

EFFECTS OF A 5-WEEK COGNITIVE STIMULATION
PROGRAM AMONG PARTICIPANTS WITH MILD COGNITIVE IMPAIRMENT OR
DEMENTIA

By

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EFFECTS OF A 5-WEEK COGNITIVE STIMULATION
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Abstract: The aim of this thesis was to investigate the effects of a curated cognitive stimulation therapy (CST) program for participants with mild cognitive impairment (MCI) or different stages of dementia living in a local Midwest assisted living facility. With the growth of the geriatric population, more people are likely to develop either MCI or dementia later in life. Therefore, it is important that healthcare professionals including speech-language pathologists (SLPs) create and examine possible benefits of cognitive interventions to help delay and/or minimize effects of cognitive deficits among older adults. The CST program utilized in the study was based on existing literature about cognitive areas that are most relevant to address among older participants with MCI or dementia.

The CST program was five weeks in duration with sessions twice a week for a total of 10 sessions. Sessions were 45-60 minutes in duration. There were 10 participants total split into appropriate groups: three participants in a mild-moderate cognitive group, six in a moderate-severe cognitive group, and one as a control participant. The participants were assessed a week before and after the CST program using the same set of assessment measures. The Montreal Cognitive Assessment (MoCA) was used to determine the severity of cognitive deficits among the participants. In addition, the study included reading subtests of the Arizona Battery for Cognitive-Communication Disorders and a short version of the Boston Naming Test. The assessment battery also included the self-report Geriatric Depression Screener and the EuroQoL as the quality-of-life (QoL) screener.

Although there were no statistically significant differences between the two treatment groups, descriptive analyses showed that participants with mild-moderate and some with moderate-severe dementia demonstrated relatively improved cognitive scores at the end of the CST program. Some of the naming and reading assessments were not as sensitive in capturing participants' actual level of functioning, as evident with ceiling effects. Overall, the results indicated CST could be a beneficial nonpharmaceutical treatment for people with MCI or mild to moderate dementia. Additional studies with larger sample sizes and with participants of different levels of functioning are warranted to understand the impact of CST programs better.

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CHAPTER I

INTRODUCTION

Dementia is the umbrella term used to describe a neurogenic disorder that affects one's memory, cognitive functioning, reasoning skills, and social abilities impacting one's daily functioning (Alzheimer's Association, 2022). The most common cause of dementia is Alzheimer's disease (AD). Alzheimer's disease is a progressive neurodegenerative disease that is mostly seen in people over 65 (Alzheimer's Association, 2022). Alzheimer's disease has become prevalent as approximately 6.5 million Americans over 65 are estimated to be living with AD-dementia (Alzheimer's Association, 2022). Some people who do not have dementia but experience changes with their memory, reasoning, and other cognitive skills may have mild cognitive impairment (MCI). Mild cognitive impairment can be of different types, can be often degenerative, and may or may not progress to dementia with time (Mayo Clinic, 2018). With our elderly population growing yearly, different forms of MCI and dementia are likely to increase in prevalence. Therefore, healthcare professionals, including speech-language pathologists (SLPs), will see more clients with issues in their daily functioning due to the underlying cognitive and communicative challenges associated with MCI or dementia.

According to the American Speech-Language-Hearing Association (ASHA; 2016) cognitive skills (including attention, memory, problem-solving, executive functioning) fall under

the umbrella of communication and is within the scope of practice for SLPs. These cognitive skills are needed for successful and effective communication, as these are foundational skills needed to create meaningful communicative interactions (*Cognitive-Communication Abilities*, 2022). SLPs are integral team members in adult healthcare settings that utilize the Minimum Data Set (MDS) process to determine the need for therapy services for individuals with cognitive-communication disorders (*Demonstrating the Value of SLP Services in the New Medicare SNF Payment Model*, n.d.). Accurate MDS information is needed for insurance coverage and a large majority of people over the age of 70 years have Medicare that covers speech therapy services for any cognitive-communicative disorders. Medicare covers cognitive therapy services with the current procedural terminology (CPT) code 97532 for cognitive skills development. The CPT 92507 may also be appropriate and is a code for cognitive communication treatment (Kander, 2006). Because of the importance of cognitive communication, it is imperative that the current as well as the next generation of SLPs work to find evidence-based therapy techniques to help maintain the cognitive abilities and functional skills of these population groups, to help slow down the disease progression or maintain their daily functioning and quality of life (QoL) for as long as possible.

Researchers have examined the effects of different cognitive programs among people with dementia (Loewenstein et al., 2004; Saragih et al., 2021; Spector et al., 2003). The existing literature includes a discussion of three terms - cognitive training, cognitive rehabilitation, and CST. According to Bahar-Fuchs and their colleagues (2013), cognitive training focuses on specific cognitive skills, such as attention, memory, and problem-solving (Bahar-Fuchs et al. 2013). Likewise, activities completed in cognitive training are related to cognitive skills such as attention or memory. Cognitive training is noted to be useful for both individual and group

treatment sessions. A trained clinician or family member conducts it from guided practice. In contrast, cognitive rehabilitation is used to create more individualized strategies to help with functional skills for everyday living that involve multiple cognitive abilities such as orientation, attention, memory, and problem-solving (Bahar-Fuchs et al., 2013). Further, CST is used extensively for dementia as a nonpharmacological treatment for skills including cognition, memory, attention, and problem-solving (Saragih et al., 2021).

The current study included a CST program administered in a local senior assisted living facility. The study's main aim was to examine the effectiveness of a five-week CST program among people with MCI and dementia. The following sections include existing evidence about the benefits of cognitive rehabilitation and CST among people with MCI and dementia.

CHAPTER II

REVIEW OF LITERATURE

Cognitive Stimulation in People with Mild Cognitive Impairment and Dementia

Multiple studies have previously examined the effects of cognitive stimulation therapy (CST) among those with dementia. Among the existing studies, Spector and colleagues (2003) examined the effects of CST among residents of different in-patient care facilities based in London, England, and surrounding suburbs (Spector et al., 2003). Participants included 201 individuals with different severities of dementia. The treatment group consisted of 115 participants, while the control group included 86 participants. The 14-session program consisted of two sessions per week, 45 minutes at a time, for seven weeks. The treatment program comprised a series of activities, including reality orientation, CST activities, music reminiscence, and mindful relaxation. In contrast, the control groups did not receive any therapy. Instead, they performed their usual activities during this period, including games, group activities, or no specific intervention.

The authors included different assessments, including the Mini-Mental State Examination (MMSE; Folstein et al., 1975), the Alzheimer's Disease Assessment Scale (ADAS-Cog; Rosen et al., 1984), the Clifton Assessment Procedures for the Elderly-Behaviour Rating Scale (CAPE-BRS; Pattie & Gilleard, 1979), the Clinical Dementia Rating scale (CDR; Hughes et al., 1982), the Cornell Scale for Depression in Dementia (CSDD; Alexopoulos et al., 1988),

Holden Communication Scale (Holden & Woods, 1995), the Quality of Life in Alzheimer's disease (QoL-AD; Logsdon et al., 1999), and finally, the Rating Anxiety in Dementia (RAID; Shankar et al., 1999). The 115 treatment and 86 control group participants were tested at baseline. However, only 97 treatment group participants and 70 participants from the control group were tested at follow-up. Results at follow-up indicated significant improvements among treatment group participants for the MMSE, ADAS-Cog, and QoL-AD. More specifically, generalized cognitive benefits were observed in the treatment group after the CST, indicated by relatively higher MMSE and ADAS-Cog scores at the end of the treatment period. Additionally, there were no significant differences between the two participant groups for CAPE-BRS, RAID, and CSDD measurements. Further, the control group saw an overall deterioration for all measures at the end of the program.

In addition to improvements in cognitive performance, the participants in the treatment group rated their QoL more positively, especially the female participants, at the end of the treatment program. There was also a trend of improvement in communication, but this was not significant. Further, the study did not indicate statistically significant differences between the treatment and control groups for functional ability, anxiety, or depression. In conclusion, this study reported improvements in cognitive and QoL scores for participants who received CST but no significant improvement in functional ability, anxiety, and depression.

In a separate study, Loewenstein et al. (2004) examined the effects of a cognitive rehabilitation program among 25 participants (15 men, 10 women, mean age 78.12 years) with mild AD-dementia. The study took place in Miami, Florida, and the program consisted of two 45-minute sessions twice per week for 24 sessions. All participants were in the cognitive

rehabilitation program, and there was no control group. The program included various activities such as face–name association tasks, object recall training, functional tasks (e.g., making change, paying bills), orientation to time and place, visuo-motor processing speed, and using a memory notebook.

All participants completed a series of cognitive assessments at baseline and once at the end of the 24 sessions. In addition, the authors included a series of assessments, including the MMSE, the Continuous Performance Test (Conners, 2014), the List-Learning Task from the Consortium to Establish a Registry for Alzheimer's Disease (Welsh et al., 1991), Logical Memory test from the Wechsler Memory Scale: 3rd Edition (WMS-III; Axelrod, 2001), Digit Span from the Wechsler Adult Intelligence Scale: 3rd Edition (WAIS-III; Axelrod, 2001), Revised Memory and Behavior Problems Checklist (RMBPC; Johnson et al., 2001), Bayer Activities of Daily Living scale (B-ADL; Hindmarch et al., 1998), Center for Epidemiological Studies–Depression Scale (CES-D; Hertzog et al., 1990), the Informant Questionnaire of the Cognitive Decline in the Elderly scale (IQCODE; Jorm, 1994). Finally, they evaluated skills for making trails, categorizing objects, making the change from purchases, balancing a checkbook, and procedural memory skills.

At the end of the cognitive rehabilitation program, the participants with AD-dementia demonstrated improvements specific to reality orientation, facial recognition skills, processing speed, and functional abilities. Furthermore, the participants maintained their performance during the three-month follow-up. Overall, the study indicated the effectiveness of a cognitive rehabilitation program among participants with mildly impaired AD-dementia.

Around the same time, Woods et al. (2006) reported the effectiveness of CST and how it affects people with dementia in care facilities. Participants included 201 people (158 female, 43 male) over the age of 65 (mean age 85.3 years) living in 23 different care facilities in London (England). The participants were reported to mostly be moderate-severe dementia patients based on the MMSE, ASAS-Cog, and CDR baseline scores. The study also included activities related to reality orientation and reminiscence therapy. The program consisted of twice-a-week sessions for seven weeks, with each session of 45-minute duration. The participants were randomly assigned to either a treatment or a control group. The treatment groups consisted of at least five people per facility, and the control groups consisted of three participants per facility.

