3-2017

Can individualized music reduce agitation and increase meaningful communication in dementia center clients?

Catherine Pinas

Can individualized music reduce agitation and increase meaningful communication in dementia center clients?

by

Catherine Pinas

Undergraduate honors thesis under the direction of

Dr. Neila Donovan CCC-SLP

Department of Communication Sciences and Disorders

Submitted to the LSU Roger Hadfield Ogden Honors College in partial fulfillment of the Upper Division Honors Program.

March 2017

Louisiana State University
& Agricultural and Mechanical College
Baton Rouge, Louisiana

ACKNOWLEDGEMENTS

I would like to express immense gratitude to my advisor and mentor, Dr. Neila Donovan, for her guidance and support throughout this process. She taught me invaluable lessons about research and provided me with the moral support I needed to pursue this endeavor. Working with her has been an unforgettable experience. Thanks also to my honors thesis committee members, Dr. Katie Cherry and Dr. Susan Duncan. Their insights broadened my perspective on both memory and language.

I would also like to thank the members of the Communication Outcomes Research Lab (COR) for their dedication to this project. Their contributions of data management, transcribing, and coding allowed for the study to be completed in just two semesters. A special thanks to the COR doctoral students Surani Nakkawitta and Barnali Mazumdar for their unwavering support.

I would like to thank my funding sources, without whom this research would not have been possible: The Tiger Athletic Foundation Undergraduate Scholarship supporting Thesis research in the Honors College, the LSU Discover Program, and the LSU ASPIRE Program. These programs provided me the opportunity to present my findings at the Aging in America Conference in Chicago, IL and LSU Discover Days.

A special thank you to Alzheimer's Services of the Capital Area and Charlie's Place for their welcoming nature, and to the study participants and their families for their consent and cooperation. I would also like to thank Dr. Katie Cherry, her doctoral student Beth Lyon, and the LSU Life Course and Aging Center for the collection and creation of the M&M Playlists. The study would not have been possible without the partnerships with these people and organizations

A final thank you to my family and friends whose endless support and encouraging words were worth more than I can express on paper. Thank you for the proof reading, the pep-talks, and your belief in me—it meant the world.

Table of Contents

ABSTRACT

Purpose: Research has shown that individualized music can lead to a decrease in agitation and stimulation in remote memory in people with dementia (PWD), by giving the listener an interpretable stimulus. Music and Memory (M&M), a program based on such research, has proven successful in long term care facilities, but no known research exists concerning its feasibility in a Dementia Activity and Respite Center. Anecdotal evidence exists in support of M&M increasing quality of language and meaningful interactions; however, no empirical data exists to support this claim. This study investigated the feasibility of M&M, its effects on agitation, and its effects on quality of language as measured by abandoned utterances, extensions, tangential utterances, mazes (revision, repetition, filled pauses), and repetition of information.

Methods: Nine Charlie's Place clients participated in the study, all of whom had probable mild to moderate dementia of varying types. Participants listened to their individualized music playlists 1x/week for 30 minutes for six weeks. Feasibility was determined by taking data every session to document any difficulties in implementation. Two Charlie's Place staff members completed the Cohen-Mansfield Agitation Inventory for Community (CMAI-C) to acquire a baseline agitation level. Pre- and post-intervention language samples were collected using the M&M Questionnaire. The language samples were recorded, transcribed, coded, and analyzed using Systematic Analysis of Language Transcripts (SALT) by research assistants in the Communication Outcomes Research Laboratory at Louisiana State University.

Results: Music and Memory proved feasible in a Dementia Activity and Respite Center as the researchers were able to implement the program with ease. There was a statistically significant improvement of extensions from pre- to post-implementation of the M&M, but the other

variables did not demonstrate statistically significant improvement. As agitation was not reported pre-M&M, it could not be analyzed at the end of treatment.

Conclusion: These results represent a pilot study, and as such, cannot be generalized to the broader population. However, it is a base upon which further research into M&M and its effects on agitation and language in PWD at a Dementia Activity and Respite Center can be investigated.

List of Tables and Figures

Abbreviations used in the document

Abbreviations	Name
AD	Alzheimer's Disease
PWD	People with dementia
RDC	Respite Centers
CMAI-C	Cohen-Mansfield Agitation Inventory for Community
M&M	Music and Memory Program
CP	Charlie's Place
MMSE	Mini Mental State Examination
MAZEREV	Revision Mazes
MAZEREP	Repetition Mazes
MAZEFP	Filled Pause Mazes
EXT	Extensions
TANG	Tangential Utterances
REP	Repetition of Ideas
SALT	Systematic Analysis of Language Transcripts

Can individualized music reduce agitation and increase quality of language for dementia center clients?

BACKGROUND

What is Dementia?

In 2010, more than 35.6 million people were living with dementia, a number that is expected to triple by 2050 (Sakamoto, Ando, & Tsutou, 2013). Grabowski and Damasio (2004) defined dementia as "a syndrome characterized by acquired and persistent impairment to multiple cognitive domains that is severe enough to limit competence in activities of daily living, occupation, and social interaction" (as cited in Mahendra & Hopper, 2017). Dementia is a term that includes many syndromes. The most notable symptom is progressive cognitive decline typically associated with aging (Mitchell, McCollum, & Monaghan, 2013). While numerous subtypes of dementia have been identified, all varying in presentation, they are characterized overall by progressive loss of memory; language deterioration; poor judgement; difficulty performing practical tasks previously deemed easy (Mitchell et al., 2013); poor attention skills; decreased executive functioning; and deterioration in visuospatial abilities (Mahendra & Hopper, 2017).

The most common type of dementia is Alzheimer's Disease (AD), accounting for 50% to 70% of all dementias. 1 in 9 older adults in America has AD. Other prominent types include Vascular Dementia, accounting for 10% to 17% of all cases, and Lewy Bodies, Parkinson 's Disease and Frontotemporal Lobar Dementia, which together account for 13% of all dementia cases (Mahendra & Hopper, 2017). The *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM–5*; American Psychiatric Association, 2013) states that when diagnosing dementia, the physician should specify the cause if known (i.e., AD, Frontotemporal Lobar

Dementia, etc.). It states the diagnostic criteria for major neurocognitive disorder (dementia) as follows:

A. Evidence of significant decline from a previous level of performance in one or more cognitive domains (complex attention, executive function, learning and memory, language, perceptual motor, or social cognition) based on:
    1. Concern of the individual, a knowledgeable informant, or the clinician that there has been a significant decline of function; and
    2. A substantial impairment in cognitive performance, preferably documented by standardized neuropsychological testing or, in its absence, another quantified clinical assessment.
B. The cognitive deficits interfere with independence in everyday activities (i.e., at a minimum, requiring assistance with complex instrumental activities of daily living such as paying bills or managing medications).
C. The cognitive deficits do not occur exclusively in the context of delirium
D. The cognitive deficits are not better explained by another mental disorder (e.g., major depressive disorder, schizophrenia) (American Psychiatric Association, 2013).

