

# Computerized Functional Skills Training in Older People: Preliminary Results from a Randomized Clinical Trial



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## ABSTRACT

**Background.** Functional skills training is facilitated by computerized cognitive training (CCT) in many populations. Further, CCT often fails to yield functional benefits in the absence of formal skills training, which is commonly unavailable due lack of access or trainers. Many current functional skills are actually technology based, so development of a technology-based computer administered training program has ecological validity. Here we present preliminary results from a technology-based training program that was paired in half of the participants with a commercially available CCT program.

**Methods.** Healthy older (age>59) individuals (n=32) and similarly aged individuals who met diagnostic criteria for mild cognitive impairment (MCI; n=26) were randomized to receive 12 weeks of twice-weekly one hour computerized functional skills training (CFST) sessions or 12 weeks of two one-hour sessions split between Double Decision from Brain HQ and skills training. The functional skills trained were ATM and internet banking, ticket purchase from a kiosk, telephone and internet prescription refill, medication label comprehension and medication management, and internet shopping. There are multiple performance based outcomes, but in line with previous functional capacity measures and for parsimony, we focus on completion time for each simulation.

**Results.** Thirty-two participants had fully completed the training program, either by mastering all 6 tasks prior to 24 training sessions (23) or completing 12 weeks of training. 26 participants had completed 4 or more training sessions on all 6 tasks so they were also analyzed for improvement up to their last training session. Paired t-tests found that completion time for all 6 tests significantly improved from the baseline assessment to the final training assessment in both groups of participants, all ts >4.31, all ps <.001. Average improvement in time to completion was 45%. Further, none of 6 tests improved differentially in the two samples, as indexed by percentage of improvement from baseline to end of training: all ts <1.66, all ps >.12. Finally, combined CCT plus CFST did not differ from CSFT alone on any of the %-change score measures: all t <1.64, all p >.11.

**Implications.** Both groups evidenced substantial improvements in performance. CCT supplementation led to similar CFST gains with half as many CFST training sessions. Importantly, HC participants who received skills training alone required an average of only 6 sessions per task (out of a possible 24) to perfect their performance. In summary: both groups of participants demonstrated improvements in performance across all tasks; the HC participants proceeded through the training fairly rapidly even without CCT supplementation; 3) MCI participants required more training sessions but learned equivalently. These findings replicate our previous findings with older patients with schizophrenia and a completely separate sample of healthy controls.

## BACKGROUND

- Technology is every-changing and many current everyday functional tasks are performed mostly or entirely with technology
- These include financial, medical self management, and travel and transit
- Many populations are particularly challenged by these tasks and may require assistance, which is costly and often risky
- Previous studies have shown in both mental illness and aging populations that cognitive performance is associated with performance on technology-based tasks and that cognitive challenges lead to poor performance or real-world avoidance of task performance.
- In this study, a training program that focuses on performance of everyday functional skills was deployed to older people with normal cognition or diagnosed mild cognitive impairment
- We also randomized half of the participants to receive concurrent training with computerized cognitive training, using the Brain HQ platform

## HYPOTHESES

1. Both MCI and NC individuals will make functional gains with training
2. Concurrent Computerized cognitive training will lead to more rapid gains than skills training alone
3. Functional gain will be similar to our previous studies with patients with SMI and order people: efficiency will increase by 50% or more with training

## Conflict of Interest Statement

In the past year Dr. Harvey has received consulting fees or travel reimbursements from Alkermes, Boehringer Ingelheim, Intra-Cellular Therapies, Jazz Pharma, Minerva Pharma, Otsuka America, Roche Pharma, Sanofi Pharma, Sunovion Pharma, Takeda Pharma, and Teva. He receives royalties from the Brief Assessment of Cognition in Schizophrenia. He is Chief Scientific Officer for i-Function. Peter Kallestrup is CEO of i-Function. Lize Tibiriçá is a part time employee of i-Function. Sara Czaja is Chief Scientific officer of i-Function.

