solving								
None	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Questionable	4 (14.29)	1 (3.45)	2 (7.69)	1 (4.35)	3 (10.71)	2 (7.14)	2 (7.69)	2 (7.69)
Mild	5 (17.86)	5 (17.24)	5 (19.23)	4 (17.39)	7 (25.00)	4 (14.29)	5 (19.23)	5 (19.23)
Moderate	8 (28.57)	7 (24.14)	7 (26.92)	5 (21.74)	8 (28.57)	10 (35.71)	9 (34.62)	7 (26.92)
Severe	11 (39.29)	16 (55.17)	12 (46.15)	13 (56.52)	10 (35.71)	12 (42.86)	10 (38.46)	12 (46.15)
Mean (SD)	2.93 (1.09)	3.31 (0.89)	3.12 (0.99)	3.30 (0.93)	2.89 (1.03)	3.14 (0.93)	3.04 (0.96)	3.12 (0.99)
Community Affairs								
None	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Questionable	3 (11.11)	3 (11.11)	1 (4.17)	1 (4.55)	1 (4.17)	0 (0.00)	1 (4.55)	2 (9.09)
Mild	6 (22.22)	5 (18.52)	5 (20.83)	6 (27.27)	7 (29.17)	7 (29.17)	5 (22.73)	4 (18.18)
Moderate	9 (33.33)	8 (29.63)	5 (20.83)	7 (31.82)	3 (12.50)	4 (16.67)	3 (13.64)	10 (45.45)
Severe	9 (33.33)	11 (40.74)	13 (54.17)	8 (36.36)	13 (54.17)	13 (54.17)	13 (59.09)	6 (27.27)
Mean (SD)	2.89 (1.01)	3.00 (1.04)	3.25 (0.94)	3.00 (0.93)	3.17 (1.01)	3.25 (0.90)	3.27 (0.98)	2.91 (0.92)
Home and Hobbies								
None	0 (0.00)	1 (3.70)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Questionable	4 (15.38)	2 (7.41)	2 (8.33)	1 (4.55)	1 (4.17)	0 (0.00)	1 (4.55)	2 (9.09)
Mild	4 (15.38)	5 (18.52)	4 (16.67)	4 (18.18)	5 (20.83)	5 (20.83)	1 (4.55)	0 (0.00)
Moderate	6 (23.08)	3 (11.11)	5 (20.83)	4 (18.18)	7 (29.17)	5 (20.83)	6 (27.27)	9 (40.91)
Severe	12 (46.15)	16 (59.26)	13 (54.17)	13 (59.09)	11 (45.83)	14 (58.33)	14 (63.64)	11 (50.00)

Table 13: Frequencies and Percentages of Ratings on the Clinical Dementia Rating Scale

Count	Condition 1				Condition 2			
	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)	Time 1 N (%)	Time 2 N (%)	Time 3 N (%)	Time 4 N (%)
<i>Mean (SD)</i>	<i>3.00 (1.13)</i>	<i>3.15 (1.20)</i>	<i>3.21 (1.02)</i>	<i>3.32 (0.95)</i>	<i>3.17 (0.92)</i>	<i>3.38 (0.82)</i>	<i>3.50 (0.80)</i>	<i>3.32 (0.89)</i>
Personal Care								
None	0 (0.00)	1 (3.45)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (3.85)	1 (3.85)
Questionable	1 (3.57)	0 (0.00)	1 (3.85)	1 (4.35)	2 (7.14)	1 (3.57)	1 (3.85)	2 (7.69)
Mild	9 (32.14)	6 (20.69)	5 (19.23)	5 (21.74)	6 (21.43)	8 (28.57)	6 (23.08)	2 (7.69)
Moderate	18 (64.29)	22 (75.86)	20 (76.92)	17 (73.91)	20 (71.43)	19 (67.86)	18 (69.23)	21 (80.77)
Severe	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
<i>Mean (SD)</i>	<i>2.61 (0.57)</i>	<i>2.69 (0.66)</i>	<i>2.73 (0.53)</i>	<i>2.70 (0.56)</i>	<i>2.64 (0.62)</i>	<i>2.64 (0.56)</i>	<i>2.58 (0.76)</i>	<i>2.65 (0.80)</i>

Table 14. Clinical Dementia Rating Scale (Time 1 to 2)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Memory									
Cond = 1									
T1	28	2.68 (1.25)	Cond	1	55	0.22	0.09	0.76	
T2	29	3.00 (1.07)	Time	1	54	2.01	5.15	0.03	
			Cond*Time	1	54	0.44	1.12	0.29	
Cond = 2									
T1	28	2.64 (1.19)	Error		54	0.39			
T2	28	2.79 (1.20)	ID (Cond)		55	2.35			
Orientation									
Cond = 1									
T1	28	2.79 (0.96)	Cond	1	55	0.31	0.17	0.68	0.87
T2	29	3.03 (1.02)	Time	1	54	1.29	5.12	0.03	0.66
			Cond*Time	1	54	0.14	0.57	0.45	0.44
Cond = 2									
T1	28	2.71 (1.12)	Error		54	0.25			
T2	28	2.86 (1.04)	ID (Cond)		55	1.88			
Judgement/Problem Solving									
Cond = 1									
T1	28	2.93 (1.09)	Cond	1	55	0.26	0.16	0.69	
T2	29	3.31 (0.89)	Time	1	54	2.89	10.44	0.002	
			Cond*Time	1	54	0.14	0.52	0.48	
Cond = 2									
T1	28	2.89 (1.03)	Error		54	0.28			
T2	28	3.14 (0.93)	ID (Cond)		55	1.66			
Community Affairs									
Cond = 1									
T1	27	2.89 (1.01)	Cond	1	50	1.96	1.21	0.28	
T2	27	3.00 (1.04)	Time	1	48	0.35	1.08	0.30	
			Cond*Time	1	48	0.03	0.10	0.76	
Cond = 2									
T1	24	3.17 (1.01)	Error		48	0.33			
T2	24	3.25 (0.90)	ID (Cond)		50	1.62			
Home and Hobbies									
Cond = 1									
T1	26	3.00 (1.13)	Cond	1	49	0.81	0.45	0.51	0.78
T2	27	3.15 (1.20)	Time	1	48	0.65	2.05	0.16	0.40
			Cond*Time	1	48	0.05	0.17	0.68	0.66

Table 14. Clinical Dementia Rating Scale (Time 1 to 2)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Cond = 2									
T1	24	3.17 (0.92)	Error		48	0.32			
T2	24	3.38 (0.82)	ID (Cond)		49	1.82			
Personal Care									
Cond = 1									
T1	28	2.61 (0.57)	Cond	1	55	0.003	0.01	0.94	0.97
T2	29	2.69 (0.66)	Time	1	54	0.04	0.39	0.53	0.40
			Cond*Time	1	54	0.04	0.39	0.53	0.52
Cond = 2									
T1	28	2.64 (0.62)	Error		54	0.09			
T2	28	2.64 (0.56)	ID (Cond)		55	0.63			

Table 15. Clinical Dementia Rating Scale (Time 3 to 4)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Memory									
Cond = 1									
T3	26	2.92 (1.13)	Cond	1	53	0.00	0.00	0.99	
T4	23	3.00 (1.09)	Time	1	44	0.03	0.08	0.78	
			Cond*Time	1	44	0.16	0.42	0.52	
Cond = 2									
T3	26	3.04 (0.96)	Error		44	0.38			
T4	26	2.92 (1.06)	ID (Cond)		53	1.73			
Orientation									
Cond = 1									
T3	26	2.88 (1.07)	Cond	1	53	0.16	0.10	0.74	0.90
T4	23	3.13 (0.81)	Time	1	44	0.39	1.81	0.19	0.58
			Cond*Time	1	44	0.003	0.01	0.91	0.92
Cond = 2									
T3	26	2.81 (1.02)	Error		44	0.22			
T4	26	2.96 (0.92)	ID (Cond)		53	1.52			
Judgement/Problem Solving									
Cond = 1									
T3	26	3.12 (0.99)	Cond	1	53	0.41	0.26	0.61	
T4	23	3.30 (0.93)	Time	1	44	0.30	1.65	0.21	
			Cond*Time	1	44	0.13	0.70	0.41	
Cond = 2									
T3	26	3.04 (0.96)	Error		44	0.18			
T4	26	3.11 (0.99)	ID (Cond)		53	1.57			
Community Affairs									
Cond = 1									
T3	24	3.25 (0.94)	Cond	1	47	0.01	0.01	0.92	
T4	22	3.00 (0.93)	Time	1	39	2.38	9.67	0.004	
			Cond*Time	1	39	0.03	0.14	0.71	
Cond = 2									
T3	22	3.27 (0.98)	Error		39	0.24			
T4	22	2.91 (0.92)	ID (Cond)		47	1.43			
Home and Hobbies									
Cond = 1									
T3	24	3.21 (1.02)	Cond	1	47	0.70	0.50	0.49	0.81
T4	22	3.32 (0.95)	Time	1	39	0.10	0.65	0.43	0.64
			Cond*Time	1	39	0.30	1.90	0.18	0.20

