Assessment of Cognitive Training in People with Mild to Moderate Dementia

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INTRODUCTION

- Alzheimer's disease (AD) is a devastating age-related dementing illness affecting million of Americans with no known cure.
- General cognitive decline, memory loss, and behavioral disorders, resulting in reduced quality of life, and an increasing burden on caregivers.
- AD increasingly being housed full-time or part-time in assisted care settings.
- Current pharmaceutical treatments for AD have negative side effects.
- Non-pharmaceutical therapies (pet therapy, music therapy, traditional cognitive strategy training) promise positive changes in behavioral and cognitive function without troubling side effects, but often involve a large commitment of time and energy on the part of caregivers and assisted living staff (Douglas et al., 2004).
- E.g., cognitive strategy interventions aim to build on the areas of relative strength to compensate for impairments in those aspects of cognition and memory that are significantly affected (Barnes et al., 2009). Cognitive training with computer games designed to slow cognitive declines in typical healthy aging (Posit Science, San, Francisco, CA) may slow cognitive declines in AD with less stress on caregivers and staff (Hofmann et al, 2003).
- Social interaction during training sessions may provide support and encouragement that may help diminish the negative impact of dementia on social involvement (Bennett et al., 2006).

DESIGN

- Pre-training assessment (see tests listed below)
- Game training (1 session per day, 12 sessions total, 23-49 day window, 3 session sequence repeated 4 times)
- Post-training assessment

Training Sessions (Posit Science Games)

- **Session A**: Scene Crasher (memory), Divided Attention (attention), Recognition (people skills), Hawk Eye (brain speed)
- **Session B**: Mind Bender (intelligence), Mental Map (navigation), Face-to-Face (people skills), Double Decision (attention)
- **Session C**: To-do List (memory), Eye for Detail (brain speed), Card Shark (intelligence), Optic Flow (navigation)
- *Game difficulty is adaptive to keep the player within a fixed performance range.*

TRAINING GROUPS

- **Low Social Interaction**: limited interaction with experimenter during game play sessions.
- **High Social Interaction**: open & engaging conversation on topics of interest during game play sessions.

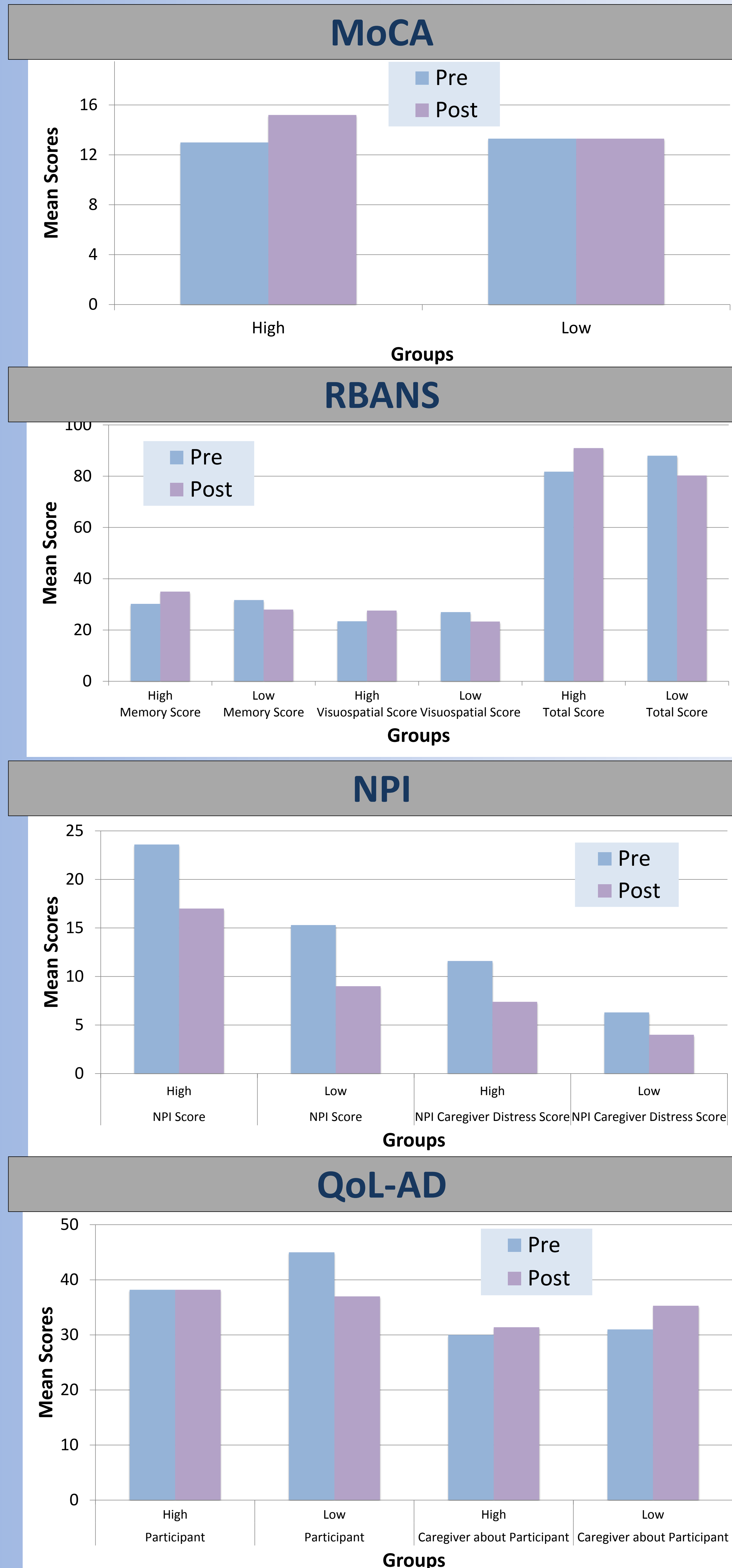### PARTICIPANTS (Coltrane LIFE Center- Concord, NC)

