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Behavioral Implications of a Cognitive Training Program for Individuals with Moderate Cognitive Impariment

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for Individuals with Moderate Cognitive Impairment

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Abstract

The purpose of this study was to evaluate the effectiveness of a cognitive training

program on behavioral outcomes for individuals with moderate cognitive impairment. A

total of twenty participants were randomized into either a waitlist control or an

experimental group. Collateral individuals familiar with each participant completed a

series of measures of behavioral and emotional functioning at both pre- and post-

intervention. Results demonstrated little effectiveness for the cognitive training program

in stabilizing or improving behavioral functioning. Limitations and future directions are

then provided to enhance future research in this area.

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Behavioral Implications of a Cognitive Training Program for Individuals with
Moderate Cognitive Impairment

Prevalence rates of cognitive impairment and dementia are wide-ranging and often conflicting depending on the research methodology used to estimate the prevalence rate. In regard to individuals with cognitive impairment but no diagnosis of dementia, prevalence rates in the United States are estimated to be 5.4 million people (Plassman et al., 2008). Looking specifically at Alzheimer's disease, prevalence rate estimates show that 5.1 million Americans age 65 and older have an Alzheimer's disease diagnosis (Alzheimer's Association, 2015a). In regard to a dementia specific diagnosis, Prince et al. (2013) found that prevalence rates of dementia from all causes to be between 5% and 7% of adults age 60+. Based on the aforementioned prevalence rates, it is clear that cognitive impairment and various forms of dementia are quite common within our population.

The older adult population (age 65+) in the United States totaled just over 40 million individuals in 2010 and is growing at a faster rate than the general population (15.1% vs. 9.7%; U.S. Census, 2010). Due to the rapid growth and high prevalence rates for dementia in this population, it is necessary that various interventions be evaluated for efficacy and effectiveness in regard to maintaining or slowing cognitive decline and associated declines in behavioral functioning that occurs with cognitive impairment and various forms of dementia.

There are many specific conditions included under the overarching diagnosis of dementia. These diagnoses range from Alzheimer's disease, the most commonly diagnosed form, to vascular cognitive impairment and Lewy body disease, among others. Along with the variety of causes of dementia, the severity of dementia can vary widely across different conditions as well as across individual cases. According to the DSM-V

(APA, 2013), individuals can be classified as mild (difficulties with instrumental activities of daily living- housework, finances), moderate (difficulties with basic activities of daily living- feeding, dressing), or severe (fully dependent individual), depending on the impact the condition has on one's ability to complete activities of daily living.

Non-Cognitive Symptoms of Dementia

Along with the wide variety of conditions that cause dementia, there are also a variety of cognitive and behavioral symptoms associated with the diagnosis (for a comprehensive review of cognitive impacts of cognitive impairment and dementia, see Johnson, 2015). Individuals struggling with cognitive impairment are impacted not only in terms of cognitive functioning (memory loss, decreased reaction time, decreased visual-spatial ability), but in non-cognitive domains as well. Some of these non-cognitive symptoms include: socially unacceptable behavior, inability to read facial expressions and other social cues, loss of empathy, mood fluctuations, agitation, restlessness, depression, aggression, loss of motivation, and other erratic or strange behaviors (ASLHA, 2015). These behaviors can happen frequently and often have negative consequences for the individual (e.g., social isolation, injury to self or others, and the use of chemical restraints). In fact, Steffens, Maytan, Helms, & Plassman (2005) found that apathy was the most prevalent symptom (39.3% prevalence), followed closely by agitation/aggression (31.8% prevalence) and aberrant motor behavior (31.2% prevalence) in a study of individuals with dementia.

Medical Treatments for Cognitive and Non-Cognitive Symptoms

Although various medications exist to help slow the progressive decline associated with many causes of dementia (i.e., cholinesterase inhibitors: donepezil,

galantamine, etc.; N-methyl-D-aspartate receptor antagonist: memantine), many of these medications are only effective for a short time and can have various negative side-effects (nausea, loss of appetite, increased frequency of bowel movements, headache, confusion, and dizziness; Alzheimer's Association, 2015b).

Medications are also often used to address the non-cognitive symptoms of dementia when they become disruptive or dangerous. Antipsychotics (both typical and atypical) have been used in the treatment of non-cognitive symptoms to varying degrees of success (Sink, Holden, & Yaffe, 2005; Kolanowski, Fick, Waller, & Ahern, 2006; Yury & Fisher, 2007). In a large meta-analysis, Yury and Fisher (2007) found a small-medium effect size (.31) across all studies for the effects of antipsychotic medications on reducing behavioral problems associated with dementia. Although some effectiveness has been shown for the use of antipsychotic medications in reducing behavioral symptoms associated with dementia, results are mixed and often show small to no significant effects for these medications (Sink, Holden, & Yaffe, 2005; Kolanowski et al., 2006; Yury & Fisher, 2007).