Table 15. Clinical Dementia Rating Scale (Time 3 to 4)

Measure	N	Mean (SD)	Effect	d.f.num	d.f.den	MS	F	p	Randomization p
Cond = 2									
T3	22	3.50 (0.80)	Error		39	0.16			
T4	22	3.32 (0.89)	ID (Cond)		47	1.42			
Personal Care									
Cond = 1									
T3	26	2.73 (0.53)	Cond	1	53	0.45	0.61	0.44	0.78
T4	23	2.70 (0.56)	Time	1	44	0.01	0.09	0.77	0.66
			Cond*Time	1	44	0.01	0.09	0.77	0.88
Cond = 2									
T3	26	2.58 (0.76)	Error		44	0.10			
T4	26	2.65 (0.80)	ID (Cond)		53	0.75			

Table 16: Medications Prescribed by Category

Dietary Supplements	Lactase, Alendronate Sodium, Boost, Calcium, Calcitonin, Cranberry, Ferrous Sulfate, Folic Acid, KlorCon, Lactobacillus, Lactase, Mighty Shake, Multivitamin, Potassium Chloride, Prosource, Prostat, Prune Juice, Therapeutic M, Thiamine HCl, UtiStat, Vitamin B1, Vitamin B6, Vitamin B12, Vitamin C, Vitamin D, Vitamin D2, Vitamin D3, Vitamin E
Constipation	Bisacodyl, Docusate Sodium, Fiber Lax Powder, Fleet Enema, Hyfiber, Lactulose, Magnesium Hydroxide, Milk of Magnesia, Phosphate Enema, Polyethylene Glycol, Propylene Glycol, Sennosides Docusate Sodium, Surfak
Antibiotic	Amoxicillin, Clindamycin HCl, Gentamicin, Methenamine, Hippurate, Ofloxacin
Analgesic	Acetaminophen, Acetaminophen with Codeine, Aspirin, Bengay, Ibuprofen, Naproxen Sodium
Narcotic Opioid	Fentanyl, Morphine Sulfate, Oxycodone HCl, Tramadol HCl, Hydrocodone Acetaminophen
Antipsychotic	Aripiprazole, Haloperidol, Risperidone, Quetiapine Fumarate, Olanzapine
High BP / Angina	Amlodipine, Atenolol, Bystolic, Carvedilol, Clonidine HCl, Diltiazem, Disopholol Fumarate, Fosinopril, Furosemide, Hydralazine HCl, Hydrochlorothiazide, Labetalol, Lisinopril, Losartan Potassium, Metolazone, Metoprolol, Propranolol HCl, Spiroxolactone HCTZ, Valsartan, Verapamil
Anti-asthma / COPD	Advair, Albuterol Sulfate, Ipratropium Albuterol, Ipratropium Bromide, Symbicort, Tiotropium Handihaler
Uric Acid Redux	Allopurinol
Cholesterol	Atorvastatin Calcium, Fenofibrate, Fish Oil, Lovastatin, Omega3, Pravastatin Sodium, Simvastatin
Heart Rate	Atropine Sulfate, Digoxin, Diltiazem Flecainide
Antihistamine	Benadryl Cream, Cetirizine HCl, Fexofenadine HCl, Loratadine
Glaucoma	Azopt, Bimatoprost, Brimonidine Tarate, Dorzolamide HCl, Latanoprost Solution, Lantus Solution, Timolol Maleate, Travatan
Anti-depressant	Bupropion, Citalopram Hydrobromide, Duloxetine HCl, Escitalopram Oxalate, Paroxetine HCL, Mirtazapine, Venlafaxine HCL, Sertraline HCl
Anti-anxiety	Buspirone HCl, Lorazepam, Trazodone, Alprazolam
Dermatological	Calazyme, Clobetasol Dimethicone, Hydrocortisone, Ketoconazole, Lidocaine, Lubrisilk, Mometasone, Nystatin, Orajel, Pramoxine HCL, Sigmacort, Selenium Sulfide Shampoo, Triamcinolone, Acetonide, Vanicream, WhPetrolMinOil, Lanolin Ointment
Hemorrhoids	Preparation H, ProctozoneHC, Tucks Pad
Anticonvulsant	Carbamazepine, Fosphenytoin Sodium, Clonazepam, Divalproex, Gabapentin, Levetiracetam Phenytoin, Valproic Acid
Antiparkinson	Carbidopa Levodopa
Artificial Tears/Saliva	ArtificialTears, ArtificialSaliva
Cannabinoid	Dronabinol
Cancer	Exemestane, Ondansetron HCl
Acid Indigestion	Famotidine, Mylanta, Omeprazole, Tums
Diabetes	Glipizide, Glimepiride, Glucagon, Metformin, HumulinR, InstaGlucose, InsulinDetemir, InsulinGlargine, Insulin Lispero, Liquid Glucose, Nateglinide, Sitagliptin Phosphate
Cough Congestion	GeriTussin DM Syrup, Guaifenesin Syrup, Robitussin, Saline Nasal Spray
Hypothyroidism	Levothyroxine Sodium, Liothyronine
Diarrhea	Loperamide HCl
Alzheimer's Specific	Mernantine HCl, Rivastigmine Tartrate, Donepezil HCl
Antiflatulent	Miacid, Simethicone
Angina	Nitroglycerin Sublingual
Emotional incontinence	Dextromethorphan, Quinidine
Blood thinner	Coumadin, Clopidogrel Bisulfate, Rivaroxaban
Eye conditions	Occusoft, Prednisone Acetate, PreserVision

Table 16: Medications Prescribed by Category

Topical hormone	Premarin Vaginal Cream
Nausea/Vomiting	Prochlorperazine, Scopalamine
Ear wax	Carbamide Peroxide
Immunosuppressant	Cyclosporine
Steroid/Corticosteroid	Dexamethasone, Fludrocortisone
Stomach cramping	Hyoscyamine Sulfate
Mouth sores	Periogel
Prostate	Bicalutamide, Finasteride, Tamsulosin HCl, Trosipium
Ulcers	Ranitidine Sucralfate, Pantoprazole Sodium
Parkinson's disease	Ropinirole Hydrochloride
Chron's disease	Budisonide