The activities used in the therapy session consisted of a reality orientation board, activities using money, famous faces, and word games. In addition, the study also included a series of assessments, including the MMSE, the QoL-AD, ADAS-Cog, CDR, CSDD, Rating for Anxiety in Dementia (RAID), the CAPE-BRS, and finally, the Holden Communication Scale. Results indicated improvements in the participants' performance based on improved scores for QoL-AD and the MMSE at the end of the program when compared to the baseline status. In addition, participants in the treatment group demonstrated improvement in energy levels, relationships with significant others, and the ability to do chores at the end of the treatment period. In conclusion, the study provided evidence for the effectiveness of the CST program for cognitive skills and in terms of relationship with family members and functioning in daily life activities.

Similar benefits of CST were also reported in a recent comprehensive review by Saragih et al. (2021). The authors reviewed a total of 26 articles related to the effects of CST among people with dementia. The treatment articles included 2,244 participants in the mild to moderate

stages of dementia. In addition, the authors conducted a meta-analysis of the articles to find patterns for specific variables. The variables examined for the meta-analysis were depression, neuropsychiatric symptoms, and cognitive function among people with dementia.

Activities in the study included: word associations, categorizing, reality orientation, using money, using food, current events, and other articles listed the therapy as 'general CST.

The meta-analysis indicated that CST improves cognitive function and significantly improves depression symptoms among participants with dementia. However, the studies did not indicate any benefits of CST on the neuropsychiatric symptoms of the participants with dementia. The authors discussed that the lack of improvement in neuropsychiatric symptoms due to CST could be attributed to the complex nature of the symptoms. In addition, only three of the 26 studies included information about the neuropsychiatric symptoms leading to insufficient data to make broad conclusions. In summary, the authors note the possible benefits of CST (a non-pharmacological intervention) in helping improve cognitive performance and reduce depression symptoms among participants with mild to moderate dementia.

Lastly, Everly et al. (2022) examined the benefits of a multidisciplinary approach. Specifically, the study included an exercise program, CST, reminiscence therapy, OT, and music therapy. Results suggest physical activity and socialization may help prevent cognitive decline and improve overall cognitive skills. The authors concluded that CST could be an inexpensive and safe nonpharmacological intervention for people with MCI and dementia. This study emphasized the need for CST programs in nursing homes, as residents often feel isolated. The authors discussed that CST programs include a social element that can positively impact one's stress and mood and help with slowing down cognitive decline. Finally, the researchers suggested that it may be more beneficial to do CST programs during the early stages of cognitive

decline rather than more advanced stages where participants may have lost most of their independence in performing different life skills.

Effects of Cognitive Rehabilitation Among People with MCI and AD Dementia

Numerous researchers have studied cognitive rehabilitation and its effects on people with AD-dementia. Among the existing studies, Talassi et al. (2007) compared the difference between cognitive rehabilitation and a non-cognitive treatment program among participants with dementia. Specifically, the authors examined the benefits of these two programs on 30 people with MCI, 20 people with mild AD-dementia, and four with another non-specific mild dementia. Sessions consisted of 30-45 minutes for each activity type for four days across three weeks. The treatment program consisted of computerized cognitive training (CCT), behavioral therapy (BT), and occupational therapy (OT). Specifically, OT sessions included basic daily living activities, and BT sessions focused on conversations and behavioral therapy. In contrast, the control group received a program offering BT and OT but no activities specific to cognition.

Neuropsychological measures in the study included the MMSE, forward and backward digit span, phonemic and semantic verbal fluency (Spinnler and Tognoni, 1987), sub-test for episodic memory of Rivermead behavioral memory test (Wilson et al., 1985), visual search (Spinnler and Tognoni, 1987), digit symbol test (Wechsler, 1981), Rey complex figure copy and recall (Osterrieth, 1944), and the clock drawing test (Ghianda, 2002). In addition, the behavioral assessment included measurements from the Geriatric Depression scale (GDS), State-Trait Anxiety Inventory (Stai-Y1 and Stai-Y2), and Neuropsychiatric Inventory (NPI). Results indicated that the affective state and cognitive scores improved in the treatment group when compared to the control group at the end of the treatment period. The authors also indicated a significant reduction in stress and anxiety in the treatment group compared to the control group

at the end of the program. In contrast, the control group participants did not show any improvement in their cognition, behavior, and functioning at the end of the study. Thus, the authors concluded that the multidisciplinary treatment program benefited participants with mild AD-dementia and other non-specific types of mild dementia.

In a systematic review by Bahar-Fuchs et al. (2013), the authors examined the current evidence for cognitive training and cognitive rehabilitation programs when treating people with different dementias. The authors chose 11 random controlled trials (RCTs) studies for the review. Results of the review indicated no evidence of the efficacy of cognitive training for people with mild to moderate dementia in improving their cognitive functioning, mood, or daily living activities. In contrast, the review suggested more favorable results from the cognitive rehabilitation program. The authors discussed that cognitive rehabilitation programs could produce positive trends for improving daily functioning for people with mild AD-dementia. However, among the two programs (cognitive training and cognitive rehabilitation), cognitive training was not found to be as effective for people with mild or moderate dementia. In contrast, cognitive rehabilitation was reported to be more useful as it could help create more favorable outcomes for people with dementia regarding their effectiveness in daily function activities.

Effects of Reminiscence Therapy and Music on People with MCI and Dementia

In addition to CST and cognitive rehabilitation training, prior researchers have examined the effectiveness of reminiscence therapy and music in people with dementia. Among existing studies, Thomas et al. (2021) examined the effects of reminiscence therapy based on published articles among people with mild to moderate dementia living in long-term care facilities. Reminiscence therapy involves sharing past life experiences using audio-visual aids like a video, photos, or physical objects from one's life. The authors reviewed five articles (all RCTs) with

mild to moderate dementia. The authors examined the effects of reminiscence therapy on different variables such as depression, QoL, and cognition of the participants with dementia.

The authors reviewed five articles (all RCTs) with 267 participants with mild to moderate dementia. The included articles in the review consisted of different assessments such as the MMSE, Autobiographical Memory Interview (AMI; Kopelman et al., 1990) with two sub-scales- the personal semantic schedule (PSS) and the autobiographical incident schedule (AIS), and AMI-Extended version (AMI-E; Woods et al., 2009). In addition, two included studies reported QoL outcomes based on the QoL-AD and the self-reported QoL (SRQoL). In addition, three articles listed depression as one of their outcomes, and the assessments used were CSDD, the Geriatric Depression Scale-Residential (GDS-12R; Sutcliffe et al., 2000), and the Geriatric Depression Scale-Short Form (GDS-SF; Sheikh & Yesavage, 1986).

Although the four articles in the Thomas et al. (2001) review suggested improvement in participants' cognitive scores following reminiscence therapy, the findings were not statistically significant. However, results for the two articles examining QoL found a significant improvement in QoL for mild to moderate dementia patients after reminiscence therapy. In addition, results did not suggest any clear significant impact of reminiscence therapy on the depression levels of participants with different severities of dementia. In conclusion, the existing literature suggests possible benefits of reminiscence therapy among participants with mild-to-moderate dementia regarding their QoL along with positive improvements in overall cognition and self-reported depression.

Lee et al. (2019) examined the effects of both art and music reminiscence therapy on cognition for people with MCI. The study included three groups: an art therapy group comprising 22 participants, a music reminiscence therapy group comprising 24 participants, and

a control group consisting of 22 participants who received no treatment during the program. All participants had a diagnosis of MCI. The study included a series of assessments, including the Rey Auditory Verbal Learning test (RAVLT; Schmidt, 1996), Delayed Recall and Recognition Trial (WAIS-III; Wechsler, 1997), Digit Span Forward task from WAIS-III Digit Span Task (Wechsler, 1997), and the Color Trails Test (CTT) Form A – Trial 2 (D'Elia, 1996). The assessments covered cognitive domains of attention, memory, visuospatial skills, and executive functioning. Each session was one hour, with the first 12 sessions being weekly (first three months), followed by biweekly sessions for the remaining six months. There were 24 sessions in total. The participants attended the program for nine months, and post-event assessments were completed at the end of the therapy program.

Results indicated significant improvements in overall memory and attention for the art therapy group compared to the control group during the program's first three months. Additionally, overall memory improvement was sustained for the art therapy group during the last six months of the program. Comparatively, the music reminiscence group did not demonstrate any significant change in cognition at three months or after six months. The control group did not have any improvement in cognition skills. In conclusion, the authors indicated the possible benefits of art therapy among people with MCI regarding their memory, attention, and cognition. However, the authors suggested additional studies were needed to determine the efficacy of art therapy among people with MCI.

In addition to art therapy and reminiscence therapy, music therapy has also been used as an intervention program for people with dementia. Regarding the benefits of music therapy, Zhang et al. (2017) examined its effect among people with different severities of dementia. This review included 34 studies, including 2000 participants with AD-dementia or unspecified mild to

moderate dementia. Among the selected articles, the music activities used were either active, where participants would listen to music and interact by singing, dancing, or clapping/tapping with the beat, or passive, by just having the participants listen to the music but have no interaction.

The main assessments used in this study were the MMSE, the Cohen-Mansfield Agitation Inventory (CMAI; Cohen-Mansfield, 1986), the NPI, the Behavioral Symptomatology in Alzheimer's Disease scale (BEHAVE-AD; Reisberg et al., 1987), the Hasegawa's dementia scale-revised (HDS; Hasegawa, 1974), and the Self-Administered Gerocognitive Examination (SAGE; Scharre et al., 2010), the RAID, the QoL-Ad, the STAI-A, and the GDS. The authors also measured participants' disruptive behavior, depression, cognitive status, and QoL. The meta-analysis showed a positive trend for reduced instances of disruptive behavior and reduced anxiety among participants with dementia following music therapy. In addition, the participants with dementia showed a positive trend in terms of improved cognitive scores, depression, and QoL scores. However, none of these outcomes were statistically significant. Despite the lack of statistical significance, the authors concluded that music therapy could be helpful for those with mild to moderate dementia as it is a non-invasive form of therapy with participants demonstrating reduced instances of disruptive behaviors and anxiety. However, the lack of statistical significance in the prior study and lack of conclusive evidence suggests the need for additional studies to understand better the possible impact of music therapy among participants with varying severities of dementia.