Non-Pharmacological Cognitive Interventions

Due to the high prevalence rate associated with dementia and the aging baby-boomer generation in the United States, many researchers are examining the efficacy and effectiveness of various cognitive intervention programs that are designed to stabilize or slow cognitive decline associated with dementia (Algase et al., 1996; Whall & Kolanowski, 2004; Cohen-Mansfield, 2000; Lowenstein, Acevedo, Czaia, & Duara, 2004; Requena et al., 2004; Moore, Sandman, McGrady, & Kesslak, 2001; Mate-Kole et al., 2007; Ball et al., 2002; Willis et al., 2006; Brum, Forlenza, and Yassuda, 2009).

Many of these studies have also examined the impact of these cognitive interventions on non-cognitive symptoms such as depression or agitated behaviors. Before reviewing these studies, it is important to first clarify the similarities and differences between different types of cognitive interventions described in the literature.

Categories of Cognitive Interventions. According to Clare and Woods (2004), researchers have used a variety of terminology to describe different types of cognitive interventions for persons with cognitive impairment. One type of cognitive training intervention is reality orientation where the individual is presented with orientation information that is thought to provide the person with a greater sense of their surroundings, possibly resulting in an improved sense of control and self-esteem. Other cognitive interventions include brain training (where the individual is instructed to play games individually, usually on a computer, in hope that these activities will help with certain areas of brain functioning), cognitive rehabilitation (where the individual are instructed to achieve their optimum well-being by engaging in desired activities and interactions to the best of their abilities), and cognitive stimulation (where the individual is instructed to enhance cognitive and social functioning through a range of activities intended to stimulate various parts of the brain).

Cognitive training is another type of intervention approach that requires individuals to engage in a standardized program that includes a series of specific exercises designed to target different cognitive skills which get progressively more difficult as training progresses (Clare & Woods, 2004). These programs are typically delivered in groups and the attempt is to improve overall cognitive functioning. All of

these programs have been used to describe some form of cognitive intervention targeted at a variety of individuals, including older adults, to varying degrees of success.

Empirical Studies Measuring Non-Cognitive Outcomes. The majority of research studies on cognitive training programs focus on cognitive outcomes with fewer noting associated behavioral changes. This is important due to the implications that cognitive decline has on the behavior and associated functioning of an individual. If an individual is declining cognitively, there are likely associated behavioral changes (Cohen-Mansfield, 2000; Algase et al. 1996; Whall & Kolanowski. 2004). A comprehensive cognitive training program will directly target cognitive areas of functioning, but may positively impact the associated behavioral and functional changes, as well. Although limited, some research is available noting specific functional or behavioral outcomes related to cognitive intervention programs. This literature will be reviewed below.

In a review of some of the findings on the cognitive domain of cognitive intervention programs Lowenstein et al. (2004) examined the efficacy of a cognitive rehabilitation program by comparing it with a cognitive stimulation program. Both of these programs were designed for individuals with mild Alzheimer's disease, but the cognitive rehabilitation program was much more focused on improving specific cognitive domains (verbal, episodic, recall, and working memory; executive functioning; visual attention and task switching; and language skills). The researchers in this study used 24 individual training sessions aimed at improving various domains of cognitive functioning for both groups. For the cognitive rehabilitation group, individuals practiced spaced retrieval, visuo-motor processing, functional skills training, procedural memory

activation, and dual cognitive support. For the cognitive stimulation group, cognitive activation (through computer memory games) and therapist contact were used as training. Lowenstein et al. (2004) then compared the treatment group pre- and post-training. Researchers found that the treatment group performed significantly better at the trained tasks (face-name association, object-memory learning, change for purchase test, and balancing a checkbook) at post-treatment compared to pre-treatment. Along with the cognitive measures, Lowenstein et al. (2004) also used self-report measures. These measures found that both groups reported improved memory over baseline and reduced depression. Also, individuals in the cognitive rehabilitation group reported more memory improvement than the informants of the mental stimulation group, lending some credence to the concept of targeted training (i.e., cognitive rehabilitation) vs. general cognitive stimulation.