Table 17: Frequency and Percentage of Medication Use by Medication/Supplement

Medication	Condition 1								Condition 2								
	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	
	Freq	%	Freq	%		Freq	%	Freq		%	Freq	%		Freq	%	Freq	%
Acetaminophen	25	83.33	28	93.33	26	92.86	24	96.00		26	89.66	26	100.0	29	100.0	25	100.0
Acetaminophen Hydrocodone	3	10.00	4	13.33	4	14.29	5	20.00		4	13.79	4	15.38	2	6.90	3	12.00
Acetaminophen with Codeine	0	0.00	0	0.00	0	0.00	0	0.00		1	3.45	1	3.85	0	0.00	1	4.00
Acetic Acid	0	0.00	1	3.33	0	0.00	0	0.00		0	0.00	0	0.00	0	0.00	0	0.00
Advair	0	0.00	0	0.00	0	0.00	0	0.00		1	3.45	1	3.85	1	3.45	1	4.00
Albuterol Sulfate	0	0.00	2	6.67	2	7.14	2	8.00		0	0.00	1	3.85	1	3.45	1	4.00
Alendronate Sodium	1	3.33	1	3.33	0	0.00	1	4.00		1	3.45	1	3.85	1	3.45	1	4.00
Allopurinol	1	3.33	1	3.33	1	3.57	1	4.00		0	0.00	0	0.00	0	0.00	0	0.00
Alprazolam	4	13.33	3	10.00	2	7.14	2	8.00		0	0.00	0	0.00	0	0.00	1	4.00
Amlodipine	6	20.00	8	26.67	7	25.00	5	20.00		5	17.24	5	19.23	7	24.14	6	24.00
Amoxicillin	1	3.33	1	3.33	1	3.57	1	4.00		0	0.00	0	0.00	0	0.00	0	0.00
Aripiprazole	0	0.00	0	0.00	0	0.00	0	0.00		1	3.45	1	3.85	1	3.45	1	4.00
Atenolol	2	6.67	2	6.67	2	7.14	2	8.00		2	6.90	2	7.69	2	6.90	2	8.00
Atorvastatin Calcium	3	10.00	5	16.67	4	14.29	4	16.00		2	6.90	4	15.38	4	13.79	4	16.00
Artificial Tears	3	10.00	4	13.33	4	14.29	4	16.00		4	13.79	3	11.65	5	17.24	4	16.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1				Time 2				Time 3				Time 4			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Artificial Saliva	2	6.67	1	3.33	2	7.14	2	8.00	2	6.90	0	0.00	0	0.00	1	4.00
Aspirin	8	26.67	10	37.33	10	35.71	9	36.00	9	31.03	9	34.62	10	34.48	10	40.00
Atropine Sulfate	3	10.00	4	13.33	2	7.14	4	16.00	3	10.34	3	11.54	3	10.34	3	12.00
Azopt	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Benadryl Cream	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	0	0.00	0	0.00
Bengay	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Bicalutamide	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Bimatoprost	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Bisacodyl	19	63.33	20	66.67	19	67.86	19	76.00	23	79.31	18	69.23	22	75.86	18	72.00
Boost	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	7.69	1	3.45	0	0.00
Brimonidine Tarate	1	3.33	1	3.33	1	3.57	1	4.00	2	6.90	1	3.85	0	0.00	2	8.00
Budisonide	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Brupropion	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Buspirone HCl	1	3.33	1	3.33	1	3.57	1	4.00	2	6.90	2	7.69	1	3.45	0	0.00
Bystolic	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Calazyme	0	0.00	0	0.00	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1		Time 2		Time 3		Time 4		Time 1		Time 2		Time 3		Time 4	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Calcium	2	6.67	1	3.33	3	10.71	0	0.00	1	3.45	2	7.69	1	3.45	2	8.00
Calcitonin	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Carbamazapine	0	0.00	0	0.00	0	0.00	0	0.00	2	6.90	2	7.69	2	6.90	2	8.00
Carbamide Peroxide	1	3.33	1	3.33	1	3.57	0	0.00	2	6.90	2	7.69	2	6.90	1	4.00
Carbidopa Levodopa	0	0.00	0	0.00	0	0.00	0	0.00	5	17.24	7	26.92	7	24.14	7	28.00
Carvedilol	3	10.00	3	10.00	3	10.71	3	12.00	0	0.00	1	3.85	1	3.45	1	4.00
Fosphenytoin Sodium	1	3.33	1	3.33	1	3.57	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Cetirizine HCl	2	6.67	3	10.00	3	10.71	1	4.00	1	3.45	1	3.85	1	3.45	1	4.00
Citalopram Hydrobromide	7	23.33	7	23.33	6	21.43	5	20.00	2	6.90	3	11.54	3	10.34	2	12.00
Clindamycin HCl	1	3.33	1	3.33	0	0.00	2	8.00	0	0.00	1	3.85	0	0.00	0	0.00
Clonidine HCl	3	10.00	3	10.00	3	10.71	2	8.00	0	0.00	1	3.85	1	3.45	1	4.00
Clobetasol	0	0.00	0	0.00	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Colnazepam	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Coumadin	2	6.67	3	10.00	3	10.71	3	12.00	1	3.45	2	7.69	2	6.90	2	8.00
Cranberry	1	3.33	2	6.67	1	3.57	1	4.00	1	3.45	0	0.00	0	0.00	0	0.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Cyclosporine	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	0	0.00	0	0.00
Dexamethasone	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Dextromethorphan																
Quinidine	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	0	0.00	0	0.00
Digoxin	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Diltiazem	1	3.33	1	3.33	1	3.57	1	4.00	1	3.45	0	0.00	1	3.45	1	4.00
Dimethicone	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Disophanolol Fumerate	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	0	0.00	0	0.00
Divalproex	1	3.33	2	6.67	2	7.14	1	4.00	3	10.34	4	15.38	3	10.34	3	12.00
Dorzolamide HCl	2	6.67	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Docusate Sodium	0	0.00	1	3.33	1	3.57	1	4.00	3	10.34	2	7.69	2	6.90	2	8.00
Donepezil HCl	11	36.67	10	33.33	8	28.57	8	32.00	8	27.59	8	30.77	6	20.69	9	36.00
Dronabinol	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	0	0.00	0	0.00
Duloxetine HCl	2	6.67	1	3.33	1	3.57	1	4.00	3	10.34	3	11.54	2	6.90	3	12.00
Escitalopram Oxalate	1	3.33	1	3.33	1	3.57	1	4.00	3	10.34	3	11.54	3	10.34	1	4.00
Exemestane	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1		Time 2		Time 3		Time 4		Time 1		Time 2		Time 3		Time 4	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Famotidine	1	3.33	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	0	0.00
Fenofibrate	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Fentanyl	1	3.33	3	10.00	1	3.57	1	4.00	0	0.00	1	3.85	1	3.45	1	4.00
Ferrous Sulfate	2	6.67	3	10.00	2	7.14	2	8.00	1	3.45	0	0.00	1	3.45	1	4.00
Fexofenadine HCl	0	0.00	1	3.33	1	3.57	1	4.00	1	3.45	1	3.85	1	3.45	0	0.00
FiberLax Powder	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	0	0.00	1	4.00
Finasteride	2	6.67	1	3.33	1	3.57	1	4.00	1	3.45	1	3.85	1	3.45	1	4.00
Fish Oil	1	3.33	0	0.00	1	3.57	1	4.00	1	3.45	1	3.85	1	3.45	1	4.00
Flecainide	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Fleet Enema	3	10.00	3	10.00	3	10.71	2	8.00	3	10.34	3	11.54	1	3.45	0	0.00
Fludrocortisone	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	3.85	1	3.45	1	4.00
Folic Acid	1	3.33	0	0.00	0	0.00	1	4.00	1	3.45	0	0.00	0	0.00	0	0.00
Fosinopril	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	3.85	1	3.45	1	4.00
Furosemide	7	23.33	10	33.33	8	28.57	9	36.00	8	27.59	10	38.46	10	34.48	8	32.00
Gabapentin	1	3.33	1	3.33	1	3.57	1	4.00	4	13.79	5	19.23	5	17.24	4	16.00
Gentamicin	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	0	0.00	0	0.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1				Time 2				Time 3				Time 4			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Gen Tussin DM Syrup	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Glipizide	1	3.33	2	6.67	1	3.57	1	4.00	0	0.00	1	3.85	1	3.45	1	4.00
Glimepiride	1	3.33	1	3.33	1	3.57	2	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Glucagon	1	3.33	2	6.67	1	3.57	0	0.00	3	10.34	2	7.69	2	6.90	2	8.00
Guaifenesin Syrup	5	16.67	2	6.67	2	7.14	4	16.00	9	31.03	6	23.08	7	24.14	7	28.00
Haloperidol	1	3.33	1	3.33	1	3.57	2	8.00	1	3.45	1	3.85	1	3.45	1	4.00
Humulin R	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	0	0.00	0	0.00
Hydralazine HCl	1	3.33	0	0.00	1	3.57	0	0.00	1	3.45	0	0.00	1	3.45	1	4.00
Hydrochlorothiazide	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	0	0.00	0	0.00
Hydrocortisone	0	0.00	0	0.00	1	3.57	1	4.00	1	3.45	0	0.00	0	0.00	0	0.00
Hyfiber	1	3.33	1	3.33	1	3.57	1	4.00	1	3.45	1	3.85	1	3.45	1	4.00
Hyoscyamine Sulfate	1	3.33	1	3.33	2	7.14	2	8.00	0	0.00	0	0.00	0	0.00	0	0.00
InstaGlucose	1	3.33	1	3.33	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Insulin Determir	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Insulin Glargine	0	0.00	1	3.33	0	0.00	0	0.00	0	0.00	2	7.69	0	0.00	1	4.00