The etiology of dementia is idiopathic and inadequately understood, despite being the leading cause of disability and dependence in care (Mitchell et al., 2013). Need for care arises because it eventually becomes impossible for people with dementia (PWD) to function independently in daily life due to both cognitive and physical declines. However, people with dementia may maintain modified independence through early and mid-stages.

Stages of Dementia:

There are three stages of dementia. These stages are the mild (early) stage, the moderate (middle) stage, and the severe (late) stage. As AD is the most common cause of dementia, the stages presented in this paper focus on symptoms associated with the progression of AD. Type and severity of cognitive and language impairment change as AD progresses.

The mild (early) stage is the least severe. The affected person is still self-sufficient, but the cognitive deficits begin to affect his or her daily life. The hallmark symptom of this phase is memory loss, namely a decline in short term memory. The impairment has a significant effect on anyone diagnosed with dementia, but it may create even more difficulty for those who still hold a job or participate in other complex activities (Kilmova, Maresova, Valis, Hort, & Kuca, 2015). Other symptoms at this stage include apathy, loss of interest, fear, and sadness. People with AD often become depressed or anxious because they are aware of their cognitive decline but are incapable of stopping it. The depression and anxiety may lead to isolation (Kilmova et al., 2015).

The moderate (middle) stage is more severe and can last anywhere from two to ten years. Its hallmark signs are memory loss and the worsening of speech and language skills (Kilmova et al., 2015). People with AD have difficulty remembering basic information such as their address or telephone number and confuse words in sentences. They experience reduced attention and difficulty with verbal, mathematical, reading, and writing activities. Disorientation in both unknown and known environments becomes common, as does disorientation in time and space accompanied by delusions and hallucinations. Moodiness and withdrawal from daily activities are also likely, especially if the activities are mentally or socially challenging (Kilmova et al., 2015). It is at this stage that the burden on caregivers may increase significantly due to the constant care the PWD may require.

Supporting caregivers is an effective measure for improving the well-being of the caregivers and PWD. One way to support caregivers during the mild and moderate stages of dementia is to provide respite care for the PWD. Respite care is defined as "a supportive service provided in or outside of the home to give the informal caregiver a temporary relief or break from caregiving duties" (Vandepitte et al., 2016, p. 1278). Respite care can be divided into community based and residential. Respite Day Centers (RDC) are classified as residential and are advantageous because they allow caregivers to take a short break while keeping PWD in familiar surroundings. The decision to admit someone with dementia into a RDC program is often due to the burden of caregiving and insufficient social support for PWD in the home (Mossello et al., 2008). Furthermore, Mossello et al. (2008) found behavioral and psychological symptoms decreased when people participated in RDC. They suggested that the increase in stimulation in a social environment may be part of the reason for such improvements.

In the severe (late) phase of AD, the damage spreads to the frontal lobe and severely affects memory, judgment, logical reasoning, and social skills. This stage lasts one to three years and inevitably leads to death. The affected person is unable to act appropriately, as most of the nerve cells of the brain are damaged (Kilmova et al., 2015). Prominent signs of this phase are difficulties with eating, walking, and identifying relatives and friends. Memory is severely impaired, but certain memories may be recalled with cues, such as pictures or music (Kilmova et al., 2015). Many PWD are admitted into residential long-term care facilities in the final stages of the disease because they are unable to communicate their needs and require a level of nursing care that is typically not available in the home.

Dementia and Language:

Communication disorders are present in most cases of dementia. In fact, a key sign of dementia is the deterioration of both speech production and comprehension (Brotons & Koger, 2000). The severity of language impairments correlates with the severity of the dementia. For example, in the late stages of dementia, language mainly consists of "pre-learned, preprogrammed utterances used in common situations" and echolalia, which is the repetition of another's speech (Brotons & Koger, 2000).

In the early stages of dementia, language impairment associated with a decrease of sociolinguistic aspects, or language usage, arise. Language usage affects successful interpersonal interactions, thus, declines in sociolinguistic skills lead to difficulties in social situations. People with dementia may speak too loudly, talk excessively, or speak at inappropriate times. They often digress from the topic, repeat thoughts or trail off in the middle of an utterance (Kilmova et al., 2015). Language impairments in dementia are also characterized by language structure difficulties which include phonology, morphology, and syntax. The result is difficulty with all language modalities—auditory comprehension, verbal expression, reading, and writing (Donovan, Kendall, Bacon Moore, Rosenbek, & Gonzalez Rothi, 2006).

In AD specifically, people tend to experience "early lexico-semantic disturbances and late syntactic impairment" (Mondini, Arcara, & Jarema, 2014, p. 969). The type and severity of language impairment changes as AD progresses. In the mild phase, speech is fluent but word-finding is problematic. In the moderate phase, communication ability deteriorates significantly. The affected PWD may have trouble remembering their thoughts long enough to verbalize them and cannot adequately respond in conversation because they do not understand everything being said. During this stage, people may return to their native language in an effort to be understood,

even if it has not been spoken in years (Kilmova et al., 2015). In the severe phase, both sending and receiving of messages is impaired to the point that communication is nearly impossible (Kilmova et al., 2015).

While AD is the most common type of dementia, other types of dementia present different language symptoms. Identification of language impairment is important because it may give insight into the specific type of dementia a person has, ultimately determining the management of the disease (Tang-Wai & Graham, 2008). For example, Frontotemporal Lobar Dementia alone has four variants, each presenting with different language problems. A person with Semantic Frontotemporal Lobar Dementia presents with semantic association and conceptual knowledge deficits. A person with Progressive Nonfluent Aphasia (PNFA) presents with agrammatism, apraxia of speech, dysarthria, verbal preservation, and mutism. Moreover, a person with Logopenic Variant Primary Progressive Aphasia (LV-PPA) presents with impaired auditory comprehension and naming ability as well as phrase and sentence repetition. Finally, the Behavioral Variant presents with repetition of another person's speech, verbal disinhibition, and scarce language (Mahendra & Hopper, 2017). Identification of these language symptoms is essential in the differential diagnosis of the dementia type. While language impairment assists in identifying the type of dementia, identification of cognitive impairments plays the most critical part in diagnosing dementia.