Overall, the existing literature indicates a clear need for additional research to determine the best possible evidence for treatment programs appropriate for people with different forms and severities of MCI and dementia. The incidence of dementia is likely to increase by 100% by

the year 2050, based on the research done by the Global Burden of Disease team in their 2019 study (Nichols, 2022). Specific to Oklahoma, a demographic survey from 2019 estimates that approximately 645,836 people are 65 years or older. With consistent population growth, this number will only continue to rise in the coming decades (United States Census Bureau, 2021). The existing literature seems to include studies from different parts of the world and different regions of the United States. To the best of our knowledge, no known studies discuss the benefits of a CST program for participants based in assisted living facilities in the Midwest regions, including Oklahoma and surrounding states. Therefore, there is also a need to specifically research dementia treatment programs in rural populations in the Midwest. Thus, the study's main research question was to determine the possible effects of a five-week CST program among participants mild to moderate dementia, moderate to severe dementia, and a control group. The null hypothesis of the current study is that there will be no difference in any of the three participant groups at the end of the 5-week CST program, and the alternative hypothesis is that there will be one or more group differences at the end of the 5-week CST program. Based on the existing literature, it was hypothesized that the two participant groups (mild-moderate and moderate-severe) will demonstrate changes in cognition, naming, reading, self-reported depression, and QoL at the end of the CST program.

CHAPTER III

METHODS

The Oklahoma State University, Institutional Review Board approved the study before data collection. Following the IRB approval, staff members of a local assisted living facility distributed flyers of the program and shared information about it with residents and their legal guardians. Convenience sampling was used in the current study. The participation was completely voluntary, and participants had the flexibility to miss days of the cognitive stimulation (CST) program for any reason. In addition, they could opt out at any point during the program.

This study included a five-week CST program and two separate treatment groups: mild-moderate dementia and moderate-severe dementia. The participants were assigned to either mild-moderate or moderate-severe groups based on the cognitive scores on the MoCA. In addition, all participants completed several assessments during the week before the CST began. The assessments included in the study were the MoCA (Nasreddine et al., 2005), the Boston Naming Test (BNT; Graves et al., 2014), the Geriatric Depression Scale (GDS; Yesavage et al., 1982), the EuroQol (EQ-5D; Balestroni, G., & Bertolotti, G., 2015), and the Single Word Reading Comprehension and Sentence Reading Comprehension subtests of the Arizona Battery of Communicative Disorders (ABCD; Bayles & Tomoeda, 1993). Following the assessments, participants attended one of the two treatment groups for ten sessions (twice a week for 45-

60-minute duration). At the end of five weeks, all participants were again assessed with the same battery of assessments. A total of 12 participants were assessed during baseline. One of the participants was restricted to her room at all times and, therefore, could not participate in the five-week CST program. As a result, she was assigned as the control participant, while the other 11 participants participated in one or more of the ten treatment sessions.

The CST was offered twice a week for five weeks from June-July 2022. Three first-year graduate students (including the study author) of the Department of Communication Sciences and Disorders administered the assessments at baseline and post-event. Four other graduate students who were not involved with assessments facilitated the treatment sessions under the supervision of an ASHA-certified SLP with experience working with older adults. The study author and the four clinicians worked together to plan the activities. The study author took data about all the participants during each session while the clinicians administered the activities using session note templates. The study author created a specific template for each treatment week, five templates for the clinicians. In addition, the study author used an independent template for data collection that was the same for each week. The session notes were organized where clinicians could note various observations such as how the participant was oriented, what activities were done that session and how the participant did during the session, and space for any comments the clinician thought were relevant to the document. The session notes were not directly used for finding group differences, as only the pre and post-CST program assessment scores were used to comment on group differences. Examples of blank session note templates are found in Appendix A. The following paragraphs include information about the participants' backgrounds and the study measures.

Participants

The current study included residents from a local assisted care facility. The staff of the facility helped identify potential participants. There were nine participants total, two males and seven females. Table 1 shows the breakdown of age and gender for the participants. One group included people with mild or early stages of dementia. Participants with scores of 18 or above on MoCA were grouped under MCI or mild-moderate dementia, and those scoring 17 or lower were grouped in the moderate-severe group. One participant, TX10, did not show any cognitive deficits at baseline. However, he was interested in attending the CST program with his wife, who demonstrated a relatively lower baseline MoCA score. Because of this, both participants were included in the mild-moderate dementia group. The second group included people with moderate to advanced stages of dementia reports from the nursing staff at the assisted care facility.

Table 1. Demographic Information of Study Participants

Group	Participant ID	Age (in years)	Gender
Mild-Moderate	TX04	98	F
Mild-Moderate	TX07	77	F
Mild-Moderate	TX08*	84	F
Mild-Moderate	TX09*	91	F
Mild-Moderate	TX10	86	M
Moderate-Severe	TX01	84	F
Moderate-Severe	TX02	87	M
Moderate-Severe	TX03	78	F
Moderate-Severe	TX05	80	F
Moderate-Severe	TX06	91	M
Moderate-Severe	TX11	86	F
Control Participant	CN01	74	F

**Note: TX08 could not complete post-assessment due to being hospitalized. TX09 passed away unexpectedly during Week 4 of the CST program. So, no post-assessment data were available for her.*

Study Assessments

The study included a series of assessments, and participants were assessed once at baseline and then at the end of the five-week treatment period. The following sections include names and details of the assessments used in the current study.

1. **Montreal Cognitive Assessment (MoCA):** The Montreal Cognitive Assessment (MoCA) is a screener that assesses orientation, attention, executive functions, naming, visuospatial skills, cognition, and memory (Nasreddine et al., 2005). This is a brief assessment and takes about 10 minutes to administer. The test score ranges from 0 to 30, with a score of 26 or higher indicating cognitive functioning within normal limits. A score of 18 to 25 indicates a mild cognitive impairment, 10 to 17 indicates moderate impairment and a score of <10 indicates severe impairment.

2. **Boston Naming Test (BNT):** The Boston Naming Test (BNT) assesses memory and naming skills and includes confrontation naming cards. Confrontational naming is a task where the participant is presented with either a real object or a picture of an object and the participant then names the presented object/ picture of the object. The standard version of BNT consists of 60 items, while the shorter version (used in the current study) includes 15 items (Graves et al., 2014). The naming items are separated into difficulty: the first five items are easy, the second five are moderately difficult, and the last five items are the most difficult. The shorter version of BNT typically takes 15 minutes to administer. A point is assigned for each item named correctly with maximum possible points of 15. If the participants scored 12 or more, they are credited with the remaining items. The test is discontinued if participants scored 3 or fewer of the 15 items. However, all participants in the current study completed the shorter version of BNT without needing to discontinue at any point.

3. ***Geriatric Depression Scale (GDS)***: The Geriatric Depression Scale (GDS) is a depression screening that includes 15 questions (Yesavage et al., 1982). A shorter version of GDS is also available that includes five questions. The GDS-15 scale was administered if the participant could complete the session. For participants in advanced stages of dementia, the GDS-5 scale was administered. Scores of 2 or more on the GDS-5 scale and 5 or more on the GDS-15 indicate possible depression. Both scales typically take about ten or fewer minutes to administer.

4. ***EuroQol (EQ-5D)***: The EuroQol (EQ-5D) is a QoL questionnaire and includes five areas of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (Balestroni & Bertolotti, 2015). This measurement takes approximately five minutes to administer (Balestroni, & Bertolotti, 2015).

5. ***Arizona Battery of Communicative Disorders (ABCD)***: The current study included two subtests of ABCD. These include the Single Word Reading Comprehension and the Sentence Reading Comprehension subtests (Bayles & Tomoeda, 1993). A total of 15 items for both subtests were administered, each counting as one point. The Single Word Reading Comprehension subtest score is 8 points, while the Sentence Reading Comprehension subtest is 7 points. The two subtests typically take a total of 10 minutes to administer.

Treatment Schedule

The current study included two treatment groups: people in mild-moderate stages of dementia and people in moderate-severe stages of dementia. The CST included activities focusing on orientation, attention, memory, and planning. The cognitive areas were selected based on existing literature by Spector et al. (2003), Woods et al. (2006), and Lee et al. (2019). Activities varied in difficulty level for the two participant groups. The participants voluntarily attended their respective groups and joined activities facilitated by the clinician's who are

assigned to their group. Because the CST program was on a voluntary basis, attendance was often inconsistent for the majority of participants for multiple reasons including sickness, medical appointments, and other personal needs. The percentages of attendance for participants are listed in the appendix section (Appendix B) and includes notation for the participants who attended 50% or more of sessions. The appendix also includes the tentative cognitive stimulation program schedule (Appendix C). Each color corresponds with a theme of activities, such as the light blue in the mild group and the dark blue in the severe group focusing on related activities for that week. The two groups had a similar order of activities within and across sessions to maintain consistency regarding the targeted cognitive areas.

CHAPTER IV

RESULTS

A total of 10 participants were assessed for both baseline and post-event assessments. However, two participants from the mild-moderate group were lost due to attrition or hospitalization before the post-event assessments. Six participants were in the mild-moderate group, three in the moderate-severe group, and one in the control group. The sections below explain the results of the two groups based on a five-week cognitive stimulation therapy (CST) program. The current study included statistical comparisons between the mild-moderate and moderate-severe groups only. There was only one control participant, so their data was not included in the group comparisons. The current study included the significance level (alpha value) as 0.05. (Maxwell & Satake, 2006).

The study included test measures that included both continuous and ordinal data. The scores for MoCA, BNT, Word, and Sentence Reading subtests of ABCD represented continuous data, while EQ-5D and GDS (i.e., GDS-15 and GDS-5) represented ordinal data. Some participants completed GDS-15 for both phases, while some completed GDS-15 for one of the two phases. Therefore, all GDS scores were converted into percentages, which were included in the statistical analyses. In the current study, paired samples *t*-tests were used to determine pre-post differences for the test scores that met normality assumptions. Additionally, the Wilcoxon

signed ranks test was used to determine pre-post differences for the ordinal data and the continuous data that did not meet the normality assumptions (Corder & Foreman, 2009).

Research Question 1: Pre-post differences for the mild-moderate group

The test scores were first tested for normality assumptions by completing Shapiro-Wilk tests. Only the pre-post total MoCA scores met the normality assumption ($p > .05$). All other test scores did not meet the normality assumption ($p < .05$). Next, paired samples t -test indicated no significant pre-post differences for the total MoCA scores for the mild-moderate group. Finally, multiple Wilcoxon signed rank tests were completed to determine the pre-post differences for the BNT, Word, and Sentence reading subtests of ABCD, EQ-5D, and GDS scores for the mild-moderate group. Results indicated no statistically significant differences for any of the scores (all with $p > .05$). In conclusion, the null hypothesis could not be rejected at this time, and there was no significant impact of the CST program on mild-moderate group participants' cognitive, naming, reading, self-reported depression, and self-reported QoL scores. Table 2 summarizes the paired samples t -tests, and Wilcoxon signed rank tests for the mild-moderate group.