Insulin Lispero	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	0	0.00	0	0.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Ibuprofen	1	3.33	0	0.00	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Ipratropium Albuterol	4	13.33	5	16.67	6	21.43	6	24.00	3	10.34	3	11.54	2	6.90	2	8.00
Ipratropium Bromide	1	3.33	2	6.67	1	3.57	1	4.00	2	6.90	3	11.54	1	3.45	2	8.00
Ivite	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	1	3.45	1	4.00
Ketoconazole	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
KlorCon	2	6.67	2	6.67	2	7.15	3	12.00	6	20.69	6	23.08	5	17.24	4	16.00
Labetalol	0	0.00	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Lactobacillus	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	3.85	0	0.00	0	0.00
Lactulose	2	6.67	1	3.33	2	7.15	2	8.00	1	3.45	1	3.85	1	3.45	1	4.00
Lactase	1	3.33	1	3.33	1	3.57	1	4.00	1	3.45	0	0.00	0	0.00	0	0.00
Latanoprost Solution	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Lantus Solution	0	0.00	0	0.00	1	3.57	1	4.00	6	20.69	3	11.54	5	17.24	3	12.00
Levetiracetam	0	0.00	1	3.33	1	3.57	1	4.00	1	3.45	1	3.85	1	3.45	1	4.00
Levothyroxine Sodium	5	16.67	3	10.00	4	14.29	3	12.00	7	24.14	7	26.92	8	27.59	7	28.00
Lidocaine	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	3	11.54	4	13.79	1	4.00
Lisinopril	2	6.67	3	11.00	3	10.71	3	12.00	9	31.03	8	34.62	8	27.59	7	28.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Liothyronine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00
Liquid Glucose	1	3.33	2	6.67	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Loperamide HCl 1	3.33	1	3.35	1	3.57	2	8.00	4	13.79	5	19.23	4	13.79	2	8.00	
Loratadine	0	0.00	0	0.00	0	0.00	0	0.00	2	6.90	2	7.69	4	13.79	3	12.00
Lorazepam	7	23.33	6	20.00	7	25.00	7	28.00	9	31.03	10	38.46	10	34.48	9	36.00
Losartan Potassium	5	16.67	6	20.00	6	21.43	6	24.00	1	3.45	0	0.00	0	0.00	0	0.00
Lovastatin	1	3.33	0	0.00	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Lubrisilk	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Magnesium Hydroxide	0	0.00	0	0.00	0	0.00	0	0.00	2	6.90	2	7.69	1	3.45	0	0.00
Mernantine HCl	9	30.00	9	30.00	8	28.57	7	28.00	7	24.14	7	26.92	8	27.59	7	28.00
Meprnole EC	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Metformin	1	3.33	0	0.00	0	0.00	1	4.00	1	3.45	0	0.00	0	0.00	0	0.00
Methanamine Hippurate	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Metolazone	1	3.33	3	10.00	2	7.14	2	8.00	0	0.00	0	0.00	0	0.00	0	0.00
Metaprolol	5	16.67	7	23.33	5	17.86	6	24.00	3	10.34	4	15.38	4	13.79	4	16.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Miacin Simethicone	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	0	0.00	0	0.00
Mighty Shake	0	0.00	1	3.33	1	3.57	1	4.00	0	0.00	1	3.85	1	3.45	1	4.00
Milk Magnesia	19	63.33	18	60.00	20	71.43	17	68.00	15	51.72	14	53.85	19	65.52	14	56.00
Mineral Oil Ointment	2	6.67	1	3.33	0	0.00	1	4.00	2	6.90	1	3.85	0	0.00	1	4.00
Mirtazapine	5	16.67	5	16.67	4	14.29	5	20.00	7	24.14	5	19.23	7	24.14	5	20.00
Mometasone	0	0.00	0	0.00	0	0.00	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Morphine Sulfate	3	10.00	4	13.33	5	17.86	5	20.00	3	10.34	4	15.38	4	13.79	5	20.00
Multivitamin	6	20.00	7	23.33	5	17.86	6	24.00	7	24.14	6	23.08	9	31.03	7	28.00
Mylanta	2	6.67	1	3.33	1	3.57	1	4.00	1	3.45	1	3.85	2	6.90	1	4.00
Nateglinide	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Naproxen Sodium	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Nitroglycerin Sublingual	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Nuirtogapine	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Nystatin	0	0.00	0	0.00	1	3.57	0	0.00	1	3.45	0	0.00	0	0.00	2	8.00
Occusoft	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	1	3.85	0	0.00	0	0.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2								
	Time 1		Time 2		Time 3		Time 4		Time 3	Time 4	Time 1		Time 2		Time 3	Time 4	
	Freq	%	Freq	%	Freq	%	Freq	%			Freq	%	Freq	%			
Olanzapine	1	3.33	1	3.33	1	3.57	1	4.00		2	6.90	2	7.69	2	6.90	1	4.00
Oflaxin	0	0.00	0	0.00	0	0.00	0	0.00		0	0.00	1	3.85	1	3.45	1	4.00
Omega 3	1	3.33	1	3.33	1	3.57	1	4.00		1	3.45	1	3.85	1	3.45	0	0.00
Omeprazole	4	13.33	6	20.00	6	21.43	5	20.00		6	20.69	6	23.08	7	24.14	6	24.00
Ondansetron HCl	1	3.33	1	3.33	3	10.71	3	12.00		0	0.00	1	3.85	1	3.45	1	4.00
Orajel	1	3.33	1	3.33	1	3.57	1	4.00		0	0.00	0	0.00	0	0.00	0	0.00
Oxycodone HCl	3	10.00	3	10.00	3	10.71	2	8.00		0	0.00	0	0.00	0	0.00	0	0.00
Pantoprazole Sodium	1	3.33	1	3.33	1	3.57	1	4.00		1	3.45	1	3.85	0	0.00	1	4.00
Paroxetine HCL	1	3.33	1	3.33	1	3.57	1	4.00		2	6.90	1	3.85	2	6.90	1	4.00
Periogel	1	3.33	0	0.00	0	0.00	0	0.00		0	0.00	0	0.00	0	0.00	0	0.00
Phenytoin	1	3.33	0	0.00	0	0.00	0	0.00		0	0.00	0	0.00	0	0.00	0	0.00
Phosphate Enema	1	3.33	0	0.00	1	3.57	1	4.00		2	6.90	0	0.00	3	10.34	3	12.00
Clopidogrel Bisulfate	1	3.33	1	3.33	1	3.57	0	0.00		0	0.00	1	3.85	0	0.00	0	0.00
Polyethylene Glycol	9	30.00	8	26.67	8	28.57	7	28.00		12	41.38	9	34.62	12	41.38	10	40.00
Potassium Chloride	1	3.33	3	10.00	3	10.71	3	12.00		1	3.45	4	15.38	4	13.79	5	20.00
Pramoxine HCL	0	0.00	0	0.00	0	0.00	0	0.00		1	3.45	0	0.00	1	3.45	1	4.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Pravastatin Sodium	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Prednisone Acetate	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	0	0.00
Premarin Vaginal Cream	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	1	3.45	1	4.00
Preparation H	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	1	3.45	2	8.00
Preser Vision	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	3.85	1	3.45	1	4.00
Prochlorperazine	1	3.33	1	3.33	1	3.57	1	4.00	1	3.45	2	7.69	2	6.90	2	8.00
Proctozone HCl	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Propylene Glycol	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Propranolol HCl	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Finasteride	2	6.67	1	3.33	1	3.57	1	4.00	1	3.45	1	3.85	1	3.45	1	4.00
Prosource Prostat	0	0.00	1	3.33	0	0.00	1	4.00	2	6.90	1	3.85	3	10.34	2	8.00
Prune Juice	4	13.33	4	13.33	4	14.29	2	8.00	5	17.24	5	19.23	5	17.24	5	20.00
Quetiapine Fumerate	3	10.00	5	16.67	5	17.86	3	12.00	9	31.03	6	23.08	9	31.03	8	32.00
Ranitidine	1	3.33	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Risperidone	3	10.00	2	6.67	3	10.71	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1				Time 2				Time 3				Time 4			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Rivaroxaban	1	3.33	1	3.33	1	3.57	1	4.00	1	3.45	1	3.85	1	3.45	0	0.00
Rivastigmine Tartrate	1	3.33	1	3.33	1	3.57	0	0.00	3	10.34	4	15.38	3	10.34	3	12.00
Robitussin	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	2	7.69	2	6.90	2	8.00
Ropinirole Hydrochloride	1	3.33	2	6.67	2	7.14	2	8.00	0	0.00	0	0.00	0	0.00	0	0.00
Saline Nasal Spray	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	2	7.69	2	6.90	2	8.00
Scopolamine	2	6.67	1	3.33	2	7.14	3	12.00	2	6.90	3	11.54	2	6.90	3	12.00
Sigmacort	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Selenium Sulfide Shampoo	1	3.33	0	0.00	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Sennosides Docusate Sodium	12	40.00	9	30.00	10	35.71	11	44.00	11	37.93	11	42.31	13	44.83	10	40.00
Sertraline HCl	5	16.67	6	20.000	6	21.43	6	24.00	4	13.79	2	7.69	6	20.69	4	16.00
Simvastatin	3	10.00	2	6.67	2	7.14	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Sitagliptin Phosphate	1	3.33	1	3.33	1	3.57	1	4.00	1	3.45	1	3.85	1	3.45	1	4.00
Spiroxolactone HCTZ	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	0	0.00	1	4.00
Sucralfate	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	0	0.00	0	0.00