Dementia and Cognition:

Cognitive impairment is a hallmark sign of dementia. Deficits include those of executive functioning, reasoning, visuoconstructive abilities, language abilities, semantic knowledge, and short term memory (Szatloczki, Hoffmann, Vincze, Kalman, & Pakaski, 2015). Language is a "cognitive process that conveys what people see, hear, feel, want, and remember" (Wray, 2017,

p. 85). As cognitive decline occurs, language abilities deteriorate (Wray, 2017), specifically the language that relies heavily on cognitive processing (i.e., reading, using sequential relations and context, and understanding divergencies) (Brotons & Koger, 2000).

Language function is helpful in identifying the extent of the cognitive deficits throughout the stages of dementia (Szatloczki et al., 2015). People with dementia lack cognitive inference abilities. This leads to a struggle with conversation because conversation often requires multiple inferences. Discourse requires numerous cognitive processes and complicated ideation (i.e., planning, organizing and cognitive flexibility). Therefore, as cognitive abilities decrease, discourse abilities decrease. As such, discourse is a useful tool in identifying the cognitive abilities of PWD (Deepa & Shyamala, 2010).

Difficulties in speech production and comprehension overlap with memory functions. Early on, dementia affects the hippocampus which is essential for episodic memory. This explains why a person with AD has trouble remembering recent events but does relatively well recalling past events. As past memories are easier to remember, stimulus that evokes the recollection of past memories is pleasing to PWD (Gerdner, 1997).

As AD progresses, cognitive decline affects semantic knowledge. Semantic knowledge is the ability to gain and preserve general knowledge about the world, such as basic facts and words and their meanings. An example of semantic knowledge includes the ability to identify people and objects. Semantic knowledge deficits worsen as dementia, specifically AD, progresses, suggesting that there is a steady decline in semantic memory through the phases of AD (Szatloczki et al., 2015).

Cognitive impairment lessens one's ability to process and receive sensory stimuli, resulting in a decrease in the individual's stress threshold. Agitation occurs when the stress

threshold is exceeded. Therefore, with a lower stress threshold it becomes easier for the threshold to be exceeded, allowing a person with dementia to become agitated more quickly (Gerdner, 2010). The study of music and dementia can be linked largely to music's soothing cognitive effects and language elicitation in PWD.

Dementia and Music:

Music provides a connection to inner life and the power to bring about change (Wall & Duffy, 2010). Consequently, music has the power to engage PWD, enhance social and emotional skills, and decrease behavioral problems while acting as a stimulus for language and memory recall. It acts as an alternative for medication and helps to integrate PWD in physiological, psychological, and emotional ways. Music can be used to enhance communication between PWD and their caregivers (Wall & Duffy, 2010).

Music contains elements such as melody and rhythm, which access different parts of the brain. Such areas include the right hemisphere and limbic system, which is responsible for "emotions and language as a function of the left hemisphere" (Wall & Duffy, 2010, p. 108). When language and music act together in a song, they create more neural activation than language alone. Music can activate pathways to different brain areas such as the hypothalamus and prefrontal cortex, which are linked with emotional behaviors (Wall & Duffy, 2010).

Receptive and expressive music abilities are preserved beyond cognitive decline, suggesting that music and language processing are separate. Memory for *familiar* music is spared in PWD longer than the ability to recognize the name of the song (Gerdner, 1997). Individualized music therapy takes traditional music therapy further by providing familiar, personalized music that will elicit positive memories for PWD.

Individualized music is the music preferred by an individual. It has specific meaning in the individual's life. Gerdner (1997) found that individualized music reduced agitation and stress by evoking positive memories in PWD. It allows PWD to connect with the past and acts as an alternative method of communication following the deterioration of expressive and receptive language abilities. Schall, Haberstroh, and Pantel (2015) found that individualized music therapy has a positive effect on communication behavior, situational well-being and expression of positive emotions in PWD. Furthermore, interactive music intervention stimulates cognitive and emotional function in PWD (Sakamoto et al., 2013). It elicits personal memories, which in turn provoke positive emotional states. Interactive individualized music therapy is an effective way to restore relationships between PWD and their loved ones (Sakamoto et al., 2013).

Gerdner (1992) theorized remote memory would be engaged during individualized music therapy because music changes the focus of attention to provide an interpretable stimulus—something recognizable. The meaningful musical stimulus overrides the competing stimuli in the environment which are often confusing and meaningless to PWD. The idea was expanded upon by Gerdner in 1997 with the *Mid Range Theory* of individualized music as an intervention for people with dementia. The theory, which is illustrated in Figure 1, states that cognitive impairment leads to a lower stress threshold, which in turn leads to increased agitation. Individualized music then decreases such agitation in PWD because the memories associated with the music are positive and soothing.

Gerdner (2005) found that personalized music sparked meaningful conversations and led to an overall reduction in agitation. Seven family members described reduced levels of agitation and three family members reported that the music had a calming effect on their loved ones and alleviated and prevented stress (Gerdner, 2005). Individualized music therapy has been described

as a proven clinical intervention for individuals who have emotional, behavioral, social, and communication difficulties which includes PWD. The research surrounding personalized music and the Mid Range Theory is the basis of the Music and Memory program (M&M).

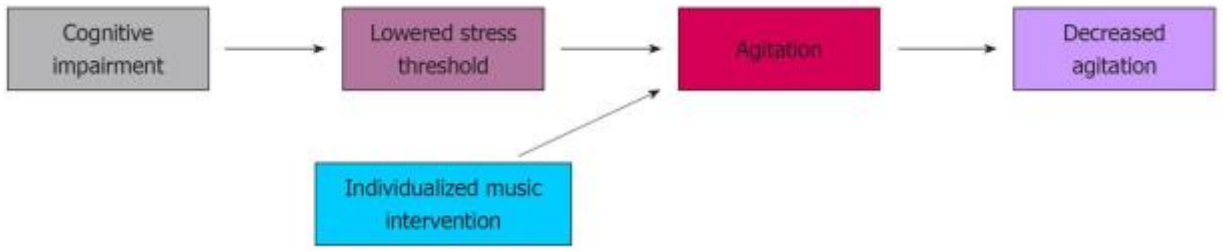

Figure 1: The Mid Range Theory is depicted in this chart as it shows how cognitive impairment leads to a lowered stress threshold which leads to increased agitation. It also shows that individualized music intervention decreases agitation.