Research Question 2: Pre-post difference for the moderate-severe group

Similar to the mild-moderate group, the scores for the moderate-severe group were first tested for normality assumptions by completing Shapiro-Wilk tests. Only the total MoCA and BNT scores met the normality assumptions ($p > .05$). All other test scores did not meet the normality assumptions. Next, paired samples t -tests were completed to determine any pre-post differences for the total MoCA scores and BNT scores for the moderate-severe group. Results indicated no statistically significant differences for these scores ($p > .05$). In addition, several Wilcoxon signed rank tests were completed to test the pre-post group differences for the

remaining test scores that did not meet the normality assumptions. Results showed no statistically significant differences for the pre-post scores of Word reading, Sentence reading, EQ-5D, and GDS scores for the moderate-severe group (all with $p > .05$). Thus, the second null hypothesis could not be rejected at this time. Also, the CST program had no statistically significant impact on moderate-severe group participants' cognitive, naming, reading, self-reported depression, and self-reported QoL scores. Table 3 summarizes the paired samples t -tests, and Wilcoxon signed rank tests for the moderate-severe group.

As no significant treatment effects were seen within each group alone, the data for both groups were combined next to determine any other possible trends or outcomes. The combined scores from both treatment groups were first tested for normality assumptions. Only the pre-post MoCA scores met the normality assumption ($p > .05$). All other measures failed to meet the normality assumption. Paired samples t -test indicated no statistically significant pre-post differences for the MoCA scores for both treatment groups combined ($z = .54$; $p = .59$). Next, separate Wilcoxon signed rank tests were completed to determine any pre-post differences for the remaining test scores (including BNT, word and sentence reading of ABCD, EQ-5D, and GDS). Results indicated no statistically significant pre-post differences for the combined scores for above-mentioned measures (all with $p > .05$). In conclusion, the current results do not support a significant treatment effect for the two treatment groups. Table 4 includes a summary of pre-post differences including scores of both treatment groups.

Table 2. Summary of Pre-Post Score Differences for the Mild-Moderate Group

Pre-post Score Comparisons	Mild-moderate Group (n=3)
(A) Paired samples <i>t</i> -test	
(i) MoCA (pre vs. post)	$t(2) = -2.21; p = .16$
(B) Wilcoxon signed rank test	
(i) BNT (pre vs. post)	$z = -1.41; p = .16$
(ii) ABCD word (pre vs. post)	$z = -1.0; p = .32$
(iii) ABCD sentence (pre vs. post)	$z = .00; p = 1.0$
(iv) EQ-5D (pre vs. post)	$z = 1.73; p = .08$
(v) GDS (pre vs. post)	$z = -1.34; p = .18$

Table 3. Summary of Pre-Post Group Differences for the Moderate-Severe Group

Pre-post Score Comparisons	Mild-moderate Group (n=6)
(A) Paired samples <i>t</i> -test	
(i) MoCA (pre vs. post)	$t(5) = .36; p = .73$
(ii) BNT (pre vs. post)	$t(5) = -.79; p = .46$
(B) Wilcoxon signed rank test	
(i) ABCD word (pre vs. post)	$z = -1.0; p = .32$
(ii) ABCD sentence (pre vs. post)	$z = .82; p = .41$
(iii) EQ-5D (pre vs. post)	$z = -.58; p = .56$
(iv) GDS (pre vs. post)	$z = .73; p = .47$

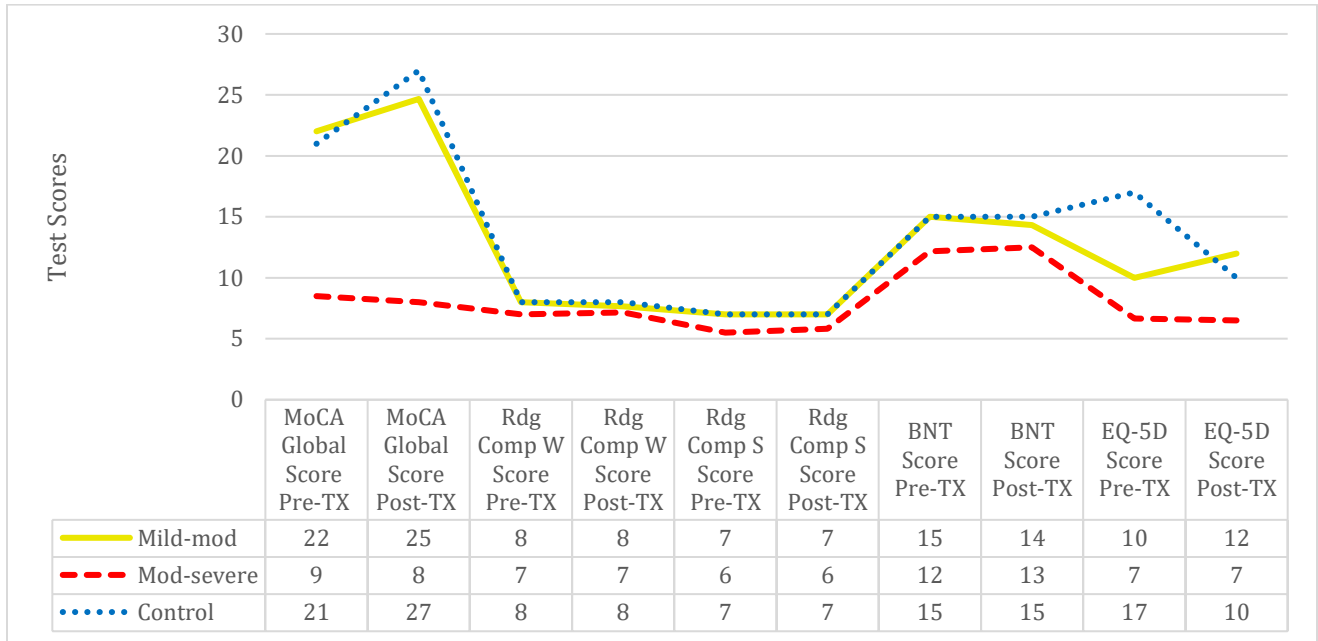
Table 4. Summary of Pre-Post Group Differences for both Treatment Groups Combined

Pre-post Score Comparisons	Treatment Groups Combined (n=9)
(A) Paired samples <i>t</i> -test	
(i) MoCA (pre vs. post)	$t(8) = -.51; p = .63$
(B) Wilcoxon signed rank test	
(i) BNT (pre vs. post)	$z = .00; p = 1.0$
(ii) ABCD word (pre vs. post)	$z = .00; p = 1.0$
(iii) ABCD sentence (pre vs. post)	$z = .82; p = .41$
(iv) EQ-5D (pre vs. post)	$z = 1.39; p = .16$
(v) GDS (pre vs. post)	$z = -.10; p = .92$

Descriptive Statistics

Although there were no statistically significant differences within the two treatment groups, the test scores were also analyzed based on descriptive measures to determine any specific patterns. Figure 1 includes a line graph of all the group means for the different test measures except for GDS (which was not consistently completed by all participants). The following sections summarize the descriptive analyses for each test measure.

Figure 1. Line Graph Showing the Group Means for Different Test Measures



1. Cognitive performance (MoCA scores)

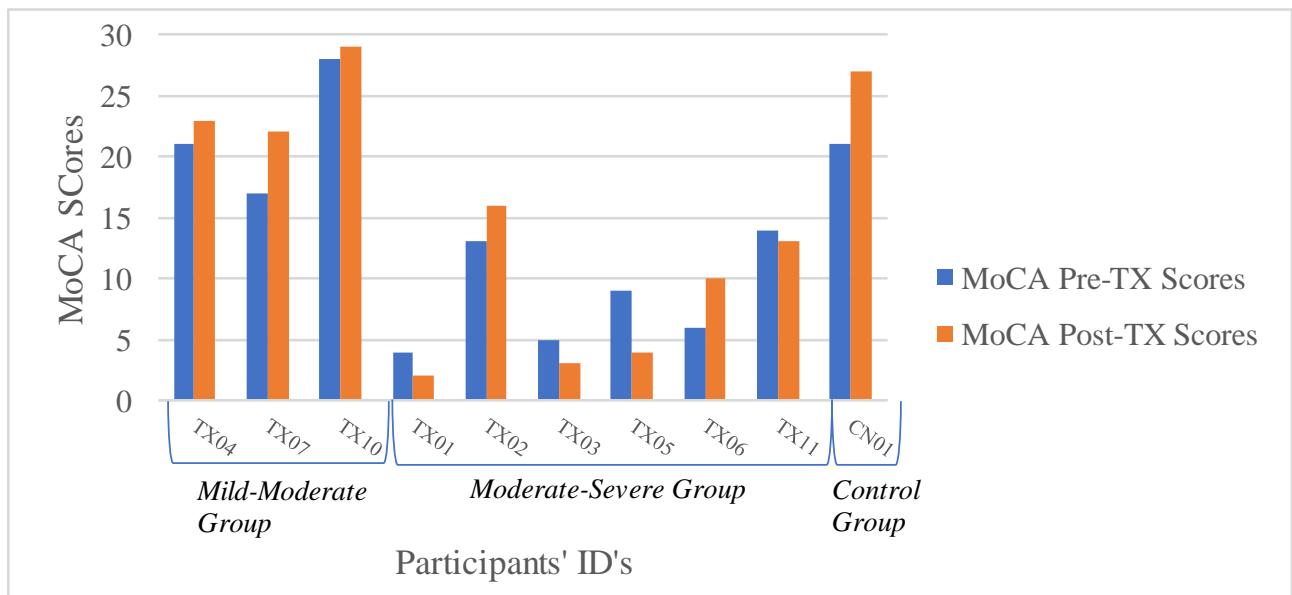
Participants’ cognitive performance was measured twice using MoCA (Nasreddine et al., 2005). There are two different versions of the MoCA. In the current study, one version was used at baseline, and the second was used for the post-group phase to minimize possible learning effects. A total of 10 participants completed both phases of the assessment. Figure 2 includes a graphic representation of the participants' MoCA scores (at baseline and post-group stage).

Results indicated that the average baseline MoCA score was 22 out of 30 for the mild-moderate and 9 out of 30 for the moderate-severe group. In contrast, the average post-treatment MoCA score was 25 out of 30 for the mild-moderate group and 8 out of 30 for the moderate-severe group. Overall, based on the groups’ means, the moderate-severe dementia group demonstrated lower cognitive scores during both phases when compared to the mild-moderate group.

MoCA scores can also be broken down by the number of participants. Based on pre- and post-event scores, it can be concluded that six out of the 10 participants demonstrated improved cognitive scores at the end of the CST program. In contrast, four participants demonstrated relatively poorer cognitive scores at the end of the five-weeks. Specific to participants in each group, three out of three participants in the mild-moderate group demonstrated improved cognitive scores at the end of five weeks. However, only two out of six participants in the moderate-severe group showed improvements in their cognitive scores at the end of the program.