Table 17: Frequency and Percentage of Medication Use (cont.)

Medication	Condition 1								Condition 2							
	Time 1				Time 2				Time 3				Time 4			
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Surfak	1	3.33	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Symbicort	0	0.00	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Tamsulosin HCl	3	10.00	2	6.67	3	10.71	2	8.00	0	0.00	0	0.00	0	0.00	0	0.00
Therapeutic M	1	3.33	1	3.33	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Thiamine HCl	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Timolol Maleate	2	6.67	2	6.67	1	3.57	2	8.00	0	0.00	0	0.00	0	0.00	0	0.00
Tiotropium Handihaler	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Travatan	1	3.33	1	3.33	1	3.57	1	4.00	0	0.00	1	3.85	1	3.45	0	0.00
Tramadol HCl	4	13.33	5	16.67	5	17.86	5	20.00	2	6.90	4	15.38	2	6.90	2	8.00
Trazodone	0	0.00	0	0.00	0	0.00	0	0.00	2	6.90	1	3.85	2	6.90	2	8.00
Triamcinolone Acetonide	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	0	0.00	1	3.45	0	0.00
Trospium	0	0.00	1	3.33	1	3.57	1	4.00	0	0.00	0	0.00	0	0.00	0	0.00
Tucks Pad	0	0.00	0	0.00	0	0.00	0	0.00	1	3.45	1	3.85	1	3.45	1	4.00
Tums	1	3.33	1	3.33	1	3.57	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Uti Stat	0	0.00	0	0.00	0	0.00	1	4.00	0	0.00	1	3.85	0	0.00	0	0.00

Table 25: Musical Genres on Playlist by Resident (Key below)

ID	BAND	BARB	BLUE	BROD	CELT	CHRI	CLAS	CNTY	DISC	EASY	FOLK	FUNK	GOSP	HIPH	HYMN	JAZZ	JEWI	LATI	MINS	MOVE	MRCH	NATI	NEWA	OPER	PATR	POLK	POP	REGG	REGI	RNB	ROCK	SOUL	SWIN	WALT
Crossover Study Group 1																																		
1	*		*	*		*	*	*		*	*		*	*	*	*				*						*		*	*	*	*	*	*	*
2	*	*		*				*	*		*					*					*			*	*	*		*	*	*	*	*	*	*
3	*		*					*	*							*					*				*	*	*		*	*	*	*	*	*
4	*		*	*				*	*		*		*	*	*	*				*		*			*	*	*		*	*	*	*	*	*
5	*			*		*	*	*		*	*		*		*	*									*		*							*
6	*			*				*	*						*	*										*	*	*						*
7								*	*		*		*		*	*										*	*	*						*
8	*			*		*	*	*	*	*	*		*	*	*	*				*	*	*	*	*		*	*	*			*	*	*	*
9				*			*	*	*	*	*		*	*	*	*				*	*	*	*	*		*	*	*		*	*	*	*	*
10	*					*		*	*	*	*		*	*	*	*				*	*	*	*	*		*	*	*		*	*	*	*	*
11	*			*			*	*							*	*		*	*	*	*	*	*			*	*	*		*	*	*	*	*
12	*			*			*	*	*	*					*	*	*	*	*	*	*	*	*			*	*	*		*	*	*	*	*
13															*	*	*						*			*	*	*	*		*	*	*	*
14	*			*											*	*	*			*						*	*	*				*	*	*
15	*			*				*					*		*	*	*			*						*	*	*		*	*	*	*	*
16	*			*									*		*	*	*			*						*	*	*				*	*	*
17	*			*		*	*				*		*		*	*	*			*						*	*	*		*	*	*	*	*
18	*			*									*		*	*	*			*						*	*	*				*	*	*
19	*										*	*			*	*	*							*		*	*	*		*	*	*	*	*
20											*	*			*	*	*							*		*	*	*		*	*	*	*	*
21															*	*	*									*	*	*		*	*	*	*	*
22	*														*	*	*		*						*	*	*	*		*	*	*	*	*
23	*														*	*	*		*						*	*	*	*		*	*	*	*	*
24	*														*	*	*		*						*	*	*	*		*	*	*	*	*
25															*	*	*		*					*	*	*	*	*		*	*	*	*	*
26	*					*	*								*	*	*		*						*	*	*	*		*	*	*	*	*
27															*	*	*		*						*	*	*	*		*	*	*	*	*

Table 25: Musical Genres on Playlist by Resident (cont.)

ID	BAND	BARB	BLUE	BROD	CELT	CHRI	CLAS	CNTY	DISC	EASY	FOLK	FUNK	GOSP	HIPH	HYMN	JAZZ	JEWI	LATI	MINS	MOVE	MRCH	NATI	NEWA	OPER	PATR	POLK	POP	REGG	REGI	RNB	ROCK	SOUL	SWIN	WALT
Crossover Study Group 2																																		
28	*							*								*									*		*							
29						*		*								*				*						*	*							
30	*			*		*		*			*		*		*	*			*	*					*	*	*						*	
31	*			*				*					*		*	*				*					*	*	*			*		*		
32	*	*		*			*	*			*		*		*	*				*	*	*			*	*	*	*				*		
33	*			*				*					*		*	*				*	*				*	*	*	*						
34	*							*								*				*	*				*	*	*	*					*	
35	*			*				*		*						*				*	*				*	*	*	*					*	
36								*								*				*	*				*	*	*	*						
37	*			*			*	*		*	*		*		*	*				*	*				*	*	*	*			*	*	*	
38	*			*		*	*	*		*	*		*		*	*				*	*				*	*	*	*			*	*	*	
39	*			*		*		*		*	*		*		*	*				*	*				*	*	*	*			*	*	*	
40	*			*			*	*								*		*		*				*	*	*	*	*						
41							*	*								*	*						*	*	*	*	*	*	*		*			
42	*			*			*	*		*						*	*	*		*	*			*	*	*	*	*						
43	*			*			*	*								*	*	*		*	*			*	*	*	*	*					*	
44	*			*		*	*	*								*	*	*		*	*			*	*	*	*	*				*	*	*
45	*			*				*								*	*	*		*	*			*	*	*	*	*				*	*	*
46				*	*	*	*	*				*	*		*	*		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
47				*		*		*			*	*	*		*	*		*	*	*	*		*	*	*	*	*	*	*			*	*	*
48								*			*					*			*	*			*	*	*	*	*	*					*	*
49								*			*					*			*	*			*	*	*	*	*	*						*
50	*						*	*			*				*	*			*	*			*	*	*	*	*	*			*			
51								*								*	*		*	*			*	*	*	*	*	*			*			
52								*								*	*		*	*			*	*	*	*	*	*						
53	*							*								*	*		*	*			*	*	*	*	*	*						
54		*				*	*	*			*		*		*	*			*	*			*	*	*	*	*	*						
55				*		*	*	*			*		*		*	*			*	*	*		*	*	*	*	*	*			*			
56				*		*	*	*			*		*		*	*			*	*	*		*	*	*	*	*	*						

Table 26: Listing of Genres and Codes for Music and Memory iPod Data

	Genre	Code
1	Barbershop quartet	BARB
2	Big band	BAND
3	Blues	BLUE
4	Broadway musical	BROD
5	Celtic	CELT
6	Christian	CHRI
7	Classical	CLAS
8	Country	CNTY
9	Disco	DISC
10	Easy listening	EASY
11	Folk	FOLK
12	Funk	FUNK
13	Gospel	GOSP
14	Hip Hop	HIPH
15	Hymn	HYMN
16	Jazz	JAZZ
17	Jewish	JEWI
18	Latin	LATI
19	March	MRCH
20	Minstrel / Parlour	MINS
21	Movie score	MOVE
22	Native American New Age	NATI
23	New Age / Electronic	NEWA
24	Opera	OPER
25	Patriotic	PATR
26	Polka	POLK
27	Pop	POP
28	Regge	REGG
29	Regional music	REGI
30	Rhythm and Blues	RNB
31	Rock	ROCK
32	Soul	SOUL
33	Swing	SWIN
34	Waltz	WALT

Table 47. Qualitative Responses to the Question about Key Reasons for Selecting Residents to Participate in the M&M

Category	Note	Number of Respondents	Examples of Quotes
Music as enjoyment	Music to increase enjoyment as music has been meaningful to or enjoyed by residents (personal history or connection identified by family members or staff)	21	<p>"Family shared resident had a history with music and or enjoyed music."</p> <p>"Residents with strong interest or response to music."</p> <p>"Enjoyed music."</p>
Positive mood and reduced behavioral problems	Music to improve resident mood (e.g., reducing anxiety, agitation, etc) or reduce behavioral problems	16	<p>"Included residents in program that showed signs of depression, anxiety, boredom, isolation, and also included any resident that would enjoy music."</p> <p>"Passive participation, tendencies to wander."</p> <p>"To decrease episodes of behaviors, decrease signs and symptoms of depression, improve foster communication."</p>
Positive mood and reduced behavioral problems	Music reduces anxiety or stress during transitioning into the NH life	2	<p>"When new residents are admitted they sometimes need the music diversion to help them settle in."</p> <p>"Some residents that are having a difficult time adjusting find the M&M program comforting."</p>
Positive mood and reduced behavioral problems	Music as a stimulant during leisure time	2	<p>"Someone who could use some stimulation during their leisure"</p>
Comfort	Music as a palliative care for end-stage dementia residents (to provide comfort and relieve pain)	7	<p>"Pain, bed bound residents to give comfort, end of life for comfort"</p> <p>"End of life care, relaxation during night hours for restlessness"</p>
As an alternative activity	Music listening as an alternative to structured other individual or group activities for residents who are socially isolated (either by choice or	22	<p>"Residents do not show agitation or behaviors but responds to music when no other activities gain their interest"</p>