The M&M website suggests that M&M vastly improves the quality of life in PWD by giving them personalized music on iPods. Caregivers and family members are trained to create individualized playlists and administer the music. Although M&M has not been implemented in a Dementia Activity and Respite Center, to our knowledge, there is anecdotal evidence for M&M's success in long term care facilities. This anecdotal evidence comes from a video produced by M&M in which a client, Henry, becomes animated listening to his personal playlists, singing and rocking his arms as the music plays. Following the presentation of M&M, Henry is more talkative and social as well as easier to understand. He engages in conversation and answers questions. This anecdotal evidence suggests that M&M allows PWD to reconnect with those around them, regain social skills, and improve their quality of life (Music and Memory, 2017). However there is no empirical evidence to support these claims.

In conclusion, dementia affects cognitive and communicative behaviors significantly. Music and Memory originated in long term care facilities, and has not been used for PWD in a Dementia Activity and Respite Center. Anecdotal evidence suggests that language improves after

M&M, but there is no quantified data to support this. This study attempted to quantify the changes in language, specifically language usage. There are currently no known studies that have done pre-and post-M&M, but given the perceptions about improvement, the study seemed worthwhile.

Purpose:

The aims of this study were to determine the feasibility of M&M at a Dementia Activity and Respite Center and to investigate the effects of individualized music on language usage and agitation.

Research Questions:

1. Is it feasible to implement M&M at a Dementia Activity and Respite Center?
2. Does individualized music improve the quality of language in PWD as measured by the number of abandoned utterances, extensions, tangential utterances, mazes (repetitions, revisions, filled pauses), and repetitions of information?
3. Does individualized music reduce agitation in PWD in a Dementia Activity and Respite Center setting?

Hypothesis:

Based on its success in long-term care facilities, I hypothesized that M&M would be successfully implemented in the Dementia Activity and Respite Center. Based on the anecdotal evidence of the improvement of the man in the M&M video after individualized music intervention, I hypothesized the quality of language would increase. In consulting the research done by Gerdner and other researchers, I hypothesized that agitation would decrease.

METHODS

This study examined the quality of verbal expression of PWD before and after they participated in M&M. Participants and/or caregivers gave their consent according to the Alzheimer's Services of the Capital Area Charlie's Place Respite Center Consent Form.

Design: This was an exploratory within group comparison of repeated measures study. The independent variable was the M&M treatment condition: pre- and post-implementation of M&M. There were two dependent variables. The first was the measure of language variables—abandoned utterances, extensions, tangential utterances, mazes (revisions, repetitions, and filled pauses), and repetition of ideas—that determine quality of language taken from the participants' collected language samples. The second was the ratings on the Cohen-Mansfield Agitation Inventory for Community, which has established validity and reliability.

Participants: The study originally included 10 participants, all of whom were current clients at Charlie's Place (CP), but one withdrew due to discharge. To obtain the sample, 14 participants were screened, one refused, and three did not meet the study criteria. The CP admission criteria were used as the study inclusion criteria. They included:

- Must have a physician documented diagnosis of probable mild to moderate dementia
- Must be independent in toileting
- Must be ambulatory
- Must be able to hear and communicate verbally
- Must not require medical attention (dressing changes, injections, oral medications) while at CP

Specific inclusion criteria for this study included:

- Must be a client at CP for at least one month prior to enrolling in the study

- Must be a native English speaker because, as previously stated, people often revert to their native language during the moderate stage of dementia
- Must have an interest in music because if they did not enjoy music before dementia, it is not likely that they will enjoy it once they have acquired dementia
- Must have a high school level of education, as that is when the brain acquires an adequate level of problem solving skills and language usage

It was also important for the participant to have a family member who could communicate their music preferences to the researchers. In accordance with HIPAA regulations, all the participants' information was de-identified. Table 1 summarizes the participants' demographics according to age in years, sex, years post-diagnosis, type of dementia, years of formal education, profession, MMSE score on admission to CP and list of medications each participant was taking.

Table 1. Participant Demographics

ID	Age (years)	Sex	Race	Education	Profession	Year post-Diagnosis	Dementia Type	Admit MMSE Score	Pre-existing Disorders
B2	63	M	Caucasian	B.S.	Contractor	5	Frontotemporal	3	None
D4	79	F	Caucasian	High School	Accounting Clerk	4	Alzheimer's	27	None
E5	87	F	Caucasian	High School	Switchboard Operator	6	Alzheimer's	12	Diabetes
F6	59	F	Caucasian	High School	Payroll Clerk	4	Alzheimer's	14	None
G7	76	M	Black	High School	Pipefitter	5	Alzheimer's	18	Glaucoma, HBP
H8	79	M	Caucasian	M.B.A.	Legislative Auditor	7	Alzheimer's	17	Glaucoma, High Blood Pressure, Diabetes
J10	97	M	Caucasian	B.S.	Dairy Farmer/Finance Company Owner	5	Dementia	13	Diabetes, Heart Disease
K11	90	F	Black	M.A. Ed	P.E. Teacher	7	Dementia	20	Hypertension
M13	82	F	Caucasian	M.A. Ed	Teacher/Nun/ Missionary	3	Dementia	14	Cancer survivor

Materials:

The materials for this study included:

- The Gerdner Assessment of Personal Music Preference to gather information about the participants' music preferences (Gerdner, Hartsock, & Buckwalter, 2000)
- The Cohen-Mansfield Agitation Inventory for Community (Appendix A)
- The Music and Memory Language Questionnaire to assess the clients' quality of language pre-and post-M&M intervention (Appendix B)
- An LG4 Smartphone with an app called Smart Recorder by SmartMob (v. 1.8.0.) to record the language samples
- A software program called Systematic Analysis of Language Transcripts (SALT) used to transcribe, code, and analyze the data
- SPSS (v. 22) to run t-tests and determine the statistical significance of the data

Procedures: Treatment: The participants' preferred music selections were collected using the Gerdner assessment of personal music preference and stored on a centralized computer with Wi-Fi connection at CP (Gerdner et al., 2000). The nine personalized playlists were uploaded onto five iPods prior to the start of the study. Two CP staff members completed the training to receive the M&M Certification and trained the main investigator before she elicited language samples and completed the M&M treatment. This ensured treatment fidelity as the project progressed.

Pre-treatment Phase: Two CP staff members completed the CMAI-C prior to the start of the study. The raters documented the participants' behaviors in the two weeks leading up to the study to obtain a baseline agitation level. The MMSE was administered to each participant to determine a cognitive baseline. They also completed the M&M Questionnaire--a semi-structured

interview comprised of questions modeled after those observed in a video produced by M&M. The questions included inquiries about the participant's past, music preferences, and the way music makes him/her feel. The language samples from the questionnaire were recorded using an LG4 Smartphone app called Smart Recorder by SmartMob (v. 1.8.0.).