In contrast, the only control participant in the program had a baseline score of 21 and a post-treatment score of 27, indicating an overall improved performance during the post-event period compared to the baseline. The control participant, who would have been in the mild-moderate group, could not engage in the CST program due to limited physical mobility. She stayed in her room and only left the nursing home for medical and other personal appointments. However, during the five weeks, she continued to engage in her daily activities (including watching TV in her room and communicating with her husband and other nursing staff).

Figure 2. Summary of Montreal Cognitive Scores (MoCA) for Participants

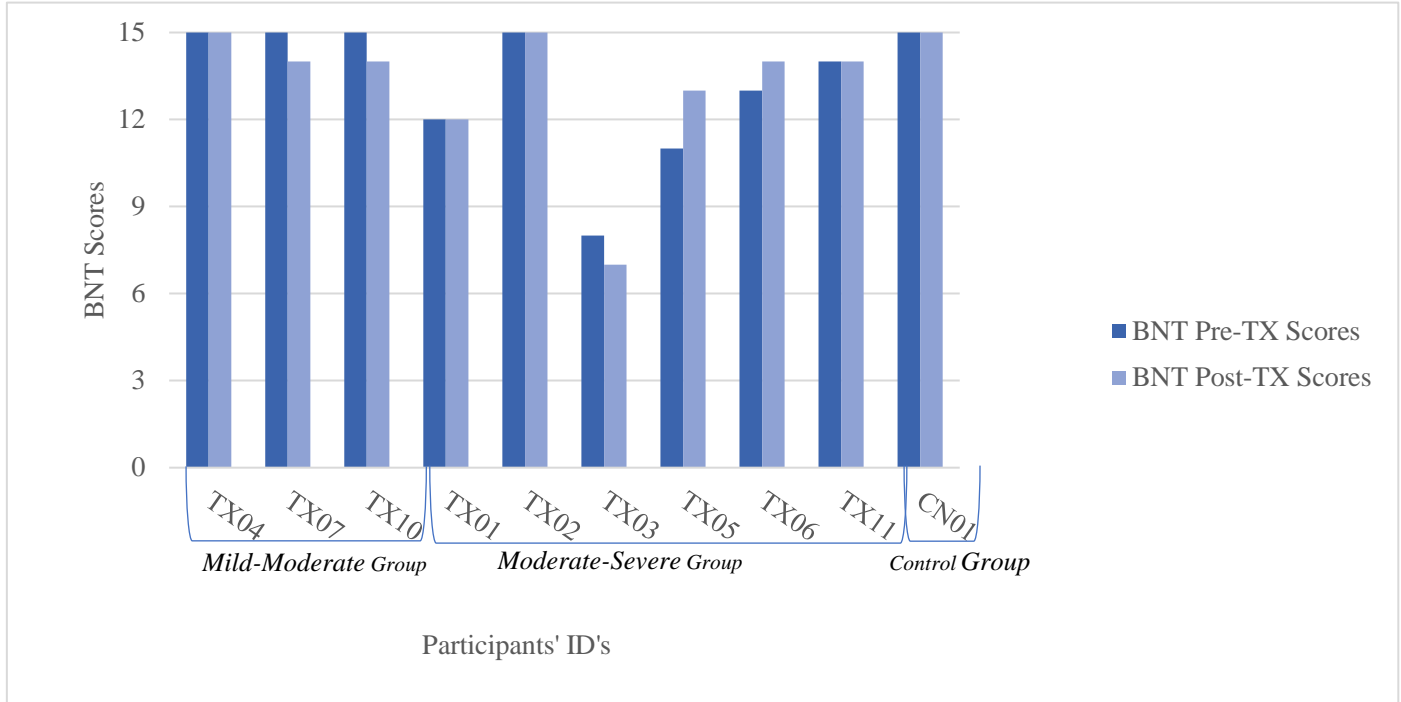


2. Naming performance (BNT scores)

The naming skills of the participants were measured twice with the BNT. A total of 10 participants completed the baseline and end-of-treatment assessment for the naming test. Figure 3 includes a graphic representation of BNT scores for the participants. Results indicated that the average baseline BNT score was 15 out of 15 (i.e., 100%) for the mild-moderate group and 12 out of 15 (i.e., 80%) for the moderate-severe group. Further, the average post-treatment BNT score was 14 out of 15 (i.e., 93%) for the mild-moderate group and 13 out of 15 (i.e., 87%) for the moderate-severe group.

Based on group comparisons, the moderate-severe group participants had relatively lower naming scores both at baseline and final phases when compared to the mild-moderate group. However, when the naming scores were compared within each group, one out of three from the mild-moderate group maintained their naming scores. In contrast, two out of six participants in the moderate-severe group showed relatively poorer scores at the end of the five-week program. The rest of the treatment participants (one in the mild-moderate and three in the moderate-severe) and the control participants demonstrated no change in naming performance for the pre- and post-group assessment phases.

Figure 3. Summary of Boston Naming Test (BNT) Scores for Participants



3. Reading Comprehension (word and sentence reading subtests of ABCD)

Reading comprehension was assessed during both phases with two subtests of the ABCD (Bayles & Tomoeda, 1993). The first subtest assessed reading comprehension of single words, and the second assessed reading comprehension on the sentence level. Specific to reading comprehension of words, this subtest of the ABCD had a maximum score of 8. Both participants in the mild-moderate group (n= 3) and the control participant scored the maximum possible points of 8 on the word reading comprehension during both baseline and post-event assessment. In contrast, the average score for the moderate-severe group (n=6) was 7 out of 8 for both baseline and post-event assessment.

Specific to reading comprehension of sentences, the participants in the mild-moderate group and the control participant scored the maximum possible points of 7 during the baseline and post-treatment phases. In contrast, the moderate-severe group scored 6 points on the

sentence reading comprehension test during the baseline and post-treatment phases. The moderate-severe dementia group demonstrated lower average scores for ABCD reading comprehension subtests at both phases. All participants in the mild-moderate group demonstrated a ceiling effect (i.e., maximum possible scores) during baseline and post-event assessment. For the moderate-severe group, one out of six participants improved their score on the comprehension of words test, while five out of six participants demonstrated the same scores for post-group assessment.

Similar to reading scores for words, the mild-moderate group demonstrated a ceiling effect for reading comprehension of sentences at baseline and post-event assessment. Comparatively, for the moderate-severe group, four out of six participants demonstrated improved scores at the final phase of the assessment. Conversely, two participants had a lower score post-treatment assessment in the moderate-severe group, indicating decreased sentence-level reading comprehension. Also, four participants of the moderate-severe group maintained their reading comprehension skills as suggested by the same scores at baseline and at the end of five-weeks. Figures 4 and 5 indicate graphic representations for the participants' scores of the two subtests (word reading and sentence reading, respectively).

Figure 4. Summary of Reading Comprehension Word Scores for Participants

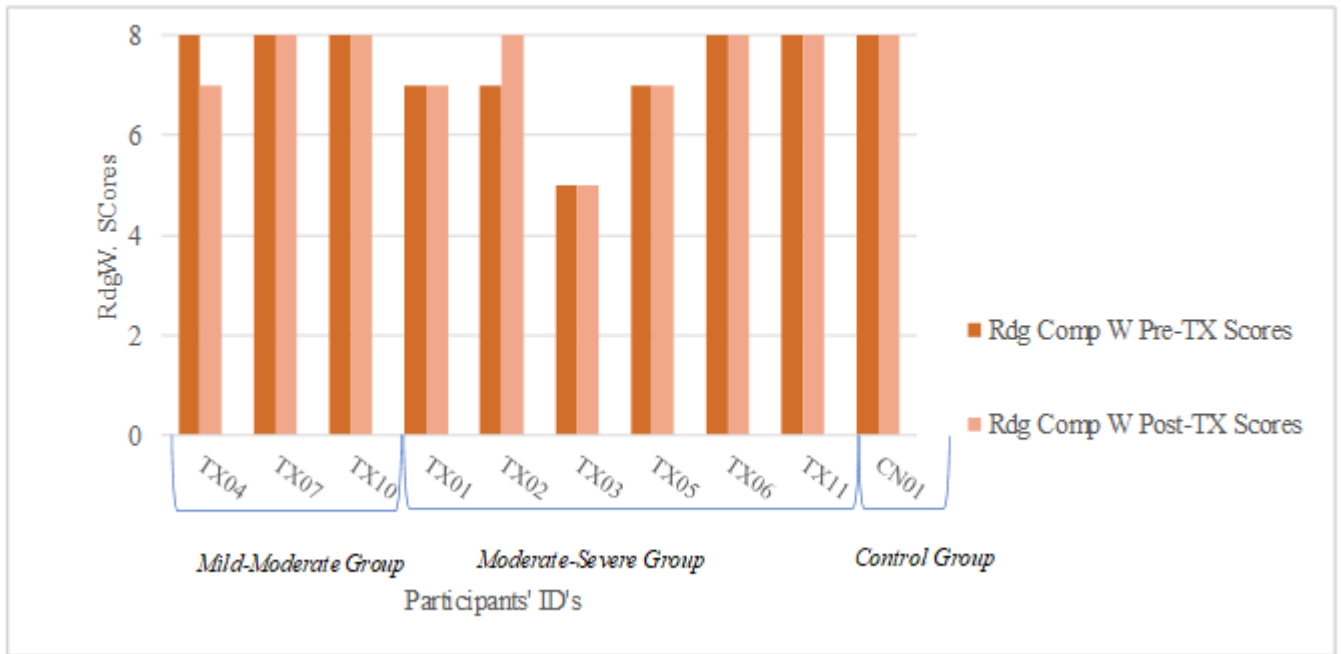
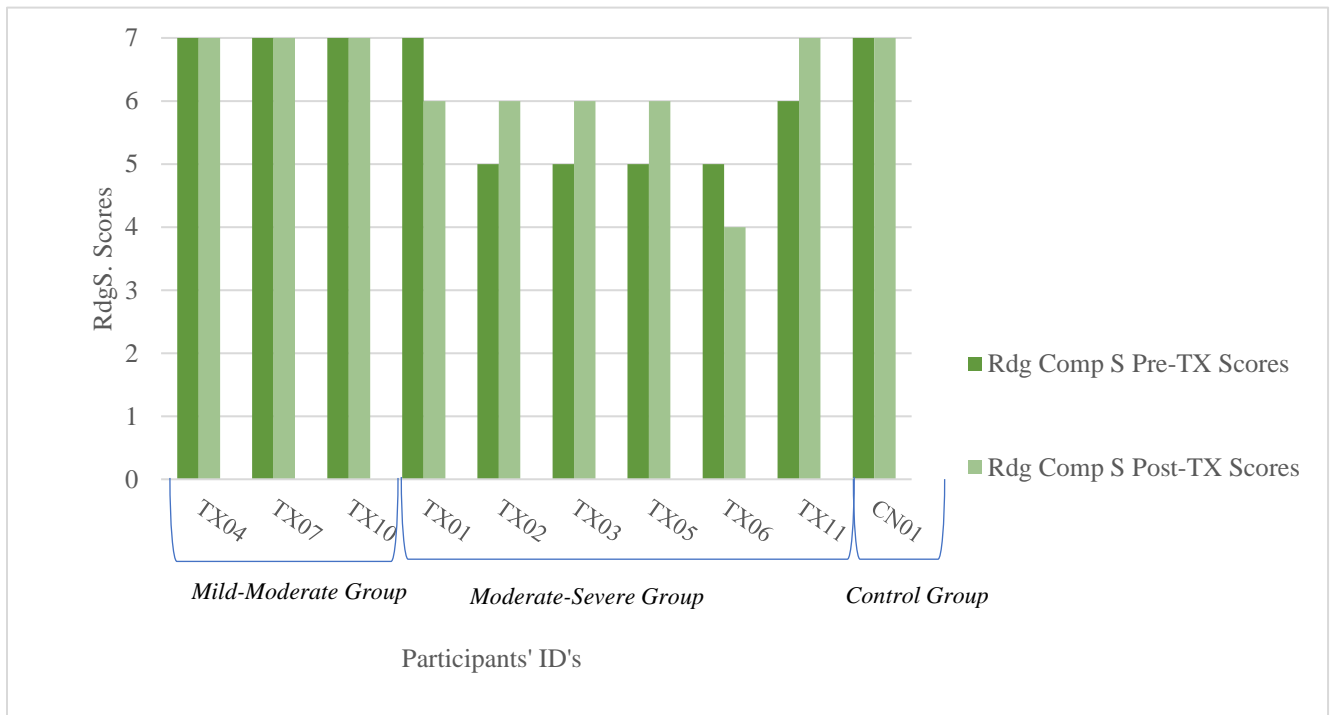