Table 47. Qualitative Responses to the Question about Key Reasons for Selecting Residents to Participate in the M&M

Category	Note	Number of Respondents	Examples of Quotes
	due to lack of ability to participate in activities)		<p>"Some residents were identified that like music and prefer minimal group activities"</p> <p>"Anxiety, or residents who preferred to stay in their room and not participate in group activities."</p> <p>"In bed often, unable to participate in group activities, confusion, loneliness"</p> <p>"Those residents who had depression or isolated were also included to benefit from uplifting music."</p>
The resident met the criteria	<ul style="list-style-type: none"> Residents met the criteria (Alzheimer's or dementia, medication, behavioral problems, etc) to participate (n=5) M&M offered as a supplemental program for Medicaid residents (n=2) Music seen as helpful by families or staff (n=2) (why perceived as helpful is not known) 	9	

Table 48. Music and Memory Implementation

	Freq (%)
Q19. Who created the playlists for your residents? (Check all that apply):	
Immediate family or relatives of the resident	90 (55.9)
Activity director or activity staff	118 (73.3)
Music therapist	14 (8.7)
The residents themselves	0 (0)
Other Nursing home personnel (please specify):	38 (23.6)
Administrator	2
Administrative Assistant	3
Business office manager and staff	1
CNA	11
Director of Education and Training	1
Line staff	4
Nurses	2
Outreach personnel	1
Psych interns	1
Residential friends	1
Social services	3
Social worker	4
Volunteers	8
Q14. Does your facility use iPods or another type of portable music player?	
Apple iPods or iPod Shuffles only	97 (60.2)
Non-Apple portable music players	3 (1.9)
Both iPod / iPod Shuffles and non-Apple portable music players	34 (21.1)
We do not currently offer the M&M program	27 (16.8)
Q16. On average, approximately how many times per week do the majority of the residents listen to their music on their playlist?	
1-5	94 (75.8)
6-10	20 (16.1)
11-15	4 (3.2)
16-20	1 (0.8)
>20	5 (4.0)
Q17. On average, for how long (in minutes) do the majority of the residents listen to the music on their playlist each week?	
0-30	34 (26.9)
31-60	23 (18.2)
61-90	10 (7.9)
91-120	11 (8.7)
121-150	3 (2.3)
151-180	9 (7.1)
181-210	5 (3.9)
211-240	3 (2.3)
241-270	2 (1.5)
271-300	3 (2.3)
>300	23 (18.2)

Table 49. Responses to the Question of Implementation Process

Category	Note	Examples of Quotes
Selection criteria	<p>Mostly dementia diagnosis with behavioral problems</p> <p>Some specifically mentioned music preferences in addition to dementia and behavioral problems</p> <p>Some specifically mentioned Medicaid and medication criteria in addition to dementia and behavioral problems</p>	<p>"Our M&M program is care planned for each person. We offer it to dementia residents especially those that become anxious and restless. The staff have them available to them as needed. Activity staff oversees the program but floor staff charge them when needed."</p> <p>"Most of the residents chosen were either non-verbal or unable to verbally say what kind of music they wanted. The headphones and iPod were then hung on the back of their wheelchair in a cloth bag. Timing and frequency of use are difficult to track since the nursing staff are encouraged to apply the iPod. They are encouraged to put the headphones on the resident whenever they are awake and not participating in any activity. Staff rarely track or use the headphones. The music therapist maintains equipment by doing weekly checks. The nursing staff doesn't always take the time to track usage."</p>
Time/day of the week and Frequency	<p>Sundown n=5</p> <p>Before and after meal n=4</p> <p>Peak behavioral problem time n=5</p> <p>Most appear to have scheduled time for some and varying time for some, with ranges of 15 minute per session to unlimited time per session, and once in a while to everyday</p>	<p>"Timing and frequency depends on residents and availability of staff time to use iPods. I try to get as many on residents on 2 days week. Night nursing staff use more frequently for residents with sundowning and behavioral issues. We chose residents based on who liked music, who have some dementia. "</p>
Staff discretion on when to administer: almost all Incorporated into a fixed schedule or care plan (n=15)		
Responsible person:	<p>Activity (n=30 including life enrichment coordinators)</p> <p>Recreation staff n=10</p> <p>Music therapist n=2</p> <p>CNAs or other direct care staff n=10</p> <p>Administrators, and others or not specifically answered = n=43</p>	<p>"We chose participants based on behaviors-medications-physical impairments. Program was implemented during down time - time of escalated behavior - and anticipated times of behavior and per request. Music offered to participants based on daily schedule, events, or activities. Ctrs and nursing aides were responsible for maintaining charging. "</p>

Table 50. Value of M&M

	N (%)
Q26. Please rate each of the following statements about M&M:	
A. M&M is easy for our facility to use	
Strongly Disagree	2 (1.5)
Disagree	14 (10.5)
Agree	78 (58.6)
Strongly Agree	39 (24.4)
B. The results of the M&M program are easy to see	
Strongly Disagree	1 (.8)
Disagree	9 (6.9)
Agree	72 (55.4)
Strongly Agree	47 (36.2)
C. The M&M program is compatible for the types of programs for dementia that our facility wants to offer	
Strongly Disagree	1 (.8)
Disagree	0 (0.0)
Agree	71 (55.5)
Strongly Agree	56 (35.0)
D. The use of M&M is cost effective relative to other interventions designed to help residents with dementia	
Strongly Disagree	0 (0.0)
Disagree	7 (5.6)
Agree	62 (49.6)
Strongly Agree	54 (33.8)
E. This type of program is suitable for helping residents experience and maintain personhood	
Strongly Disagree	1 (.8)
Disagree	2 (1.6)
Agree	59 (36.9)
Strongly Agree	66 (51.2)
F. This program complements our current programming	
Strongly Disagree	1 (.8)
Disagree	1 (.8)
Agree	62 (48.4)
Strongly Agree	63 (49.2)
G. Compared with pharmacological approaches, this program will result in the residents experiencing better interactions and being more socially engaged	
Strongly Disagree	2 (1.7)
Disagree	15 (12.5)
Agree	55 (45.8)
Strongly Agree	47 (39.2)
H. Using M&M does not involve making changes to what we usually do to provide services to our clients	
Strongly Disagree	3 (2.3)
Disagree	15 (11.4)
Agree	68 (51.5)
Strongly Agree	46 (34.8)

Table 51. Responses to the Question about the Value of the Music and Memory program

Category	Number of Respondents	Examples of Quotes
Positive	81	<p>"They are beneficial. Do require time for upkeep which with staffing issues is sometimes difficult. "</p> <p>"Helps with moods and behaviors. "</p> <p>"I believe this is an excellent program. It has great value for those participate. Activity hours have been cut and we can't maintain everything. Will be working on ramping this up again in 2016. "</p> <p>"In the words of a family member of a participant "music brings life to mom. I see my mother's face when she has her headphones on and she looks genuinely happy, calm and peaceful. I once again see the smile this horrible disease is trying to take from her. Occasionally, she will even sing again, with the music providing the ability to recall words that she has lost. Yes, music brings life back to mom..... The music and memory program has benefitted me just as much as my mom. I am able to see glimpses of happiness that the music provides her and it fill my heart with joy."</p> <p>"The residents that have used it seem to benefit from it. The music doesn't work every time but is a tool to help residents. "</p> <p>"I think this is a terrific program for people - especially with dementia. It provides a very appropriate activity for them to participate in when some activities are too difficult. It is wonderful to hear our residents make comments about the music, see them tapping their feet to the beat of the music or see them smile or relax. I just wish all the staff would embrace the program. "</p>
Mixed: <ul style="list-style-type: none"> • Varying responses by residents (n=6) • Works but time, resource, and labor intensive (n=13) • Subtle or qualitative changes but not concrete/quantitative results yet (n=6) • Other (n=11) 	36	<p>"M&M program is valuable for certain residents, but some residents it agitates them more. It is trial and error. "</p> <p>"Were seen as varied results. For some, it has been amazing - residents smile, clap hands, tap feet! Others show no response or become annoyed with head phones. "</p> <p>"It can be useful but it takes a lot of time to make it run well. "</p> <p>"M&M can be a great program when implemented consistently. I am disappointed in the study for focusing so much on medication and not emphasizing the positive impact on the individual. "</p> <p>"Good program if we could get staff on board to and use of iPods and keep them charged. "</p> <p>"The program brings about positive outcomes, but is very labor intensive. Without two interns it would have taken much longer. "</p> <p>"At this time I have not seen great changes in our residents, but I still feel it is a worthwhile alternative to</p>

offer our residents, I will continue to offer this as an added part of our activity program and life enrichment for our residents. ”