Following the session, the language samples were uploaded to a password-protected computer in the Louisiana State University Communication Outcomes Research Lab (COR) located at 33 Hatcher Hall in Baton Rouge. The language samples were transcribed by three trained research assistants using the Systematic Analysis of Language Transcripts (SALT) software conventions. Identifying information was excluded from the language sample transcriptions. The samples were then coded by two trained researchers and the transcription and coding reliability were computed by two doctoral students. The SALT codes for abandoned utterances, extensions, tangential utterances, mazes (revisions, repetitions, filled pauses), and repetition of ideas were used to analyze how much sense the participant's responses made and how well he or she could express them. Abandoned utterances were those which were not complete. The participant may have trailed off or abruptly stopped mid-sentence. An extension (EXT) was any information given that elaborated on the current topic of conversation. Tangential utterances (TANG) occurred when the participant gave information not related to the current topic of conversation. If they extended upon the tangent, it was counted as an extension. Mazes reflect the fluency of conversation. Revision mazes (MAZEREV) included edits made to part of a word, a word, or a phrase. Repetition mazes (MAZEREP) included repetitions of part of a word, a word, or a phrase, all of which may have occurred multiple times in a row. Filled pause mazes (MAZEFP) consisted of words like "uhm", "uh", and "oh" used to fill the gaps between speech. Repetition of ideas (REP) occurred when the participant said the same thing multiple

times at different points throughout the semi-structured interview. While SALT is typically used to analyze children's language samples, it has also proven easy and valuable for the analysis of middle-aged and older adults with aphasia (Bryant et al., 2013), and AD (Mitzner & Kemper, 2003). Miller, Andriacchi, and Nockerts (2016) found that language sample analysis was beneficial for repeated language analysis.

Treatment Phase: Each participant listened to his or her preferred music selections for 30 minutes in the afternoon one time a week for six weeks at CP. The participants listened to their music sitting at the same table in the same, quiet room every session. The investigator placed the headphones on the participant after selecting the participant's playlist, then clipped the iPod to his/her shirt and played the music. After the 30 minutes had passed, the investigator removed the headphones, and the participant returned to group activities. The investigator documented the treatment as well as any difficulty she encountered while getting the PWD to participate. The collected information was used to determine the feasibility of M&M for the higher functioning clients attending CP as opposed to the more impaired residents in long term care facilities where M&M originated. Treatment fidelity was checked to ensure that the investigator was following the protocol and did not drift from said protocol. No drift was noted, however, if any drift were to have been noted, a review of procedures would have been addressed in a one-on-one conversation and a return demonstration.

Post-Treatment Phase: After six weeks of treatment, the participants completed the post-test M&M Questionnaire. The CMAI-C was not completed due to the insufficient agitation found pre-test. The language samples were recorded, transcribed, coded, and then analyzed. The two doctoral students computed the reliability of the transcription and coding.

Reliability: Prior to transcribing and coding the language samples, researchers agreed upon set guidelines for transcribing and coding the samples. A handout was compiled for the research assistants to ensure reliability of transcriptions. The research assistants, all three of whom demonstrated competence using SALT, transcribed the language samples. The samples then went to two different researchers who first reviewed and corrected any inconsistencies in transcription methods, and then coded the language samples. The two researchers checked one another's coding for agreement, and the samples were then checked a second time by two doctoral students with expertise in linguistics and SALT coding. Any inconsistencies were discussed and changed or kept the same abiding by the set guidelines established prior to transcribing and coding and consensus of the two coding groups. The reliability of the transcription was carried out by having the three transcribers cross-transcribe the last 50% of 33% of the language samples and computing the percentage of point-to-point agreement for words and utterances. The reliability of the coding was carried out by having the doctoral students code the first 50% of all language samples and compute the percentage of point-to-point agreement with the coded samples of the two main researchers. The acceptable amount of inter-rater reliability was set at 90%, a number calculated by dividing disagreements by agreements and disagreements. The average reliability for words was 93.15% and the average reliability for utterances was 94.57%. The average reliability for coding was 95.54%.

Data Management and Data Analysis Plan: Due to varying lengths of transcriptions, inter- and intra-personal variation needed to be controlled. This was done by analyzing the middle 100 utterances, or total utterances if less than 100. Heilmann, Miller, and Nockerts (2010) stated that "the amount of language used (total number of utterances or words) or elapsed time" could be used to match the sample length for analysis within and between participants (p. 87).

Researchers controlled for this by analyzing the participants' middle 100 utterances, or total utterances if less than 100. Elapsed time was not used as the measure because of the interview style of conversation—the investigator was speaking a different amount for each client. All the data is maintained in the research lab and stored in double locked areas. It will be maintained for six years as is the requirement for research data in the COR. The only people with access to the password-protected computers that hold the data are research assistants and lab volunteers, all of whom have been trained on the National Institutes of Health Protection of Human Subjects and HIPAA. The audio files are password protected on the lab computer, separate from the transcripts and raw data.

RESULTS

This study was a within group comparison of repeated measures study that compared four language quality variables in pre-and post-treatment language samples. Three research questions were asked and the results for each are provided in this section.

1. Is M&M feasible at a Dementia Activity and Respite Center?

An investigator collected data during each M&M treatment session. This data was used to determine the feasibility of M&M in a Dementia Activity and Respite Center. It was hypothesized that M&M would be feasible in a Dementia Activity and Respite Center, and the data suggests that M&M was quite feasible. In most cases over the 6 weeks of intervention, participants participated willingly. Some participants were hesitant to participate and required assistance from CP staff, but once the music began playing the participants' resistance disappeared. Some sang along, hummed, swayed, whistled, and tapped their feet to the beat, while others shared memories sparked by the music to which they were listening. Overall, few

issues were encountered throughout the treatment process, but included participant absences; need for adjusting the headphones due to discomfort; need for tissue or bathroom breaks; and iPods malfunctioning or running out of battery charge. However, the ease with which the treatment protocol was implemented vastly outweighed any issues encountered by the participants or investigator.

2. Does individualized music improve quality of language in PWD as measured by abandoned utterances, extensions, tangential utterances, mazes (repetitions, revisions, filled pauses), and repetitions?

It was hypothesized that M&M would improve quality of language as measured by abandoned utterances, extensions, tangential utterances, mazes (revisions, repetitions, filled pauses), and repetition of information. The statistical results for each variable are shown in the table below and further explained in the information following.