Figure 5. Summary of Reading Comprehension Sentence Scores for Participants



4. Self-reported depression (GDS scores)

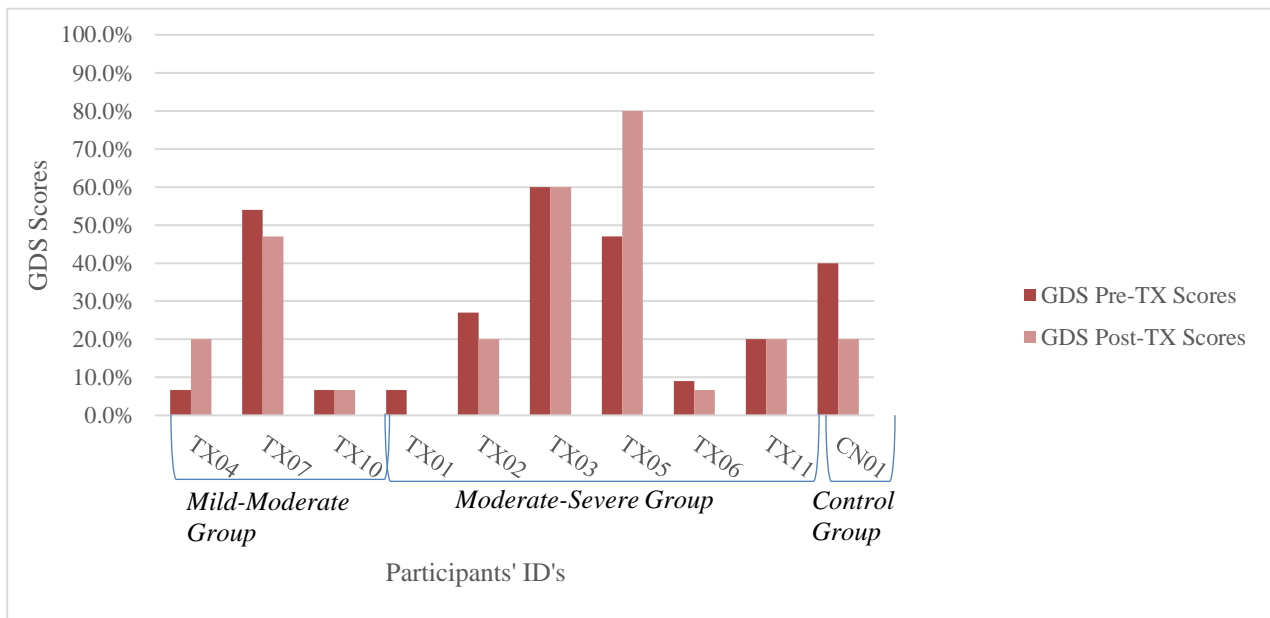
The Geriatric Depression Scale (GDS, Yesavage et al., 1982) was utilized for baseline and post-treatment assessment. The current study included the shorter and longer version of the GDS (Yesavage et al., 1982). The shorter 5-item version is typically utilized for participants who cannot complete the longer 15-item version of the GDS after several attempts (Hoyl et al., 1999). A total of six participants completed the 15-question questionnaire for either baseline or post-group phases or both. However, two participants completed the longer version in one phase and the shorter version during the other assessment period.

When the raw scores were compared, the average GDS-15 scores for baseline were 1 out of 15 for the mild-moderate group and 3.75 out of 15 for the moderate-severe group. Average GDS-15 scores for post-treatment were 3.7 out of 15 for the mild-moderate group and 1.75 out of 15 for the moderate-severe group. The only participant in the moderate-severe group who participated in the GDS-5 for their baseline assessment scored a 3 out of 5. For post-treatment assessment scores, the GDS-5 average for the moderate-severe group was 3.5 out of 5. Further, the control participant completed different versions of GDS during baseline and post-event. Her score was 2 out of 5 for GDS-5 at baseline and 3 out of 15 for GDS-15 post-event.

Higher scores on the GDS suggest the likelihood of greater self-reported depression. The moderate-severe group had a decrease in self-reported depression scores post-treatment compared to their baseline scores. It was noted that overall, the mild-moderate treatment group demonstrated higher scores on GDS (i.e., greater self-reported depression) than the moderate-severe group at post-treatment compared to baseline. Further, only one out of three participants in the mild-moderate group and three out of six participants in the moderate-severe group

reported less self-reported depression (as indicated with lower GDS scores) during the final phase. Comparatively, one out of three participants in the mild-moderate group and one out of six participants in the moderate-severe group reported relatively more depression during the final phase. Lastly, one out of three participants in the mild-moderate group and two out of six participants in the moderate-severe group reported no changes in self-reported depression during the final assessment. Due to the variability in the GDS scores, Figure 6 includes the graphic representation of all the GDS scores in percentages.

Figure 6. Summary of Geriatric Depression Scores (GDS) In Percentages (%)



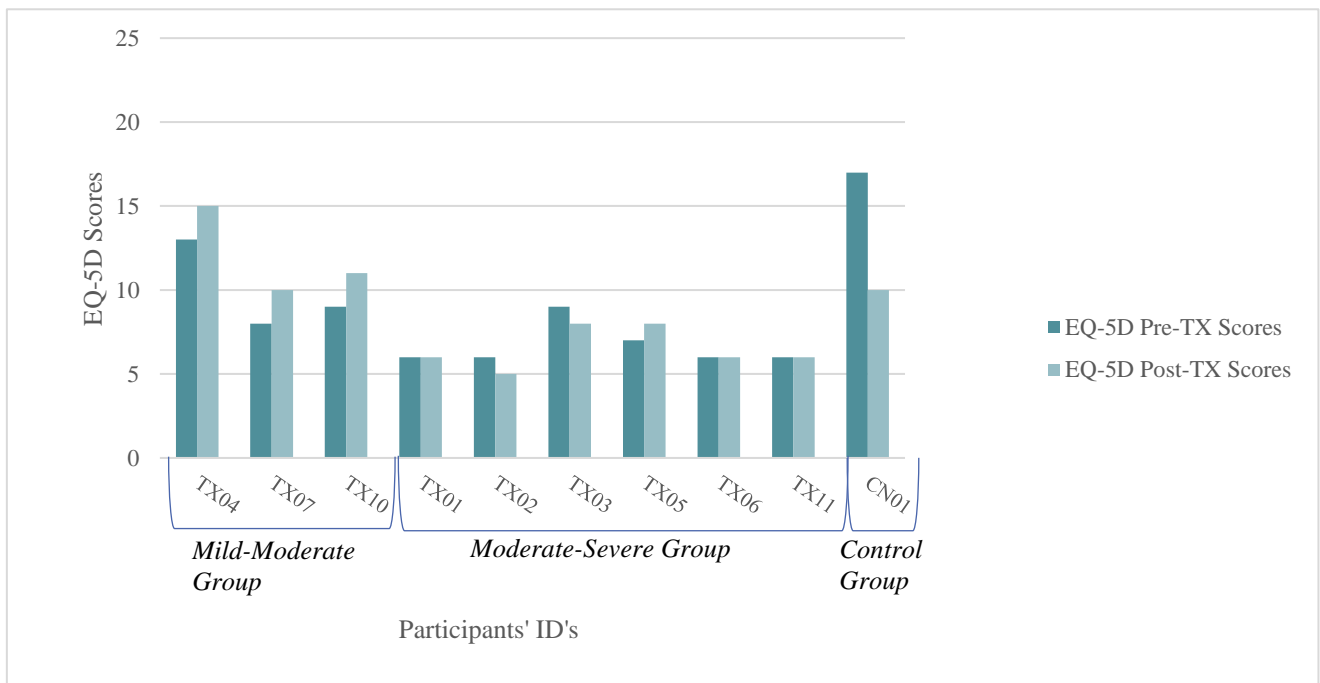
**Note: TX06 and TX07 did not complete all 15 GDS questions during their baseline assessment. So, their total scores was based on total number of questions answered.*

5. Quality-of-life performance (EQ-5D scores)

The current study included EQ-5D to assess the QOL of participants (Balestroni & Bertolotti, 2015) for both baseline and post-treatment assessments. Figure 7 is a graphic representation of the participants' scores for EQ-5D. The lower the EQ-5D score, the better QoL

for the participant at the time of assessment. The average baseline score for the mild-moderate group was 10 out of 25, and the average post-group score was 12 out of 25, indicating a slight worsening of QoL within the group. For the moderate-severe group, the average baseline score was 7 out of 25, and the average post-group score was also 7 out of 25, indicating no change in QoL. The control participant's score decreased from 17 out of 25 to 10 out of 25 at the end of five weeks. The lower scores at the end of the program suggest that the control participant self-reported a relatively better QoL for post-event assessment when compared to baseline.