“I don’t think it’s really had an impact with medication reduction. I do think during time of use it helps with resident mood. It doesn't seem to have prolonged effects on residents after use except if they listen before bed, otherwise it's more in the moment type results. ”

“I feel that it is a good program. More for enjoyment/quality of life. I would like to see better results and hope for a more structured system as the program continues to develop. ”

“My concern as a music therapist is that facilities will think they can just throw headphones on seniors to give them music, which could in turn devalue the work of a music therapist, costing music therapists their jobs. Music listening is a very tiny piece of the puzzle of the power of music. It can also do damage if not administered properly. Some facilities and news articles are praising the efforts a social worker who supposedly does music therapy called music & memory. ”

Negative	1	I don’t find it valuable.
Program not yet implemented or temporarily suspended	12	

Table 52. iPod use and resident acceptance of the Music and Memory program

	Freq (%)
Q21. How many residents have you had in your M&M program and how many liked and did not like using the iPods or other portable music players to listen to music?	
Total number of residents you have tried to involve in M&M?	
1-10	55 (45.8)
11-20	38 (31.6)
21-30	13 (10.8)
31-40	3 (2.5)
41-50	6 (5.0)
>51	5 (4.1)
Number of residents who liked using the iPods	
1-10	35 (28.4)
11-20	42 (34.1)
21-30	25 (20.3)
31-40	10 (8.1)
41-50	3 (2.4)
>51	8 (6.5)
Number of residents not liking using the iPods	
0	18 (14.8)
1	15 (12.3)
2	27 (22.1)
3	16 (13.1)
4	10 (8.2)
5	14 (11.5)
6-10	16
11-15	3
>16	3

Table 53. Responses to the question of what residents liked about M&M based on the staff observation.

Category	Note	Number of Respondents	Examples of Quotes
Positive affect or enjoyment	Most emphasized that personalized nature of the music is key to enjoyment and some stated that music seem to trigger happy memories (n=5) or happy mood. Headphone was also mentioned as a tool to distract from noise (n=2).	43	<p>"Gave them an upbeat mood."</p> <p>"They recalled songs and lyrics from the past and for some it changed their expression and mood to happy."</p> <p>"Made them happy."</p> <p>"They liked hearing all their favorite songs back to back. Many will smile when we put it on them. They like knowing that they have their own music that they don't have to share."</p>
Calming and relaxing effect		32	<p>"It took them to a relaxing calming place."</p> <p>"It triggered memory and seemed to calm behaviors during times of sun downing."</p> <p>"They were able to deescalate (behaviors) and block out the noise and commotion around them and in common areas."</p> <p>"They enjoy the music - it has a calming effect."</p>
Increased social engagement and expression	Residents were more alert, verbal and increased social interaction	22	<p>"The residents like listening to their own music as evidenced by them dancing and conducting with the music."</p> <p>"Listen to old-time favorites, smiles, toe tapping, hand gestures."</p> <p>"Talking about the era their favorite music was from and why it is special to them."</p> <p>"They seem more alert. Some residents will often sing along or hum to the music they hear, others will listen and often brings a smile to their face."</p>
Other	Individualized music seems to be the key to observing beneficial effects (n=18), and other strengths noted include portability (n=1), and headphone giving privacy without affecting others and blocks noise (n=2)	21	<p>"Their favorite music."</p> <p>"Music they reflect on."</p> <p>"Music that is portable."</p> <p>"Listening to own music choices."</p> <p>"Using the headphones also helps to mask some of the other sounds around them."</p>

Table 53. Responses to the question of what residents liked about M&M based on the staff observation.

Category	Note	Number of Respondents	Examples of Quotes
Memory	Brought back memories	11	<p>"It was their favorite music and brought back memories."</p> <p>"Memory provoking."</p> <p>"The music and the memories it brought back reminiscing and sharing with others the special significance/memory of the song(s) listening to music they personally picked."</p>
Entertainment	Pass the time or relieve boredom	5	<p>"Filled time."</p> <p>"Liked to listen to music during transition times. Helped with boredom and anxiety."</p>

Table 54. Responses to the Question about Residents did not like about M&M as implemented at their facility.

Category	Note	Number of Respondents	Examples of Quotes
Did not like wearing headphones	Some used earphone or speakers but also not being easily portable was an issue in the case of using speakers. At the same time, speakers could be effectively used mostly in their own room.	86	<p>"A small number of residents had difficulty with head phones staying in place."</p> <p>"Residents were unable to take headphones off when tired of listening."</p> <p>"Didn't like wearing/didn't want to wear the headphones."</p> <p>"One resident does not like headphones - she enjoys live music and music on cd player but not the headphones on her ear."</p>
Music led to increased agitation or was over-stimulating	<p>Due to:</p> <ul style="list-style-type: none"> • Music too stimulating • Residents not into music (n=2) • Too much sound or noise or too long a session (e.g., 1 hour) (n=3) • Headphone or speakers (n=3) 	21	<p>"Some that were agitated found it (music) upsetting. Didn't like the noise. "</p> <p>"One resident showed more agitation."</p> <p>"Some don't like the headphones or speakers due to confusion and they may already be agitated when the music is tried on them. "</p> <p>"Sensory overload. Not interested in music."</p>
Equipment issues	<ul style="list-style-type: none"> • Charging (n=5) • iPod use (n=15) 	20	<p>"Not always charged we need a new system."</p> <p>"Battery dies. We wound up setting up multiple iPods for same residents because she would listen all day. "</p> <p>"Residents often had troubles using iPods and dock stations independently they would get especially frustrated with volume control. "</p> <p>"Not knowing how to use iPod - confusion with new technology. "</p> <p>"Some did not like the iPods - too small. "</p>

Table 54. Responses to the Question about Residents did not like about M&M as implemented at their facility.

Category	Note	Number of Respondents	Examples of Quotes
			"iPods not user friendly for seniors, those who were not capable of running them. Could not turn it on/off, could not charge, had to always ask for help to use it, or charge it."
Resident prefers quiet environment or not into music		11	<p>"Not interested in the program. Prefers a quiet environment."</p> <p>"Liked the music but didn't think she needed that "i like quiet."</p> <p>"Others just did not enjoy listening to the music."</p>
Issues with hearing		5	<p>"Some have hearing issues."</p> <p>"Difficulty hearing with hearing aids."</p>
Did not like song selection (n=3); Five facilities explicitly stated that they noticed no problem (n=5)			

Table 55. Responses to the question about Barriers that make it difficult for nursing homes to provide the Music and Memory program to residents (asked to list up to 5 barriers)

Category	Note	Number of Respondents	Examples of Quotes
Buy-in by direct care staff (e.g., nurses, CNAs, and other direct care staff) to implement the program	<ul style="list-style-type: none"> To put on/start the music (n=3) General buy-in (n=52) Using and offering iPods (n=30) <p>Examples: Staff remembering to use them; put the music on the resident during appropriate times; Follow thru with utilizing the program for those that have the iPods, Consistency in using iPods, Staff putting wrong pod on a member</p>	85	<p>"Buy-in of direct care staff."</p> <p>"CNA buy in - nursing staff in general and other staff involvement (management and other departments)."</p> <p>"Active assistance and initiative from other staff to put on residents' music."</p> <p>"Floor staff zero getting involved."</p> <p>"Loss of enthusiasm by staff."</p> <p>"Follow through from CNAs to use/apply music."</p> <p>"Reminding staff to use them if not in a group."</p> <p>"Staff remembering to use the iPod for specific residents."</p> <p>"Staff leaving iPod on"</p> <p>"Staff not initiating on all shifts."</p> <p>"Staff putting wrong iPod on a member."</p>
Use of Technology	<p>Issues with:</p> <ul style="list-style-type: none"> Charging (n=22) iTune (n=4) Downloading music (n=3) WIFI (n=3) Other equipment issues (n=17) Programing issues (n=3) Not knowing how to use equipment (n=4) Other (n=6) 	62	<p>"Maintaining iPods - checking that staff has stored / charged them."</p> <p>"Difficulty of access with iTunes."</p> <p>"Downloading music with our computer system."</p> <p>"Compatibility with wifi issues."</p> <p>"Equipment / being able to access iTunes on a work computer."</p> <p>"The shuffles are too small and the off button too hard to see and shut off."</p> <p>"Lots of iPods have died (refurbished ones) we can't use any of the shuffles because you can't see what's playing on them."</p>

Table 55. Responses to the question about Barriers that make it difficult for nursing homes to provide the Music and Memory program to residents (asked to list up to 5 barriers)