- N= 10, 8 females & 2 males, *2 females dropped out*
- MoCA inclusion score 12-20, participants enrolled: 12-17, *high average: 13 & low average: 13.3*
- NPI inclusion score 1, participants enrolled 1-48, *high average: 23.6 & low average: 10*
- Participants who completed training were 76-89 years old (M=82.3), *high: 76-89 & low: 79-83*
- Participants who completed training completed 8-16 years of school (M=12.5), *high: 8-16, low: 14-16*

Data Collection (PRE & POST)

- Montreal Cognitive Assessment (brief cognitive assessment)
- Health Questionnaire (pre-assessment only)
- Neuropsychiatric Inventory (behavioral/psychiatric symptom assessment),
- Repeatable Battery for the Assessment of Neuropsychological Status- C&D (in-depth cognitive assessment)
- Quality of Life-Alzheimer's Disease (quality of life assessment)
- Observational Measurement of Engagement (qualitative observations during study)

References

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MoCA

Mean Scores — Groups: High, Low (Pre / Post)

RBANS

Mean Score — Groups: High Memory Score, Low Memory Score, High Visuospatial Score, Low Visuospatial Score, High Total Score, Low Total Score (Pre / Post)

NPI

Mean Scores — Groups: High NPI Score, Low NPI Score, High NPI Caregiver Distress Score, Low NPI Caregiver Distress Score (Pre / Post)

QoL-AD

Mean Scores — Groups: High Participant, Low Participant, High Caregiver about Participant, Low Caregiver about Participant (Pre / Post)

RESULTS

- **MoCA**: Main Effect of Assessment & SI Group x Assessment, p>.05
  Post-hoc Pre-Post Comparison (High SI, p=.02, Low SI, p=1.0)
- **NPI**: Main Effect of Assessment, F(1,6)=6.03, p=.049
  SI Group x Assessment & post-hoc comparisons, p>.05
- **NPI Caregiver Distress**: all p>.05
- **RBANS (memory)**: SI Group x Assessment, F(1,6)=9.66, p=.021
  Main Effect of Assessment & post-hoc pre-post comparisons, p>.05
- **RBANS (visuospatial)**: all p>.05
- **RBANS (total)**: SI Group x Assessment, F(1,6)=4.74, p=.072
  Main Effect of Assessment & post-hoc pre-post comparisons, p>.05
- **QoL-AD (participant)**: Main Effect of Assessment, F(1,6)=9.73, p=.021
  SI Group x Assessment, F(1,6)=9.73, p=.021
  post-hoc pre-post comparison (High SI, p>.05, Low SI, p=.005)
- **QoL-AD (caregiver about participant)**:
  Main Effect of Assessment, F(1,6)=18.61, p=.005
  Group x Assessment F(1,6)=4.87, p=.069
  post-hoc pre-post comparison (High SI, p>.05, Low SI, p=.039)

DISCUSSION

- LOW social interaction group saw a higher drop-out rate & took longer to complete all training sessions (low: 28-49 days, high: 23-43 days).
- LOW social interaction group were slightly more hesitant to start the games, less likely to be attentive, BUT slightly more positive than the HIGH social interaction group.
- Cognitive assessment score increased in HIGH social interaction group (*probably due to combination of cognitive training and social interaction*).
- Behavioral/Psychological assessment score decreased in BOTH social interaction groups (*probably due to cognitive training*).
- Self-rated quality of life in HIGH social interaction group remained stable, where in the LOW social interaction group it decreased.
- Caregivers quality of life rating for participants in BOTH groups increased.
- Caregivers felt less distress, but saw no change in quality of life.
- Five of twelve games included in training yielded significant practice effects (To-do List p=.014, Eye for Detail p=.034, Card Shark p=.003, Optic Flow p=.008, Mind Bender p=.013).
- Frequent patterns seen during sessions: reminder of directions, reassurance, comments about the game.
- Occasional patterns: games were too fast, distraction, and enjoyment of games.

CONCLUSION

- Computer game-based cognitive therapy holds promise for low-intensity implementation by a staff member.
- People with mild to moderate dementia can do these games, but do need support/ interaction while doing so.