Figure 7. Summary of Quality of Life (EQ-5D) Scores for Participants



Spearman Correlations

In addition to possible group differences, the current study included correlational analyses in determining possible relationships between the different test scores. Spearman correlational analyses indicated significant positive relationships between cognitive and naming

performance both at baseline and post-event. In other words, participants with higher total MoCA scores also had relatively higher BNT scores and word and sentence reading scores during both phases. The correlational analysis also found a significant relationship between cognitive performance and word-level reading at baseline and post-event. Similarly, there was a significant correlational relationship between cognitive performance and sentence-level reading at baseline and post-event. Table 5 below includes all the significant relationships between the different test measures. In contrast, there were no significant relationships between cognitive performance and self-reported depression at baseline and post-event. There were also no significant relationships between cognitive scores and self-reported QoL scores at baseline and post-event.

Table 5. *Correlations between different assessment measures*

	MoCA baseline	MoCA post	BNT baseline	BNT post	Word rdg baseline	Word rdg post	Sentence rdg baseline	Sentence rdg post
MoCA_pre		.967**	.827**	.682*	.708*			.822**
MoCA_post	.967**		.905**	.778*	.708*			.703*
Word_rdg_pre						.667*		
Sentence_rdg_pre								.725*

Note. *. Correlation is significant at the .05 level; **. Correlation is significant at the .01 level.

CHAPTER V

DISCUSSION

This study aimed to determine the possible benefits of a five-week cognitive stimulation therapy (CST) program among participants with MCI or dementia residing in an assisted living facility. The group means suggest a positive impact on participants' cognitive functioning, naming, and self-reported QoL. The following sections discuss the main findings of the study.

Cognitive performance

The statistical comparisons showed no statistically significant pre-post differences for the total MoCA scores for either the mild-moderate or the moderate-severe group. However, based on the descriptive statistics, the mild-moderate group had an overall improvement as all three participants had relatively higher scores on the MoCA following the CST program when compared to the baseline phase. This was contrasted by the moderate-severe group, where only two out of six participants demonstrated relatively higher MoCA scores at the end of the CST program. In contrast, the remaining four participants had relatively lower scores at the end when compared to the baseline scores. When scores from both groups were analyzed as a whole, 56% of the participants (i.e., five out of nine participants) demonstrated relatively better cognitive performance (i.e., higher MoCA scores) at the end of the program. Additionally, three out of five participants who showed improved cognitive performance and relatively higher QoL ratings attended the

program most consistently. Therefore, regular attendance of the CST program seemed to indicate a possible positive impact on participants' cognitive functioning.

Specific to the MoCA subtests, the moderate-severe group had a significantly lower group average for different subtests of MoCA (0.17/5 for delayed recall, 1/5 for visuospatial/executive, 2/6 for orientation) compared to the mild-moderate group (2/5 for delayed recall, 4/5 for visuospatial/executive, 6/6 for orientation) at baseline. For the mild-moderate group, scores were improved at post-event measures for the delayed recall and visuospatial/ executive subtests. In addition, the mild-moderate group maintained their orientation skills during the program. However, only some moderate-severe group participants demonstrated improved orientation at the end of five weeks.

Similar improvements among participants with cognitive deficits following CST programs were also reported in prior studies by Spector et al. (2003) and Saragih et al. (2021). Specifically, Spector and her colleagues administered a seven-week CST program among 97 participants in 23 assisted living facilities. They reported an overall significant difference in cognitive scores for their participants with dementia post-treatment based on improved scores on the MMSE and ADAS-Cog. More recently, Saragih et al. (2021) completed a meta-analysis and provided clear evidence that older adults experience significant gains in different cognitive areas following CST programs. However, the current study had a relatively smaller sample size than the prior study by Spector et al. (2003). Some methodological constraints (including unequal sample size, lack of control over participants' attendance, unexpected hospitalization of one of the participants, and sudden death of another participant) could explain the lack of statistically significant differences within the two treatment groups for cognitive improvements in the current study.

Naming performance

Similar to cognitive performance, there were no statistically significant pre-post group differences for naming among the mild-moderate or moderate-severe groups. However, there were significant positive correlations between cognitive scores and naming performance. Specifically, higher cognitive MoCA scores correspond with higher BNT scores in the current study. This was evident with the moderate-severe group, who demonstrated relatively higher BNT scores at the end of the five-week CST program. One participant in the mild-moderate group and one in the moderate-severe group scored the full number of points (15 out of 15) both during baseline and post-event. It was interesting to note that more moderate to severe group participants demonstrated improvements in naming, as evidenced by improved BNT scores at the end of the five-week CST program. It is also important to note that many participants demonstrated a ceiling effect for naming on BNT. This ceiling effect may have prevented us from clearly measuring the true impact of the CST program. None of the reviewed studies related to CST included a specific naming test. Therefore, the current study findings cannot be compared with prior studies regarding how CST programs may impact the naming abilities of participants with MCI and dementia.

Reading performance

Similar to naming performance, there were no statistically significant pre-post group differences in word or sentence reading scores for either the mild-moderate or moderate-severe groups. However, participants with relatively higher cognitive and naming performance demonstrated higher word and sentence reading skills. Similar to the naming skills, a ceiling effect was noted for the two subtests of ABCD (reading words/sentences comprehension) for both baseline and post-treatment assessment measures. Overall, most

participants maintained their reading performance during the CST program. Upon comparison of scores of both participant groups, it was noted that 7 out of 11 participants had the same score for both baseline and post-treatment assessment phases for the reading comprehension of words subtest. Specifically, 4 of the 7 participants scored 8 out of 8 points at baseline and at the end of the five weeks.

Regarding the subtest for reading comprehension of sentences, there was a similar ceiling effect, most notable for the mild-moderate group, such that three participants scored the highest score of 7 both at baseline and at post-assessment measures. There was an improvement in scores for the moderate-severe group, where four out of six participants increased their score by one point. In comparison, the other two participants from this group had relatively lower scores (a difference of 1 point) at the end of the five weeks. None of the reviewed studies included any reading tests in determining the impact of CST on one's reading and attention skills. Thus, the current study cannot be directly compared to similar studies about the possible benefits of CST on participants' reading skills.

Self-reported depression

When participants' self-reported depression scores were compared, there were no statistically significant differences within the groups pre- and post-CST. Depression was measured in the current study using the self-reported questionnaire GDS-5 and GDS-15. It is important to acknowledge that during the study, two participants underwent unexpected personal tragedies during the program. Specifically, one female participant passed away unexpectedly while the husband of the now-deceased participant missed two sessions during that time. One other participant was hospitalized and missed 8 of the 10 sessions. The specific participant was also not available for post-event assessments. It is possible that all these unexpected events and

other unknown circumstances may have impacted the participants and created a possible increase in their self-reported depression levels during the study.

The two participants with the most marked increase in post-phase self-reported depression were TX05 in the mild-moderate group and TX04 in the moderate-severe group. As the current author did not have access to their existing medical history, medications, or other personal information, no specific reason can be directly associated with the increase in self-reported depression at the end of the CST program. However, if these two participants are excluded from the comparisons, all remaining participants from both treatment groups typically demonstrated a decrease in self-reported depression symptoms at the end of 5-weeks compared to their baseline scores.

The current study does not indicate a clear association between the CST program and the participants' self-reported depression status. This sharply contrasts a prior study by Saragih et al. (2021), where they found an overall decrease in depression scores based on a meta-analysis of prior studies that used CST. Improvements in self-reported depression were also reported by Loewenstein and their colleagues for their participants with dementia following a 12-week CST program (Loewenstein et al., 2004). Some of the methodological differences, including the relatively short duration of the program (i.e., five weeks), interindividual variability of the participants, limited access to participants' medical and medication history, and lack of specific mental health targeted activities in the CST program could explain the findings of the current study.

Self-reported QoL

Although statistical analyses did not show significant pre-post differences in self-reported QoL for the mild-moderate and moderate-severe groups, some trends were noticed based on descriptive analyses. Specifically, the mild-moderate group demonstrated a slight decrease in QoL at the end of the five-week program. In addition, higher scores on the questionnaire indicated this decrease, and all three participants of the mild-moderate group had relatively higher scores at the end of the five-week program. In contrast, the average EQ-5D score was the same for both stages of assessment for the moderate-severe participant group.

The current study findings of relatively poor self-reported QoL scores following the CST program among participants with mild-moderate cognitive deficits contrasted with prior studies by Woods et al. (2006) and Spector et al. (2003). Both prior studies found improved QoL among participants with dementia after the CST program. Spector's 2003 study had a CST group of 97 participants during their follow-up assessment. They found improvements in their cognitive skills and self-reported QoL measures at the end of the seven-week CST program.

Similarly, Woods et al. (2006) reported improved QoL among 115 participants with dementia following a CST group at their respective day centers or residential centers. Their study found an increase in MMSE scores correlated with an increase in QoL-AD scores during post-treatment measurements. Both studies by Spector et al. (2003) and Woods et al. (2006) had much larger treatment groups, along with longer treatment periods which may have contributed to the difference in average QoL scores. As previously stated, some unexpected events came up during the current study. Based on the test scores, the current study did not show a clear improvement in self-reported QoL for participants with mild-moderate cognitive deficits during the five-week

CST program. However, some participants with moderate-severe deficits showed some improvements in self-reported QoL during the same period.

Although no statistically significant pre-post group differences were noted for participants' QoL ratings, it is important to acknowledge some of the feedback provided by the participants suggesting otherwise. For example, a few participants noted they enjoyed the program and wished it would continue to be offered at their facility. Some participants also verbally shared that they enjoyed the social aspect of being in groups and working with the clinicians. Throughout the program, the clinicians would receive feedback from the participants regarding the group activities, especially the art and music activities, which some participants liked most.

LIMITATIONS

It is important to acknowledge some of the limitations of the current study. First, the study included only 10 participants, three in the mild-moderate group and six in the moderate-severe group, and one control participant. Second, participation in the cognitive stimulation therapy (CST) program was voluntary. The CST program was offered for free, and participants could miss or drop out anytime during the program. With a voluntary program, there were participation issues. Five participants of the moderate-severe group often did not want to participate or expressed disinterest in some of the presented activities, which may have affected the current study results.

A third limitation was that the CST program was only five weeks long, with 45–60-minute sessions twice a week. Only two sessions per week limited our ability to determine the possible impact of the CST program on different domains of participants' functioning during

other times and possible life-functioning scenarios. A fourth limitation was that some of the tests were not as sensitive to measuring the possible impact of CST on older adults with different severities of cognitive deficits. Specifically, the naming assessment (BNT) and reading assessment (subtests of ABCD) were found to have a ceiling effect; therefore, no specific trends were noted for these measures during the study.