In a study implementing a cognitive stimulation intervention, Requena et al. (2004) examined the efficacy of a combined treatment program, medication and cognitive stimulation, in both cognitive and affective domains. The researchers compared four groups (combined medication and cognitive stimulation; medication only; cognitive stimulation only; no treatment). In this study, cognitive stimulation focused on seven areas of functioning (orientation, bodily awareness, family and society, caring for oneself, reminiscing, household activities, and animals, people, and things). When analyzing data, the Requena et al. (2004) determined that subjects in the combined group improved compared to subjects who received drug treatment alone and those who received no treatment. Also, Requena et al. (2004) reported data indicated that combined treatment lead to a considerable improvement in both domains of cognitive and affective

functioning (as measured by the Geriatric Depression Scale). The results indicated that individuals in all groups showed significant improvement in affective state. Requena et al. (2004) stated that affective improvement may have been due to the interactive, group nature of all of the treatment groups.

Moore et al. (2001) examined the efficacy of a memory training program on individuals diagnosed with dementia compared with healthy controls. In this study, researchers examined the effect of a memory training program on various cognitive and non-cognitive domains (depression, memory functioning, processing speed, and stress). Moore et al. (2001) conducted the memory training sessions in group format over five weeks. In these sessions, memory training consisted of sessions of lecture (education, basic information about the brain, aging, and behavior), Name-Face Rehearsal (rehearsing names of group members with visual aids), the Significant Event Technique (SET; planning and then executing a novel event), and effortful recall (watching a sitcom and then being tested on the details of each program. Moore et al. (2001) determined an improvement of name and face recall and recognition memory (through the use of the SET) for both groups and an improvement in processing speed and Geriatric Depression Scale scores for individuals in the impaired group. Based on these findings, Moore et al. (2001) determined that a memory training program can be potentially beneficial for individuals with mild or moderate dementia to improve various domains of memory and emotional functioning.

In another study using a cognitive intervention program in a group setting, Mate-Kole et al. (2007) looked into the effects combined cognitive training program on individuals with moderate to severe dementia. The researchers in this study were

interested in maintaining participants' level of cognitive functioning as well as examining other specific areas that might be responsive to training. Participants in the study were six older adults with moderate to severe dementia residing in an assisted living community in Connecticut. The procedure used in this study consisted of two components: 1) the use of a Mind Aerobics program (an interactive group program led by a professional educator that consists of variety of activities focused on memory, attention, cognitive flexibility, manual dexterity, and problem-solving) and 2) Adaptive Computerized Cognitive Training (AACT; a computerized task that focuses on attention training, visual-spatial and motor sills, problem solving, memory, and visual discrimination). The pre- and post-treatment assessment consisted of a variety of cognitive measures, such as the Quick Cognitive Screening Test, Trail-Making Test, Mini-Mental Status Exam, and others. Mate-Kole et al. (2007) found significant improvement on measures of overall functioning (short-term memory, cognitive failures) between pre- and post-assessment. Caregiver reports indicated significant improvement in participant's behavior and socialization over the course of the treatment. Finally, data indicated that there was no significant decline on any of the measures from pre- to post-test.

In another study examining the impact of a cognitive training program, Brum et al. (2009) examined both the cognitive and functional outcomes of older adults with mild cognitive impairment. Brum et al. devised a cognitive training program consisting of five key components: 1) Orientation in time and space, 2) presentation of names of participants and researcher, 3) visual and auditory exercises (noting differences between two photographs), 4) memory exercises using visual aids (making shopping lists), and 5) a transfer task (simulating to a supermarket, giving and checking change, etc.). Using a

randomized control trial, the training program was conducted over eight total sessions (2x per week for 1 month) in a group of 16 participants (with 18 participants in the control group). Results showed significant improvement for individuals in the intervention group in regard to attention, time orientation, and ability to deal with finances. Brum et al. (2009) also indicated that the improvement of shopping skills approached a statistically significant level, perhaps demonstrating a more functional effect of this cognitive training program.

The reviewed studies provide some insight into the areas for which cognitive training programs appear to be effective (in both cognitive and behavioral/functional domains) in individuals with cognitive impairment or decline (Lowenstein et al., 2004; Requena et al., 2004; Moore et al., 2001; Mate-Kole et al., 2007). It is important to focus on both types of older adults (healthy and cognitively impaired), although more focus needs to be directed toward impaired older adults due of the rapidly increasing numbers of individuals experiencing clinical significant cognitive impairment. Often, effective management of cognitive impairment will allow individuals to remain at home longer. If individuals are able to remain at home longer, this can have significant cost savings for families as well as government-funded insurance programs. Simply put, the current aging population of the U.S. will create a need for effective cognitive intervention programs for older adults with various types of cognitive impairments.