Table 2. Statistical Data of Variables

Variable	Pre-treatment M (SE)	Post-treatment M (SE)	t-test (df)	*p*
Abandoned	2.11 (.61)	4.00 (1.19)	-1.72 (8)	0.12
EXT*	25.89 (7.04)	37.00 (8.18)	-3.63 (8)	0.01
TANG	2.22 (.66)	1.89 (.73)	.71 (8)	0.50
MAZEREV	12.44 (2.40)	21.56 (5.68)	-1.65 (8)	0.14
MAZEREP	14.89 (2.81)	19.11 (5.51)	-1.24 (8)	0.25
MAZEFP	27.78 (2.92)	30.78 (3.84)	-.93 (8)	0.38
REPINFO	1.33 (.58)	2.00 (.90)	-.74 (8)	0.48

* indicates statistical significance

Abandoned Utterances: On average, there was no statistically significant difference in abandoned utterances from pre- (M = 2.11, SE = .61) to post-M&M treatment (M = 4.00, SE = 1.19), $t(8) = -1.72$, p = 0.12.

Extensions: On average, extensions showed statistically significant improvement from pre- (M = 25.89, SE = .61) to post-M&M treatment (M = 37.00, SE = 8.18), $t(8) = -3.63$ p = .01.

Tangential Utterances: While the average number of tangential utterances decreased, there was no significant difference between tangential utterances from pre- (ME = 2.22, SE = .66) to post-M&M treatment (M = 1.89, SE = .73), $t(8) = .71$, $p = .50$.

Revision Mazes: On average, there was no statistically significant difference in revision mazes from pre- (M = 12.44, SE = 2.40) to post-M&M (M = 21.56, SE = 5.68), $t(8) = -1.65$, $p = 0.14$.

Repetition Mazes: On average, there was no statistically significant difference in repetition mazes from pre- (M = 14.89, SE = 2.81), to post-M&M treatment (M = 19.11, SE = 5.51), $t(8) = -1.24$, $p = 0.25$.

Filled Pause Mazes: On average, there was no statistically significant difference in filled pause mazes pre- (M = 27.78, SE=2.92), to post-M&M (M=30,78, SE=3.84), $t(8) = -.93$, $p = .38$.

Repetition of Information: On average, there was no statistically significant difference in repetition of information from pre- (M = 1.33, SE = .58) to post-M&M (M = 2.00, SE = .90), $t(8) = -.74$, $p = .48$.

A table with raw data can be found in Appendix C.

3. Does individualized music reduce agitation in PWD in a Dementia Activity and Respite Center setting?

Though it was hypothesized that M&M would decrease agitation in PWD, the effect of M&M on agitation in PWD could not be investigated. The trained staff members at CP who completed the CMAI-C did not report adequate levels of agitation pre-M&M for it to be measures post-M&M.

DISCUSSION

This study demonstrated the feasibility of M&M implementation in a Dementia Activity and Respite Center. Being the first study to investigate the feasibility of M&M in a respite center, it must undergo further research. However, future implementation of M&M in Dementia Activity and Respite Centers seems promising. M&M was well received by the staff and participants at CP, and according to the written documentation, the treatment was implemented easily. This pilot study laid the groundwork and can be used by researchers in the future as a baseline for M&M's feasibility.

Music and Memory improved one aspect of language quality—extensions. There was a statistically significant improvement in the number of times participants provided more information (i.e. extended) on a topic of conversation. Extensions in conversations require the conversational partners to attend to the turns in conversation and recall what was just said as they add a comment to advance the topic. This ability leads to more normal conversational interactions, rather than what some people with dementia experience, question answer, question answer. I suggest that the M&M intervention led to an increase in extensions but recognize that, due to the small number of participants, this result cannot be generalized. Participants were able to give more information to the investigator after they listened to their individualized music. This corroborated Gerdner's Mid Range Theory which states that individualized music stimulates remote memory and increases meaningful interactions with others. While the other variables resulted in no statistically significant difference, the increase in extensions during an autobiographical semi-structured interview suggests an increase in remote memory and meaningful interactions. Further research is needed before these findings can be generalized to a wider population of people with dementia in Dementia Activity and Respite Centers.

Revision, repetition, and filled pause mazes showed no statistically significant difference pre- to post-M&M intervention. This might be due to the increase in number of extensions. As extensions increase, there is an increase in the information being exchanged. This requires a person to put more information into words, which could lead to more revisions, repetitions, and filled pauses as they think about and formulate their message. As more extensions occurred post-treatment, there may have been more revising and filled pauses. Abandoned utterances and repetitions also showed no statistically significant difference pre- to post-M&M. As the majority of these variables did not seem to be sensitive to the intervention, perhaps there are other variables that could be studied to determine M&M's effect on quality of language. In the future, other language quality variables could be identified and examined.

Due to the lack of agitation observed in the pre-treatment phase CMAI-C ratings, this variable was not studied. The staff's failure to identify agitation based on the CMAI-C behaviors was curious because, prior to the study, the staff at CP identified study participants based on behaviors they labeled "agitation." However, I suggest that what staff identified as agitated behaviors may be more comparable to anxious behaviors not listed on the CMAI-C. Recall that the CMAI-C was designed for participants with many disorders in day treatment facilities, who may have had more severe agitation compared to the community-dwelling participants at CP. Therefore, in future studies investigating geriatric anxiety might be a more sensitive measure than agitation.

Study Limitations and Future Research

Due to its exploratory nature, this study included several limitations, but sparked further ideas for research on the topic, which, if conducted, may lead to a better understanding of the effects of M&M on language quality and agitation/anxiety in Dementia Activity and Respite

Center clients. The first limitation was the limited number of participants. Statistical strength and confidence in findings could be had by increasing the sample size in a study such as this. The results of nine individuals cannot be generalized to the general dementia population, but by thoughtfully increasing the number of participants, the study sample becomes more representative of the target population.

Additionally, due to time limitations and the number of days participants attend CP, M&M was only conducted once a week for 30 minutes for six weeks. Previous literature on individualized music therapy included participants who participated in individualized music therapy sessions twice a week for 30 minutes over eight weeks. It would be interesting to see if more intensive intervention would lead to more significant results in future research.

All clients at CP participated in a music activity every day. Activities varied from sing-a-longs with piano players to listening to musicians. In the future it would be useful to determine whether the general music activity also resulted in increased interactions or if there was greater increase in conversational interactions after general music plus M&M. A further control that could be added would include a group with dementia who did not receive any structured musical activities or M&M (i.e. a group that had similar characteristics but did not attend CP).