Category	Note	Number of Respondents	Examples of Quotes
Lack of Time	Limited or lack of staff time to set up, and maintain the program (e.g., creating playlist, playing it regularly, keeping it updated for new residents, checking to charge batteries, etc)	60	<p>"Lack of time and staff to assure iPod is still playing / follow-up."</p> <p>"Limited staff time, especially CNAs."</p> <p>"Staff time to keep the program up to date and current (new residents, new music)."</p> <p>"Staff time to set up and maintain the playlists."</p> <p>"Time commitment to distribute iPods."</p>
Cost	For buying music, buying iPods, and headphones	28	<p>"Budget to purchase additional music."</p> <p>"Cost of iTunes."</p> <p>"Cost of replacing the i-pod."</p> <p>"Cost of the iPods."</p> <p>"Financial upkeep."</p> <p>"Getting people to donate more devices."</p>
Materials lost / misplaced / theft prevention		24	<p>"Keeping track of all the equipment ."and keeping the iPod charged."</p> <p>"Keeping track of the shuffle units."</p> <p>"Shift to shift to inform who has them on so they can be put away."</p> <p>"No GPS on iPods."</p>
Identifying preferred songs (difficult to identify specific songs for the playlist, finding music,		22	<p>"Lack of knowledge to residents' music likes and dislikes."</p> <p>"Making playlists is challenging - family doesn't always know."</p> <p>"Having the music that the residents prefer available."</p>
Resident buy-in	Residents not liking iPods (n=14) / hearing problems or headphone issues(n=5)	19	<p>"Residents confused/take off."</p> <p>"Residents not wanting to wear headphones."</p> <p>"Residents with poor hearing cannot hear music."</p>

Table 55. Responses to the question about Barriers that make it difficult for nursing homes to provide the Music and Memory program to residents (asked to list up to 5 barriers)

Category	Note	Number of Respondents	Examples of Quotes
			"Residents passing away or leaving."
Training	Educating initial staff and educating new staff due to turnover	14	"Educating all the nursing staff CNAs and nurses due to turnover." "Training of nursing staff on 3 shifts." "Educating use of iPod shuffle, especially when there is no screen to observe ."
Accessibility	Accessibility to iPods or computer to load songs	12	"Accessibility of iPods for staff. " "Accessibility to mutual computer for iTunes. " "Having equipment available / charged. " "Securing equipment in easily accessible area."
Staffing	Inadequate staffing / staff turnover (n=9) or lack of or inconsistency volunteers (n=3)	12	"Not enough staff to do program (mostly just activity director) ." "Not enough staff trained in program." "Staff turn over."
Families not supportive or helpful		12	"Awaiting responses from family / guardians for involvement in the program and input for the playlists. ." "Getting residents specific music preferences from families." "Lack of family help and music selection."
Needing corporate approval / facility involvement		4	
Resident turnover		5	
Lack of knowledge about program implementation		4	
Other miscellaneous		10	"Limited amount of iPods."

Table 56. Responses to the Question about Facilitators (things that make it easier) for nursing homes to provide the Music and Memory program to residents

Category	Number of Respondents	Examples of Quotes
Facility personnel (basically all, IT, CAN, activity staff, administration, family) supportive of program	55	<p>“Administrator is extremely positive involvement.”</p> <p>“Daily presence of activity staff.”</p> <p>“Having a volunteer come and set-up and load iPods.”</p> <p>“Enthusiasm from activity department.”</p> <p>“Nursing staff that use it.”</p>
Positive effects of M&M on residents and resident characteristics (e.g., being calm, enjoyment, residents wanting to listen to music)	43	<p>“Enjoyment and response of residents to music.”</p> <p>“If the units are used, they do help curb behavior and anxiety.”</p> <p>“Residents want to listen to music.”</p> <p>“Residents want to participate.”</p> <p>“CNA staff observing success.”</p> <p>“May provide comfort to a resident.”</p>
Providing training and support for M&M	33	<p>“All staff training.”</p> <p>“DHS providing training.”</p> <p>“Monthly support calls from state / facilitator.”</p> <p>“Support from M&M staff, webinars.”</p> <p>“Understanding of technology.”</p> <p>“Staff education.”</p> <p>“Staff training.”</p>
Family involvement (bringing music, donating shuffles to use, putting the iPod on, being supportive of the program)	33	<p>“Asking families to bring in cd's that their family member likes.”</p> <p>“Families are happy about program.”</p> <p>“Family involvement makes it easier.”</p> <p>“Families provide or donate shuffles to use.”</p> <p>“Families are supportive and involved.”</p>
Accessibility of equipment	31	<p>“Accessibility of iPods & computer.”</p> <p>“Available in resident rooms.”</p> <p>“Having iPods accessible for staff to administer.”</p> <p>“Having iPods available on the unit.”</p> <p>“Open location for immediate access.”</p> <p>“Easily accessible 24/7.”</p>
Equipment characteristics and ease of use	21	<p>“Being so small and portable.”</p> <p>“Equipment is small, lightweight.”</p> <p>“Easy for all staff to use.”</p> <p>“iPod is easy to use.”</p> <p>“Easy to store away.”</p>
Financial / donations	20	<p>“Have purchased newer iPods through our foundation.”</p> <p>“Grant from state of WI.”</p> <p>“Grant to increase iPods.”</p>

Table 56. Responses to the Question about Facilitators (things that make it easier) for nursing homes to provide the Music and Memory program to residents

Category	Number of Respondents	Examples of Quotes
		"Donations from family/friends." "High school fundraising."
Other support (mostly volunteers)	15	"Community support once word is out." "Student volunteers to assist." "Volunteer involvement."
Equipment donations	15	"A big donation of iPods so we always have a supply on hand." "Donations of equipment." "iPod and iTunes donations."
Other <ul style="list-style-type: none"> • Playlist associated (already have good music library, or access to music) (n=8) • Keeping iPods charged / maintaining equipment (n=4) • Formal incorporation into program (n=20) • Media attention (n=2) • Type of equipment (n=6) 	40	"Good music library." "Having iPods fully charged for use at anytime." "Put on activity calendar." "Simplified assessment forms." "Assignment of time for implementation." "We initially received a lot of PR from the newspaper and a radio station that helped staff buy into the program."

Table 57. Use of medication for the management of behavioral problems

	Freq (%)
Q31. Has your facility attempted to reduce the use of medication as a form of restraint for persons afflicted with dementia?	
Yes	109 (72.2)
No	42 (27.8)
Q33. On approximately what date did you begin the process of reducing medications?	
2002	1 (1.5)
2005	2 (2.9)
2006	1 (1.5)
2009	1 (1.5)
2010	5 (7.4)
2012	7 (10.3)
2013	21 (30.9)
2014	17 (25.0)
2015	13 (19.1)
Q34. Does your facility track the rate of medication reduction over time?	
Yes and the overall rate of reduction since we started is:	21 (13.0)
Yes, but we do not know the rate of reduction	72 (44.7)
No, we do not track changes in use	19 (11.8)
Q34a. Reported rates of reduction:	
2-10%	8 (38.1)
11-20%	3 (14.2)
21-30%	4 (19.1)
31-40%	2 (9.5)
>41	4 (19.1)
Q35. If you use medication for restraint, which of the following are reasons for use? (Check all that apply to any of our residents):	
Resident(s) resist(s) care or assistance unless medicated	15 (9.3)
Resident refuses to take other medication	4 (2.5)
Resident is irritable or aggressive towards other people	52 (32.3)
Resident paces	2 (1.2)
Resident calls out or yells	21 (13.0)
Resident wanders or seeks to leave the unit or facility	13 (8.1)
Staff are unable to control resident behavior	31 (19.3)
Do not use medications as a form of restraint	13 (8.1)
Other:	28 (17.4)
a. All other behavioral modifications have failed and the resident is a danger to him/herself or others.	
b. All other behavioral modifications have failed and the resident is a danger to him/herself or others.	
c. Anxiety, panic bipolar	
d. As ordered per their doctor for their disease / Med dx support use	
e. Delusions or hallucinations	
f. Family request antianxiety be offered or anti-psych meds and family does not want trial reduction - bad experience in past	
g. Only in emergency situations	
h. Only use with appropriate mental health diagnosis	
i. Resident express psychotic behaviors	
Q36. Have you noticed any difference in the need to use medication for restraint as a result of adopting the M&M program?	
Yes	52 (54.7)

Table 57. Use of medication for the management of behavioral problems

	Freq (%)
No	43 (45.3)
Q37. By how much do you think the M&M program is responsible for decreasing medication use in your facility? (If you do not know the exact amount, please just give your best guess estimate as a percentage of the total reduction from 0% to 100%):	
0	41 (47.1)
1-5	6 (6.9)
6-10	14 (16.1)
11-20	11 (12.7)
21-30	5 (5.7)
31-40	6 (6.9)
41-50	3 (3.4)
>50	1 (1.1)



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