Purpose of the Current Study

The following study examines the behavioral/functional effects of a cognitive training program for individuals with moderate cognitive impairment. Due to the relationship between cognitive and behavioral functioning, it is hypothesized that

individuals who take part in the cognitive training intervention will either 1) stabilize in their cognitive decline, or 2) slow in their cognitive decline relative to the control group. Due to this stabilization or slowing of decline, individuals in the cognitive training treatment group will also have related behavioral changes in the form of 1) more socialization, 2) improved affect, and 3) more independence with activities of daily living (ADLs) when compared to the control group.

*For an evaluation of the cognitive effects of this research study, please see Johnson (2015) for a detailed review.

Method

Participants

   Individuals with Cognitive Impairment. Individuals with cognitive impairment were identified by staff members at four senior living facilities. Recruitment took place through mailings to the prospective participant's legal guardian. Once consent from a prospective participant's guardian was received, verbal assent was then obtained from each participant at the beginning of the study, as well as in an ongoing manner.

   Inclusion criteria for the study were that the individual must be living in a long-term care facility and have a Modified Mini-Mental State Examination (3MS) score between 77-48 (which is indicative of moderate cognitive impairment). Individuals with moderate cognitive impairment were included in this study because the cognitive training program used was designed specifically for individuals with moderate cognitive impairment. Exclusion criteria included: the presence of a serious sensory impairment (severe hearing/vision loss) or health condition that would prevent one from engaging in the cognitive training program, regular consumption of medication that may interfere

with cognitive functioning (not including medications for dementia), and cognitive decline that was either in the mild or severe range as measured by the 3MS (i.e., scores outside the range of 77-48).

Twenty older adults (age 65+) with moderate cognitive impairment participated in the study. These individuals resided in four different adult living facilities in a small metropolitan area in the Midwestern United States. One individual resided in a memory care unit while the others resided in assisted living settings. There were nineteen females and one male included in the study. The mean age for participants was 86.1 years (SD = 7.34). All but one of the participants completed the cognitive training program, as well as the pre- and post-assessment measures (the individual not completing the study died during the study).

The participants in this study had a variety of cognitive diagnoses: dementia (n=6), vascular dementia (n=2), Alzheimer's disease (n=4), and memory loss (n=1). Along with the cognitive diagnoses, participants also had a variety of psychological diagnoses: depression (n=4) and anxiety (n=3). Participants in this study were also taking a variety of medications. Medications related to dementia included: Donepezil (n=8), Namenda (n=4), and galantamine (n=2). Medications related to depression included: Mirtazapine (n=1), Tofranil (n=1), Zoloft (n=1), and Celexa (n=1). Finally, two participants were taking Ativan, a medication used to manage anxiety. Participant diagnoses and medication status remained relatively stable throughout training and testing period.

Staff Participants. Recruitment of facility staff took place through recommendations by the activity directors at each facility. Staff members were required

to have worked in the facility for at least three months to ensure that staff members were familiar enough with residents to adequately report on their day-to-day functioning. Each staff member was compensated with a $5 gift card for each set of measures he/she completed.

Measures

Overall Cognitive Functioning. The Modified Mini-Mental State (3MS) Examination is a brief, widely-used test of cognitive functioning with good reliability and validity (Teng and Chui, 1987). The 3MS is a quick and easy assessment taking between five and ten minutes to complete with sections targeting orientation, registration, attention, calculation, visuo-spatial skills, short term and delayed verbal memory (both recall and recognition memory), praxis verbal reasoning, and word fluency. Scores on the 3MS range from 0-100 (higher scores are indicative of higher cognitive functioning).

Quality of Life. The QUALIDEM, (Ettema, Dröes, Lange, Mellenberg, & Ribbe, 2007a; Ettema, Dröes, Lange, Mellenberg, & Ribbe, 2007b). This is a brief, forty question, widely-used staff reported quality of life (QOL) measure specifically designed for individuals with dementia or cognitive decline. The QUALIDEM has been shown to have acceptable validity and reliability in use with persons with dementia in residential settings (Ettema et al., 2007b). Within the QUALIDEM, there are 9 subsections measured (care relationship, positive affect, negative affect, restless tense behavior, positive self-image, social relations, social isolation, feeling at home, and having something to do). The QUALIDEM is completed by an individual who knows the participant well and can generally speak to the various items on the questionnaire (Is cheerful; Radiates satisfaction; Is angry). Item scores range from 0- Never to 3- Frequently (reverse coded

for negative items; Cuts himself/herself off from the environment; Cries), depending on the caregivers observations of these behaviors. Scores on the QUALIDEM can range from 0 to 111(higher scores on the QUALIDEM are indicative of higher quality of life).