Moreover, there is insufficient research regarding whether dementia causes an increase in mazes or whether mazing is an age-related language phenomenon. To study this, a control group of age matched participants could be studied. They would complete an M&M Questionnaire language sample at the start and end of the study, but would not receive M&M intervention. Researchers could then compare the change in use of mazes over time between the control group and dementia group.

Staff and family members reported noticing agitation in the participants, however, ratings by staff on the CMAI-C did not reflect any agitated behaviors for clients over a week. In retrospect, the behaviors described on the CMAI-C such as screaming, kicking, hitting, or tearing/destroying things seem more extreme than those demonstrated by clients at CP. Therefore, in the future, finding a more appropriate outcome measure of anxiety rather than agitation may be useful to determine if anxiety decreases due to M&M.

Finally, pre- and post-M&M intervention language samples could be collected over two or three days instead of one to get a more valid understanding of the participant's interactions. It is well known that cognition and behavioral performance can fluctuate from day to day or from morning to afternoon for example. Collecting more baseline data points could lead to more valid results on future studies.

CONCLUSION

With the number of dementia cases rising at a staggering rate, research into treatments for dementia is imperative. This study suggests that participating in M&M increases the amount of extensions PWD provide when speaking about autobiographical memories. While it is impossible to generalize the results of this study, the data indicate further research investigating how M&M increases language quality and perhaps reduces agitation/anxiety could be a worthwhile endeavor.

Reference List

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Jeste, D. V., Blazer, D. G., & Peterson, R. C.

Brotons, M., & Koger, S. M. (2000). The impact of music therapy on language functioning in dementia. *Journal of Music Therapy*, *37*(3), 183-195.

Bryant, L., Spencer, E., Ferguson, A., Craig, H., Colyvas, K., & Worrall, L. (2013). Propositional Idea Density in aphasic discourse. *Aphasiology, 27*(8), 992-1009.

Cohen-Mansfield, J., Marx, M. S., & Rosenthal, A. S. (1989). A description of agitation in a nursing home. Journal of Gerontology: Medical Sciences, 44(3), M77-M84.

Deepa, M. S., & Shyamala, K. C. (2010). Complex discourse production in persons with mild dementia: measures of richness of vocabulary. *Journal of All India Institute of Speech and Hearing, 29*(1), 12-19.

Donovan, N. J., Kendall, D. L., Bacon Moore, A., Rosenbek, J. C., Gonzalez Rothi, L. J. (2006). Why consider impaired social language usage in a case of corticobasal degeneration? *The Clinical Neuropsychologist, 21*, 190-203.

Gerdner, L. A. (1992). The effects of individualized music on elderly patients who are confused and agitated. Master's thesis, University of Iowa, Iowa City. (R)

Gerdner, L.A. (1997). An individualized music intervention for agitation. *Journal of the American Psychiatric Nurses Association, 3*(6), 177-184.

Gerdner, L. A., Hartsock, J., & Buckwalter, K. C. (2000). Assessment of Personal Music Preference (family version). The University of Iowa Gerontological Nursing Interventions Research Center: Research Development and Dissemination Core, Iowa City, Iowa.

Gerdner, L.A. (2005). Use of individualized music by trained staff and family. *Journal of Gerontological Nursing*, 22-30.

Gerdner, L.A., & Schoenfelder, D.P. (2010). Evidence-based guideline. Individualized music for elders with dementia. *Journal of Gerontological Nursing, 36*(6).

Heilmann, J. J., Miller, J. F., & Nockerts, A. (2010). Using language sample databases. *Language, Speech, and Hearing Services in Schools, 41*(1), 84-95.

Klimova, B., Maresova, P., Valis, M., Hort, J., & Kuca, K. (2015). Alzheimer's disease and language impairments: social intervention and medical treatment. *Clinical Interventions in Aging, 10*.

Mahendra, N., & Hopper, T. (2017). Dementia and Related Cognitive Disorders. In M. Kane (Ed.), *Aphasia and Related Neurogenic Communication Disorders* (2nd ed.).

Miller, J. F., Andriacchi, K., & Nockerts, A. (2016). Using language sample analysis to assess spoken language production in adolescents. *Language, Speech & Hearing Services in Schools, 47*(2), 99-112.

Mitchell, G., McCollum, P., & Monaghan, C. (2013). Disclosing a diagnosis of dementia: a background to the phenomenon. *Nursing Older People, 25*(10).

Mitzner, T. L., & Kemper, S. (2003). Oral and written language in late adulthood: Findings from the nun study. *Experimental Aging Research, 29*(4), 457-474.

Mondini, S., Arcara, G., & Jarema, G. (2014). Semantic and syntactic processing of mass and count nouns: data from dementia. *Journal Of Clinical And Experimental Neuropsychology, 36*(9), 967-980. doi:10.1080/13803395.2014.958437

Mossello, E., Caleri, V., Razzi, E., Di Bari, M., Cantini, C., Tonon, E., . . . Masotti, G. (2008). Day Care for older dementia patients: favorable effects on behavioral and psychological

symptoms and caregiver stress. *International Journal of Geriatric Psychiatry, 23*, 1066-1072.

Music and Memory. (2016). Retrieved from http://musicandmemory.org.

Sakamoto, M., Ando, H., & Tsutou, A. (2013). Comparing the effects of different individualized music interventions for elderly individuals with severe dementia. *International Psychogeriatrics, 25*(5), 775-784.

Schall, A., Haberstroh, J., & Pantel, J. (2015). Time series analysis of individual music therapy in dementia: effects on communication behavior and emotional well-being. *The Journal of Gerontopsychology and Geriatric Psychiatry, 28*(3).

Szatloczki G., Hoffmann I., Vincze V., Kalman J., & Pakaski M (2015) Speaking in Alzheimer's disease, is that an early sign? Importance of changes in language abilities in Alzheimer's disease. *Frontiers in Aging Neuroscience, 7*(195).

Tang-Wai, D. F., & Graham, N. L. (2008). Assessment of language function in dementia. *Geriatrics and Aging, 11*(2), 103-110.

Vandepitte, S., Van Den Noortgate, N., Putman, K., Verhaeghe, S., Verdonck, C., & Annemans, L. (2016). Effectiveness of respite care in supporting informal caregivers of persons with dementia: a systematic review. *International Journal of Geriatric Psychiatry, 31*, 1277-1288.

Wall, M., & Duffy, A. (2010). The effects of music therapy for older people with dementia. *British Journal of Nursing (Mark Allen Publishing), 19*(2), 108-113.