Further, we were limited by who could participate in the study as it was based in an assisted living facility. As a result, several participants could have benefitted from the program but did not participate due to personal and/or health-related issues. Finally, the age and gender of the participants were the only personal information the study author was allowed to record. Other demographic information such as medical history, current medications, education history, dietary preferences, and other information could have helped us to identify any possible relationships between these factors and the impact of the CST program on participants' performance.

FUTURE DIRECTIONS

Future research studies can focus on creating longer community-based programs with participants of different forms and severities of MCI and dementia. It is also important that future studies include assessments that can best determine participants' functioning levels and are most sensitive to tracking the possible impact of CST programs. Additional studies can also include ways to implement more of an incentive to persuade participants to join in the activities. Specifically, this could include finding meeting times that fit into everyone's schedules to help with increasing interest and overall participation.

Regarding participants, future research may benefit from gathering demographic information regarding the educational history, work history, and medical history of participants

attending CST programs and then examining the relationships between participation in CST programs and participants' existing medical, dietary, and socioeconomic backgrounds. The current study was limited in location, so similar study designs in different locations, including community-based groups, nursing homes, rehab centers, and outpatient hospitals, can also be helpful. Previous literature does recommend CST for clients with dementia, and future research must be done to continue and find the best protocols to implement CST. Finally, multi-site studies and studies with different and larger populations of people with MCI or dementia can be helpful in clearly understanding the impact of CST and help determine some of the most effective elements of CST.

CHAPTER VI

CONCLUSION

The current study aimed to investigate the effectiveness of a five-week CST program among people with MCI and different severities of dementia. Descriptive analyses suggest improvements in cognitive scores, especially for clients with mild to moderate cognitive decline, thereby supporting using a short-term CST program. However, the CST program did not show a clear improvement in the self-reported depression and QoL of the participants. Future CST studies would benefit from finding assessments geared towards measuring functional skills of participants with cognitive deficits and including different types, severities, and backgrounds of participants with MCI and dementia.

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APPENDICES

APPENDIX A: Blank Clinician Session Notes Template

S: (check all that apply): all group members were alert majority of participants were active all group members were cooperative a majority of participants required encouragement a majority of group members had limited participation one or more members were frustrated

COMMENTS: _____

O: DAILY GOALS ADDRESSED (check all that apply)

- Orientation skills (#1-6)
- Problem-solving skills (#1)
- Social communication skills (#1-6)
- Memory skills (#2)
- Naming skills (#3)
- Visuospatial skills (#4)
- Music and cognitive skills supporting communication (#5)
- Attention skills (#6)
- Other: _____

PARTICIPATED IN THE FOLLOWING COMMUNICATION ACTIVITIES: (fill the sections as appropriate)

Week 1: Session# _____

- Greeting Song: No. of minutes _____
- Reality orientation (RO): No. of minutes _____
- Money activity: No. of minutes _____
- Famous Faces: No. of minutes _____
- Goodbye song: No. of minutes _____
- Other activities: No. of minutes _____

SAMPLE COMMENTS: _____

Benefits from phoneme cues word-based cues visual cues

Comments: _____

P: Continue Dementia Camp activities Discontinue Dementia Camp

Comments: _____

APPENDIX B: Attendance by Percentage of Sessions

Group	Participant ID	Percentage of Attendance
Mild-Moderate	TX04	70% [^]
Mild-Moderate	TX07	100% [^]
Mild-Moderate	TX08	40%*
Mild-Moderate	TX09	10%*
Mild-Moderate	TX10	50% [^]
Moderate-Severe	TX01	10%
Moderate-Severe	TX02	40%
Moderate-Severe	TX03	90% [^]
Moderate-Severe	TX05	20%
Moderate-Severe	TX06	50% [^]
Moderate-Severe	TX11	10%

*Note: *Participants TX08 and TX09 were lost due to attrition. The (^) symbol indicates $\geq 50\%$ of sessions attended. Total number of sessions = 10.*

APPENDIX C: Cognitive Stimulation Program Schedule

Mild Cognitive Impairment Group	Severe Cognitive Impairment Group
5 min. of greetings with a greeting song	5 min. of greetings with a greeting song
5 min. to go over reality orientation (RO) board and schedule of activities	5 min. to go over RO board and schedule of activities
10 min. Money game (how many items could be bought to be under \$20?) (problem-solving)	10 min. Money activity, buying activity and counting change.
5 min. break	5 min. break
20 min. famous faces game. (problem-solving)	20 min. easier famous faces games (very commonly known people for this group)
5 min. goodbye with goodbye song	5 min. goodbye with goodbye song
5 min. of greetings with a greeting song	5 min. of greetings with a greeting song
5 min. to go over RO board and schedule of activities	5 min. to go over RO board and schedule of activities
Total of 5 min throughout the session. Spaced retrieval (to be used throughout the session) ex. What is my name? Full name (memory)	Spaced retrieval (to be used throughout the session) ex. What is my name? Just my first name (memory)
10 min. in my suitcase game (memory)	10 min. simple memory game using cards (5 pairs)
5 min. break	5 min. break
15 min. group memory game (memory, word recall)	15 min. short-term memory social group conversation over current events
5 min. goodbye with goodbye song	5 min. goodbye with goodbye song
5 min. of greetings with a greeting song	5 min. of greetings with a greeting song
5 min. to go over RO board and schedule of activities	5 min. to go over RO board and schedule of activities
15 min. generative naming as a team (naming)	15 min. categories activity (naming)
5 min. break	5 min. break
15 min. Word Joggers (naming)	15 min. Word Joggers warmups. (naming)
5 min. goodbye with goodbye song	5 min. goodbye with goodbye song
5 min. of greetings with a greeting song	5 min. of greetings with a greeting song
5 min. to go over RO board and schedule of activities	5 min. to go over RO board and schedule of activities
20 min. Drawing or painting keeping with a summer theme with 5 items that remind them of summer	20 min. Drawing or painting with a summer theme with 2-3 items that remind them of summer
5 min. break	5 min. break
10 min. of going around the group and naming the items they drew/painted	10 min. of going around the group and naming the items they drew/painted
5 min. goodbye with goodbye song	5 min. goodbye with goodbye song
5 min. of greetings with a greeting song	5 min. of greetings with a greeting song
5 min. to go over RO board and schedule of activities	5 min. to go over RO board and schedule of activities
20 min. of making bottle shaker instruments	20 min. of making bottle shaker instruments
5 min. break	5 min. break
15 min. of listening to music while using DIY instruments or other active interaction with the music.	15 min. of listening to music while using DIY instruments or other active interaction with the music. Passive listening is fine as well.
5 min. goodbye with goodbye song	5 min. goodbye with goodbye song
5 min. of greetings with a greeting song	5 min. of greetings with a greeting song
5 min. to go over RO board and schedule of activities	5 min. to go over RO board and schedule of activities

15 min. digit-span competition (such as counting backwards from 100 by 4) (attention)

5 min. break

15 min. "Wheel of Fortune" wall game (attention)

5 min. goodbye with goodbye song

15 min. digit-span competition (such as counting backwards or forwards by 5) (attention)

5 min. break

15 min. "Wheel of Fortune" wall game (attention)

5 min. goodbye with goodbye song

APPENDIX D: Institutional Review Board Approval Letter



Oklahoma State University Institutional Review Board

Date: 06/17/2022
Application Number: IRB-22-239
Proposal Title: Cognitive Stimulation Program for Participants with and without Dementia

Principal Investigator: Sabiha Parveen
Co-Investigator(s):
Faculty Adviser:
Project Coordinator:
Research Assistant(s): Robin Baack

Processed as: Expedited
Expedited Category:

Status Recommended by Reviewer(s): Approved

Approval Date: 06/17/2022

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent, and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a status report to the IRB when requested
3. Promptly report to the IRB any harm experienced by a participant that is both unanticipated and related per IRB policy.
4. Maintain accurate and complete study records for evaluation by the OSU IRB and, if applicable, inspection by regulatory agencies and/or the study sponsor.
5. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB

APPENDIX E: Participant Consent Form

Participant ID:

Page | 1



University Research Compliance

CONSENT FORM

Cognitive Stimulation Program For Participants With And Without Dementia

Background Information: You are invited to be participate in a research project examining benefits of a cognitive stimulation program in people with and without dementia.

1. The cognitive stimulation program will include group-based activities focusing on attention, memory, naming, and problem-solving.
2. The program is currently planned for June 20-August 5, 2022. The first week is going to include baseline assessments of the participants completed individually. Cognitive stimulation program will be offered for a total of five weeks as a twice a week 50-minute group sessions. During the final week, follow-up assessments will be conducted for the enrolled participants individually. Each of the individual assessment sessions may take up to an hour at a time.
3. Your participation is completely voluntary.

This study is being conducted by:

Sabiha Parveen, Ph.D., CCC-SLP, Oklahoma State University
Robin Baack, B.S., Oklahoma State University

Procedures: If you agree to be in this study, you are going to:

1. Complete either a self-informed consent or consent by the legal guardian, whichever seems appropriate.
2. Participate in group-based language and cognitive activities for twice a week for 50 minutes.
3. Complete language and cognitive tests and self-reported questionnaires during the program.
4. Students will be completing session observations where they are going to track the different cognitive activities that were presented during each session and how the participants responded to the activities. No identifiable information of participants will be used during the observations.

Audio and/or Video Recordings: No audio and/or video recordings will be part of this research study.

Risks and Benefits of being in the Study: 1. There are no risks except for those that may be encountered during daily activities.

2. You may skip any part of the study that you feel uncomfortable with.
3. No funds have been set aside by Oklahoma State University to compensate you in the event of illness or injury during participation in the study
4. The study can help identify possible benefits of cognitive stimulation program among people with dementia.
5. The current project is part of a graduate thesis and findings will be used for conference presentations and research manuscripts.



Approved: 06/17/2022
Protocol #: IRB-22-239

VITA

ROBIN BAACK

Candidate for the Degree of

Master of Science

Thesis: EFFECTS OF A 5-WEEK COGNITIVE STIMULATION PROGRAM AMONG
PARTICIPANTS WITH MILD COGNITIVE IMPAIRMENT OR DEMENTIA

Major Field: Communication Sciences and Disorders

Biographical:

Education:

Completed the requirements for the Master of Science in Communication Sciences and Disorders at Oklahoma State University, Stillwater, Oklahoma in May, 2023.

Completed the requirements for the Bachelor of Science in Communication Sciences and Disorders at Oklahoma State University, Stillwater, Oklahoma in 2019.