Agitation and Disruptiveness. The Cohen-Mansfield Agitation Inventory-Disruptive Form, (CAMI-D; Cohen-Mansfield, Marx, & Rosenthal, 1989) is a brief, forty question, widely- used staff report agitation inventory measure specifically designed for individuals residing in long-term care facility. The CAMI-D has been shown to have acceptable reliability and validity (Cohen-Mansfield, Marx, & Rosenthal, 1989). The CMAI-D is completed by an individual who knows the participant well and can generally speak to the various items on the questionnaire. With the CAMI-D, frequency of behavior is rated on a 7-point Likert scale (Pace, aimless wandering; Cursing or verbal aggression) ranging from 1- Never to 7- Several times per hour. Along with the frequency of behavior, the disruptiveness of each behavior is also rated using a 5-point Likert scale ranging from 1- Not at all to 5- Extremely. Through the use of a factor analysis, the CAMI-D was shown to have three distinct subsections: 1) Aggressive behavior, 2) Physically nonaggressive behavior, and 3) Verbally agitated behavior. Scores on the CMAI-D range from 58 to 248 (higher scores on the CMAI-D are indicative of more frequent and disruptive behaviors).

Functional Status. The Minimum Data Set 3.0 (MDS 3.0 Section G; Saliba & Buchanan, 2008) includes a measure of functional status specifically designed for individuals residing in a long-term care facility (Section G). This functional status questionnaire has been shown to have acceptable reliability and validity (Saliba & Buchanan, 2008). The measure is completed by an individual who knows the participant

well and can generally speak to the various items on the questionnaire. This measure includes 12 items related to various activities of daily living (bed mobility, toileting, bathing, eating, grooming, etc.). Items are rated on a 0 (independent) to 7 (total dependence, 2+ person assist) scale. Scores can range from 0-84 (higher scores being indicative of an individual needing more assistance with activities of daily living).

Mood. The Minimum Data Set 3.0 also includes a measure of mood (MDS 3.0 Section D; Saliba & Buchanan, 2008). This is a brief, ten question, staff report mood measure specifically designed for individuals residing in a long-term care facility. The MDS 3.0 Section D has been shown to have acceptable reliability and validity (Saliba & Buchanan, 2008). The MDS Section D is completed by an individual who knows the participant well and can generally speak to the various items on the questionnaire. With the MDS section D, various mood related domains are assessed (e.g., little interest or pleasure in doing things, stating that life isn't worth living, wishing for death, or harming self, etc.). These behaviors are first indicated whether they are present or not, and if present, are rated on a 0 (1 day; rarely) to 3 (12-14 days; nearly every day) frequency. Scores can range from 0 to 40, with higher scores indicative of more severe depression.

Research Design and Procedure

Participants were randomly assigned in either a no treatment, wait-list control group (N=9) or a treatment group (N=11). Staff completed the QUALIDEM, CMAI-D, and MDS (section G, functional status and section D, mood) at pre- and post-treatment (approximately 12 weeks). Participants also completed a battery of neuropsychological tests at pre- and post-treatment.

Cognitive Intervention. Active Mind (AM) is a group-administered cognitive training program designed for individuals with moderate cognitive impairment. AM is delivered in group format (typically 4-6 individuals) by an individual trained in its administration, typically someone with teaching or leadership experience and preferably is someone that is familiar to group participants.

AM consists twenty-four one hour sessions focusing on six domains of cognitive functioning: reaction time, visual-spatial integration, attention and concentration, memory, language, and problem solving/executive functioning. Each of these cognitive domains are targeted with various activities during each session. The difficulty of each task gets progressively more difficult as the training progresses (i.e., tasks in class 24 are much more difficult than tasks initially introduced in class 1).

One of the tasks associated with the cognitive domain of visual-spatial skills will be highlighted to show the progressive nature of the tasks over the length of the classes. During the first session, participants are given a 3x4 table with two of the spaces filled in (to make a shape). They are also given a blank 3x4 table and several cubes. The task here is for each participant to fill in their blank 3x4 table with the colored cubes to match the filled in 3x4 table. In contrast to the first session, on the twenty-fourth session individuals are asked to do a similar task, but this time with a 5x5 geoboard. Individuals are given an example geoboard and then asked to use rubber bands to make their geoboard look like the example. As you can see, the visual spatial task on the first session is much less challenging than the visual spatial task on the twenty-fourth session.

The Active Mind intervention classes were run by the Activity Director at each of the four facilities. Each of the Activity Directors was trained in the implementation of

Active Mind by the Executive Director of the New England Cognitive Center (creator of these programs). Training took place in the form of instructional videos, familiarization with the workbooks and class materials, and through a live demonstration of a functioning Active Mind class lead by the Executive Director of the New England Cognitive Center. It is noteworthy that the Activity Directors had access, through email and phone, to the researchers involved in this study as well as the developers of this intervention program throughout this study.