Wray, A. (2017). The language of dementia science and the science of dementia language: linguistic interpretations of an interdisciplinary research field. *Journal of Language and Social Psychology, 36*(1), 80-95.

Appendix A

COHEN-MANSFIELD AGITATION INVENTORY - COMMUNITY (CMAI-C) We would like to ask about certain specific behaviors sometimes seen in older persons. Some are verbal, some are physical. Some are quiet behaviors and others are disruptive. We do not expect that all these behaviors will apply to the subject [S]. I will read you descriptions of all behaviors on this list. **FREQUENCY: 1 – Never, 2 - Less than once a week, 3- Once or twice a week, 4 – Several times a week 5 - Once or twice a day; 6 - Several times a day,7- Several times an hour**

During the past 2 weeks how often did (the participant)…								
		Never	**Less than once a week**	**Once or twice a week**	**Several times a week**	**Once or twice a day**	**Several times a day**	**Several times an hour**
1.	repeat sentences or questions? (was **repetitive**, whether or not addressed at any particular person)							
2.	verbally **interrupt** or cut short others' interactions or conversations saying something that is are **relevant** to the conversation?							
3.	verbally **interrupt** or cut short others interactions or conversations saying something that is **not relevant** to the conversation (has nothing to do with ongoing activity)?							
4.	make **strange noises**, including strange laughter, moaning or crying?							
5.	**scream**, shout, or howl?							
6.	**complain** or whine?							
7.	make unwarranted **requests for attention** or help? (includes nagging, pleading, calling out)							
8.	**negative**, uncooperative or unwilling to participate in activities? (bad attitude, doesn't like anything, nothing is right; includes social activities, eating, bathing)							
9.	**curse** or was [S] verbally threatening or insulting? (**verbal aggression**; score only if intelligible words are used; otherwise score under item 4)							
10.	**spit** (including during meals)? (do not include involuntary salivation; i.e., drooling)							

During the past 2 weeks how often did (the participant)…								
		Never	**Less than once a week**	**Once or twice a week**	**Several times a week**	**Once or twice a day**	**Several times a day**	**Several times an hour**
11.	**verbally bossy or pushy**?							
12.	make **verbal sexual advances**? (includes direct sexual propositioning or obvious sexual hints)							
13.	make **physical sexual advances** or **expose** his/her sexual parts? (include inappropriate sexual touching of self or others)							
14.	**restless** or fidgety, or tend to move around when in a seat or repeatedly get up and sit down? (can't sit still)							
15.	**pace**, walk repeatedly back and forth or **wander** aimlessly? (include wandering when done in a wheelchair)							
16.	try to **get out** of doors inappropriately, sneak out or inappropriately enter other places?							
17.	**dress or undress** inappropriately? (such as undressing in public, or constantly dressing; it does <u>not</u> refer to ability to get dressed; if only genitals are exposed, rate on item 13)							
18.	perform **repetitious mannerisms**? (includes rocking, rubbing, tapping, picking at skin)							
19.	**handle things inappropriately**? (rummaging through drawers, picking up others' possessions or things that should not be touched)							
20.	**grab** or snatch **things** from others? (including food from others' plates)							
21.	**hoard** or collect objects?							
22.	**hide** objects?							
23.	have a **temper outburst**, including verbal or non-verbal expression of **anger**?							
24.	**hit** people, self or objects?							
25.	**kick** people or objects?							

During the past 2 weeks how often did (the participant)…								
		Never	**Less than once a week**	**Once or twice a week**	**Several times a week**	**Once or twice a day**	**Several times a day**	**Several times an hour**
26.	**throw things** such as food or knock objects off surfaces?							
27.	**tear or destroy objects** or property?							
28.	**grab on to or cling to people** physically?							
29.	**push** other persons?							
30.	**bite** people or things?							
31.	**scratch** people, self, or things?							
32.	**hurt him/herself** by cutting, burning or other means? (with **harmful object**)							
33.	**hurt others** by cutting, burning or other means? (with **harmful object**)							
34.	appear to **fall intentionally**? (include from bed or wheelchair)							
35.	attempt to or did [S] actually **eat or drink nonfood substances**?							
36.	During the past two weeks, was there any other inappropriate behavior? If so, what? How often?							
37.	Did agitated behavior occur most often In morning __ In afternoon __ In evening __ No time more than others ___ Different times for different behaviors ___							

Appendix B

M&M Questionnaire
Fall 2016

Before you begin:

Set up your space & equipment, test it to be sure it all works properly

Go get the participant.

Seat yourself alongside the person, not across the table (too formal).

Introduction: First, thank you for agreeing to work with us on this project. We really appreciate your time. I would like to visit with you today about your life and about the kinds of music you like. I may jot down a few notes to help me remember if that's okay with you. I'll also record to listen later.

Topics: (try to work these into a conversational style rather than asking the question directly)

- What was life like when you were little?
- What was your favorite part of your life?
    - What did you like about it?
- Do you like music?
- What was your favorite music when you were young?
- How does the music make you feel?
- What's your favorite song?

Probes to get more elaborate responses: (select as appropriate for the comment or statement)

- Can you tell me more about that?
- Can you give me some more examples?
- What do you think the reasons are for that?
- Why do you think you feel that way?

Appendix C

Table of Raw Data

Treatment	ID	Abandoned	EXT	TANG	PWREV	WREV	PREV	PWREP	WREP	PREP	FP	REP
1	B2	0	4	2	2	3	2	7	4	3	33	1
1	D4	3	66	4	3	12	10	1	13	4	30	3
1	E5	3	45	1	4	4	6	11	11	2	26	2
1	F6	2	6	6	6	0	2	6	0	1	26	0
1	G7	2	15	0	1	1	3	2	11	3	10	1
1	H8	2	19	1	2	3	7	2	5	0	40	0
1	J10	0	23	4	3	7	7	4	22	2	31	0
1	K11	1	11	1	0	4	0	2	0	0	34	0
1	M13	6	44	1	3	8	9	3	12	4	20	5
2	B2	0	10	3	0	5	6	0	7	2	27	1
2	D4	8	80	4	2	8	12	3	11	5	21	7
2	E5	9	66	1	13	28	19	4	25	13	43	6
2	F6	6	11	3	12	15	4	6	3	7	45	0
2	G7	2	26	0	0	2	4	1	12	4	14	2
2	H8	0	48	0	0	1	2	0	0	0	40	0
2	J10	6	24	6	19	4	6	22	23	5	28	2
2	K11	0	22	0	3	10	0	0	4	1	40	0
2	M13	5	46	0	0	12	4	2	7	5	19	0