Results

Modified Mini-Mental State Examination

A total 3MS score was calculated for each participant (scores range from 0-100). 3MS scores for the current study are as follows: all participants pre-treatment (M=66, SD=9.93), all participants post-treatment (M=66.64), experimental group pre-treatment (M=70.9, SD=3.41), experimental group post-treatment (M=71.22, SD=8.86), control group pre-treatment (M=61.1, SD=11.97), and control group post-treatment (M=61.5, SD=13.55).

To determine if any group differences existed at baseline, a t-test was used: $t(18)=2.183$, $p= .041$. This t-test indicates that the experimental group (M=70.9, SD=3.41) scored significantly higher on the 3MS at baseline than the control group (M=61.1, SD=11.97). This finding is noteworthy due to the pre-treatment differences that existed between the groups and will be explored in more detail in the discussion section.

Quality of Life- QUALIDEM

A total QUALIDEM score was calculated for each participant (scores range from 0-111) and used for the analyses. On the QUALIDEM, a higher score is indicative of a higher quality of life.

Experimental Post-Treatment vs. Control Post-Treatment. Among older adults included in the study (N=20), there was a no statistically significant difference between the two groups, experimental (M=89.09, SD=19.92) and control (M=85.22, SD=16.79), t(18)=-4.63, p=.659 on the QUALIDEM at post-treatment. Further, Cohen's (1988) effect size value (d=.210) suggested a small practical significance for this finding. See Table 1 for details.

Experimental Group: Pre- vs. Post-Treatment Scores. Among older adults included in the study (N=20), there was no statistically significant difference between the two groups, experimental post-treatment (M=89.09, SD=19.92) and experimental pre-treatment (M=92.45, SD=14.33), t(18)= .455, p=.654 on the QUALIDEM. Further, Cohen's (1988) effect size value (d=.-.194) showed a small practical significance for this finding. However, this significance is indicated in the wrong direction (e.g., decline in scores from pre- to post-treatment). See Table 2 for details.

Control Group: Pre- vs. Post-Treatment Scores. Among older adults included in the study (N=20), there was no statistically significant difference between the two groups, control post-treatment (M=85.22, SD=16.79) and control pre-treatment (M=85.67, SD=10.44), t(18)=.067, p=.947 on the QUALIDEM. Further, Cohen's (1988) effect size value (d=. -.104) suggested no practical significance for this finding. See Table 3 for details.

Agitation and Disruptiveness- CAMI-D

A total CAMI-D score was calculated for each participant (scores range from 58-248) and used for the analyses. On the CAMI-D, a higher score is indicative of more frequent and disruptive behaviors.

Experimental Post-Treatment vs. Control Post-Treatment. Among older adults included in the study (N=20), there was no statistically significant difference between the two groups, experimental (M=73.55, SD=17.62) and control (M=80.11, SD=15.02), t(18)=1.709, p=.105 on the CAMI-D at post-treatment. Further, Cohen's (1988) effect size value (d=-.401) suggested a small to medium practical significance for this finding. See Table 1 for details.

Experimental Group: Pre- vs. Post-Treatment. Among older adults included in the study (N=20), there was no statistically significant difference between the two groups, experimental post-treatment (M=73.55, SD=17.62) and experimental pre-treatment (M=69.36, SD=12.18), t(18)=.648, p=.545 on the CAMI-D. Further, Cohen's (1988) effect size value (d=.277) suggested a small practical significance to this finding. However, this significance is indicated in the wrong direction (e.g., increase in scores from pre- to post-treatment). See Table 2 for details.

Control Group: Pre- vs. Post-treatment. Among older adults included in the study (N=20), there was no statistically significant difference between the two groups, control post-treatment (M=80.11, SD=15.02) and control pre-treatment (M=80.00, SD=15.68), t(18)=.015, p=.989 on the CAMI-D. Further, Cohen's (1988) effect size value (d=.007) suggested no practical significance to this finding. See Table 3 for details.

Functional Status- MDS Section G: Functional Status.

A total MDS Section G: Functional Status score was calculated for each participant (scores range from 0-84) and used for the analyses. On the MDS Section G, a higher score is indicative of a lower level of daily functioning (e.g., needing more assistance for daily tasks).

Experimental Post-Treatment vs. Control Post-Treatment. Among older adults included in the study (N=20), there was no statistically significant difference between the two groups, experimental ($M=15.55$, $SD=16.96$) and control ($M=6.33$, $SD=8.11$), $t(18)=-1.491$, $p=.153$ on the MDS Section G at post-treatment. Further, Cohen's (1988) effect size value ($d=.694$) suggested a medium practical significance to this finding. Set Table 1 for details.

Experimental Group: Pre- vs. Post-Treatment. Among older adults included in the study (N=20), there was no statistically significant difference between the two groups, experimental post-treatment ($M=15.55$, $SD=16.96$) and experimental pre-treatment ($M=11.64$, $SD=15.88$), $t(18)=.558$, $p=.583$ on the MDS Section G. Further, Cohen's (1988) effect size value ($d=.240$) suggested a small practical significance to this finding. However, this significance is indicated in the wrong direction (e.g., increase in scores from pre- to post-treatment). See Table 2 for details.

Control- Pre- vs. Post-treatment. Among older adults included in the study (N=20), there was a no statistically significant difference between the two groups, control post-treatment ($M=6.33$, $SD=8.11$) and control pre-treatment ($M=5.44$, $SD=13.02$), $t(18)=.174$, $p=.864$ on the MDS Section G. Further, Cohen's (1988) effect size value ($d=.082$) suggested no practical significance to this finding. See Table 3 for details.

Mood- MDS Section D: Mood.

A total MDS Section D: Mood score was calculated for each participant (scores range from 0-40) and used for the analyses. On the MDS Section D, a higher score is indicative of a more severe depression.

Experimental Post-Treatment vs. Control Post-Treatment. Among older adults included in the study (N=20), there was a no statistically significant difference between the two groups, experimental (*M*=3.73, *SD*=5.71) and control (*M*=4.78, *SD*=5.36), *t*(18)=.421, *p*=.679 on the MDS Section D at post treatment. Further, Cohen's (1988) effect size value (*d*= -.190) suggested a small practical significance for this finding. See Table 1 for details.

Experimental Group: Pre- vs. Post-Treatment. Among older adults included in the study (N=20), there was no statistically significant difference between the two groups, experimental post-treatment (*M*=3.73, *SD*=5.71) and experimental pre-treatment (*M*=2.82, *SD*=3.13), *t*(18)= .463, *p*=.648 on the MDS Section D. Further, Cohen's (1988) effect size value (*d*=.198) showed a small practical significance for this finding. However, this significance is indicated in the wrong direction (e.g., increase in scores from pre- to post-treatment). See Table 2 for details.

Control Group: Pre- vs. Post-treatment. Among older adults included in the study (N=20), there was a no statistically significant difference between the two groups, control post-treatment (*M*=4.78, *SD*=5.36) and control pre-treatment (*M*=4.11, *SD*=3.72), *t*(18)=.307, *p*=.763 on the MDS Section D. Further, Cohen's (1988) effect size value (*d*=.145) suggested no practical significance to this finding. See Table 3 for details.

Table 1

Experimental vs. Control at Post-Treatment

Measure	Experimental Mean	Control Mean	Effect Size
QUALIDEM	89.09	85.22	.21*
CMAI-D	73.55	80.11	-.40**
MDS Section G	15.55	6.33	.69**
MDS Section D	3.73	4.78	-.19*

*Note. * denotes small effect size, ** denotes medium effect size, and *** denotes large effect size*

Table 2

Experimental Group from Pre- to Post-Treatment

Measure	Pre-Treatment Mean	Post-Treatment Mean	Effect Size
QUALIDEM	92.45	89.09	-.19*
CMAI-D	69.36	73.55	.28*
MDS Section G	11.64	15.55	.24*
MDS Section D	2.82	3.73	.20*

*Note. * denotes small effect size, ** denotes medium effect size, and *** denotes large effect size*

Table 3

Control Group from Pre- to Post-Treatment

Measure	Pre-Treatment Mean	Post-Treatment Mean	Effect Size
QUALIDEM	85.76	85.22	-.10
CMAI-D	80.00	80.11	.01
MDS Section G	5.44	6.33	.08
MDS Section D	4.11	4.78	.15

*Note. * denotes small effect size, ** denotes medium effect size, and *** denotes large*

effect size

Discussion

The QUALIDEM analyses showed little evidence for the effectiveness of the Active Mind Program. Looking at the data it is evident that the experimental group declined over the course of the study while the control group remained relatively stable. This may be due to the fact that the experimental group started treatment at a higher level of functioning than the control group. Therefore, it appears as if quality of life as perceived by others in the participant's environment was not positively impacted by participation in the Active Mind program.

The CMAI-D analyses showed little evidence for the effectiveness of the Active Mind program. Similar to the QUALIDEM analysis, examining the data it is evident that the experimental group declined over the course of the study while the control group

remained relatively stable. Again, this may be due to the fact that the experimental group started treatment at a higher level of functioning than the control group.

The MDS Section G analyses showed no evidence for the effectiveness of the Active Mind program. When looking at experimental and control group at post treatment, the control group clearly requires less assistance with daily functioning activities. It is also noteworthy that the experimental group showed decline in this measure from pre- to post-treatment, while the control group showed relative stability throughout the study.

The MDS Section D analyses showed little evidence for the effectiveness of the Active Mind program. However, similar to the QUALIDEM and CMAI-D analyses, examining the data it is evident that the experimental group declined over the course of the study while the control group remained relatively stable. Again, this may be due to the fact that the experimental group started treatment at a higher level of functioning than the control group.

The overall findings for this study are mixed, but generally produced little evidence that the Active Mind cognitive training program has a positive impact on behavioral and emotional functioning (i.e., quality of life, functional status, frequency and disruptiveness of problematic behaviors, and mood) in this sample of moderately cognitively impaired older adults.

The findings of the current study are inconsistent with other research studies examining the effectiveness of various cognitive interventions for improved behavioral and psychological outcomes. This result may be due to the large initial difference between the experimental and control groups included in this study. One way to control for this would be to use an ANCOVA controlling for pre-treatment group differences.

However, given the sample size of the groups (experimental: n=9 and control: n=11) there is simply not enough power to make use of this type of analysis in the current study.

Limitations and Future Directions

The main limitation of this study is the small number of participants (experimental: n=9 and control: n=11). The small number of participants presents problems for statistical analyses (i.e., unable to run ANOVA or ANVOVA due to not having enough power and having difficulty finding significance in the t-test analyses). Although this was an intentional decision in the design of this study, it still presents limitations.

As previously mentioned, the large difference between groups at pre-treatment on the various outcome measures (3MS, QUALIDEM, CMAI-D, MDS Sections G and D) is a limitation in the current study. To examine this further, a one-way ANOVA between facilities was used to detect differences in pre-treatment functioning, as measured by the 3MS. This ANOVA was non-significant $F(3,20) = .778$, $p=.622$, indicating no pre-treatment differences between facilities on the 3MS measure. If more participants had been included in the current study, it would be more appropriate to run an ANCOVA controlling for group differences to look for statistically significant differences on the outcome measures.

Another limitation of this study may be the insensitivity of the outcome measures. Due to the subtle changes in behavior and functioning that occurred of the course of this study, the behavioral outcome measures may not have been sensitive enough to determine these subtle changes.

The heterogeneity of the group may also be a limitation in this study. In terms of diagnoses, some individuals included in the study had formal diagnoses of dementia, while others did not. For 3MS scores, some individuals scored on the high end of the inclusion criteria (77) and others scored on the low end of the inclusion criteria (48) indicating quite a bit of variability in cognitive functioning between group members.

Another limitation of this study has to do with the administration of the Active Mind Training Program intervention. It is unknown whether each of the class leaders administered the Active Mind Program in the manner intended. Future research should focus on developing adherence and competence measures for the Active Mind program to ensure that programs are being delivered as intended and are being applied consistently over time and across facilitators.

Another point to address in future research would be including more participants. For example, it would be quite helpful to have a larger randomized control trial that includes more participants to take place with the Active Mind program. This would allow researchers to use various statistical procedures (ANOVA, ANCOVA) to statistically explore the differences between groups (similar to the current study, but with a larger participant size).

Along with running a study with a larger participant pool, it would also be interesting to study the administration of the Active Mind training program to assess for adherence to specified training procedures. This study would determine how much training and practice are needed for an individual to be prepared to administer the Active Mind classes as intended by their creators.

Future Directions

A recommendation for the future direction of this research concerns the heterogeneity of the group structure. Along with improving the number of participants included in the study, it would be beneficial to be able to match individuals to the appropriate types of treatment based on their level of cognitive functioning. This aspect would give us further control and may help with some of the limitations present in the current study (by balancing the challenge each participant is receiving in the classes based on their level of cognitive functioning.

Summary

Although some evidence has been presented for the effectiveness of the Active Mind cognitive training program for the use of improving behavioral (quality of life, functional status, frequency and disruptiveness) and psychological (mood) outcomes, the current research study did not support the hypothesis that the Active Mind cognitive training program would have a positive impact on non-cognitive outcomes. Limitations of this study present (discussed above) challenges to drawing precise conclusions about the effectiveness of the Active Mind program. In future research studies it is necessary to use some of the recommendations outlined in the directions section to design a more comprehensive and sensitive research study to evaluate the effectiveness of the Active Mind cognitive training program.

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