## METHODS

### PARTICIPANTS

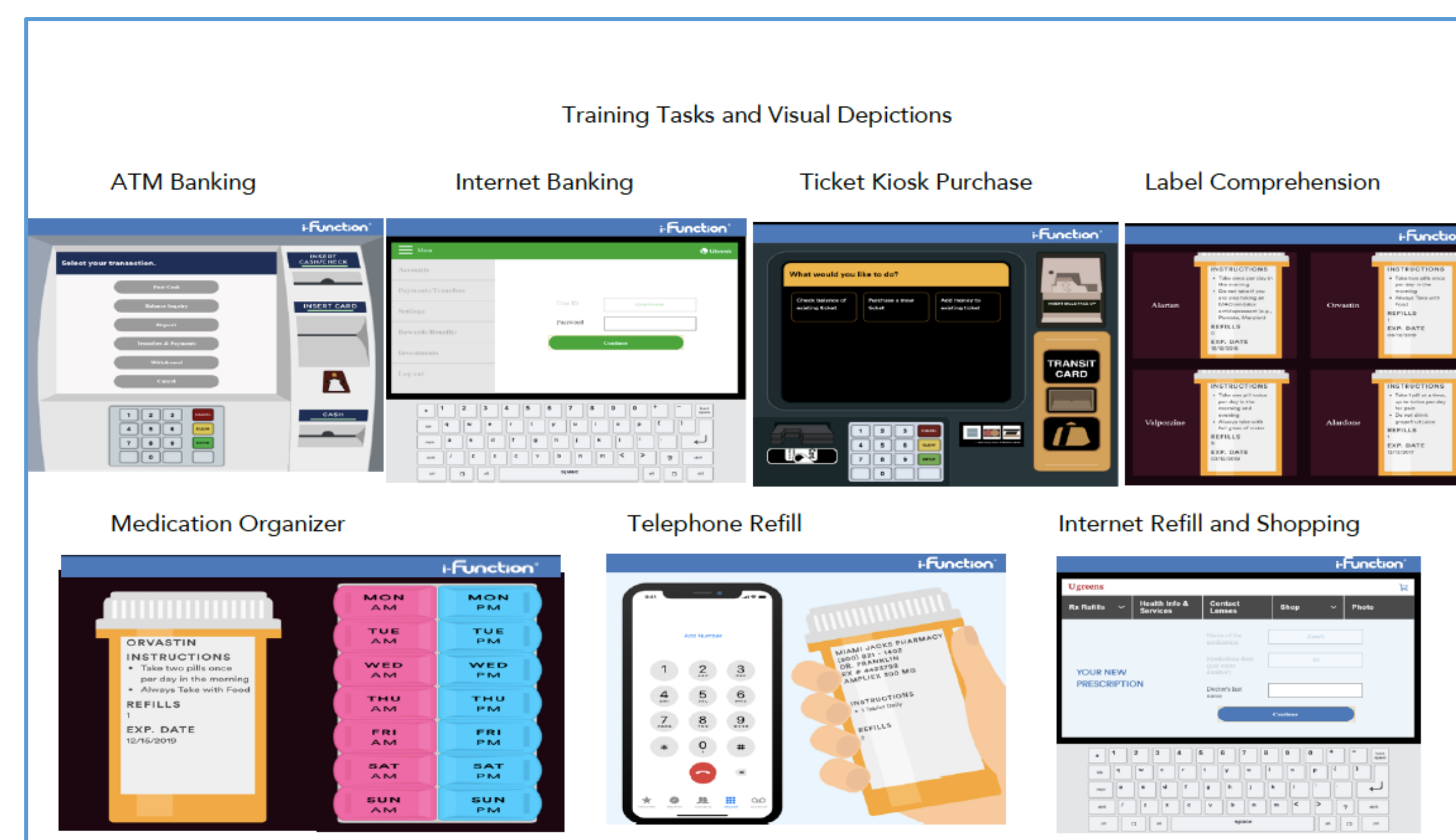
- Participants were recruited from three locations: Key Biscayne Community Center, Coral Gables Community Center, and Charles Hadley Center (Liberty City)
- All were assessed with the Montreal Cognitive Assessment
- Baseline Cognitive Performance was assessed with the Brief Assessment of Cognition (BAC) App

### Eligibility

- Age >59
- MOCA>18
- No Diagnosis of Alzheimer's Disease
- No Severe Sensory Limitations
- Read and Understand either English or Spanish

### Functional Simulations

- ATM Banking
- Internet Banking
- Transit Ticket Purchase
- Telephone Voice Menu
- Medication Label Comprehension and Organizer
- On Line Refill and Shopping Tasks



### Training protocol

- Fixed difficulty Pretest
- 24 Training Sessions, one hour each
- Training included structured training delivered by the system
  - Error 1: Repeat Instruction
  - Error 2: Focus attention
  - Error 3 Direct to response
  - Error 4: Demonstrate Response
- 12 Week period
- Proctored Training
- Walk-up technology
- Missed sessions made up
- Graduation from each task when it is performed perfectly twice
- Alternate Form Fixed difficulty post test

### CCT

- Brain HQ Double Decision
- Training for 30 minutes with 30 minutes of skills training

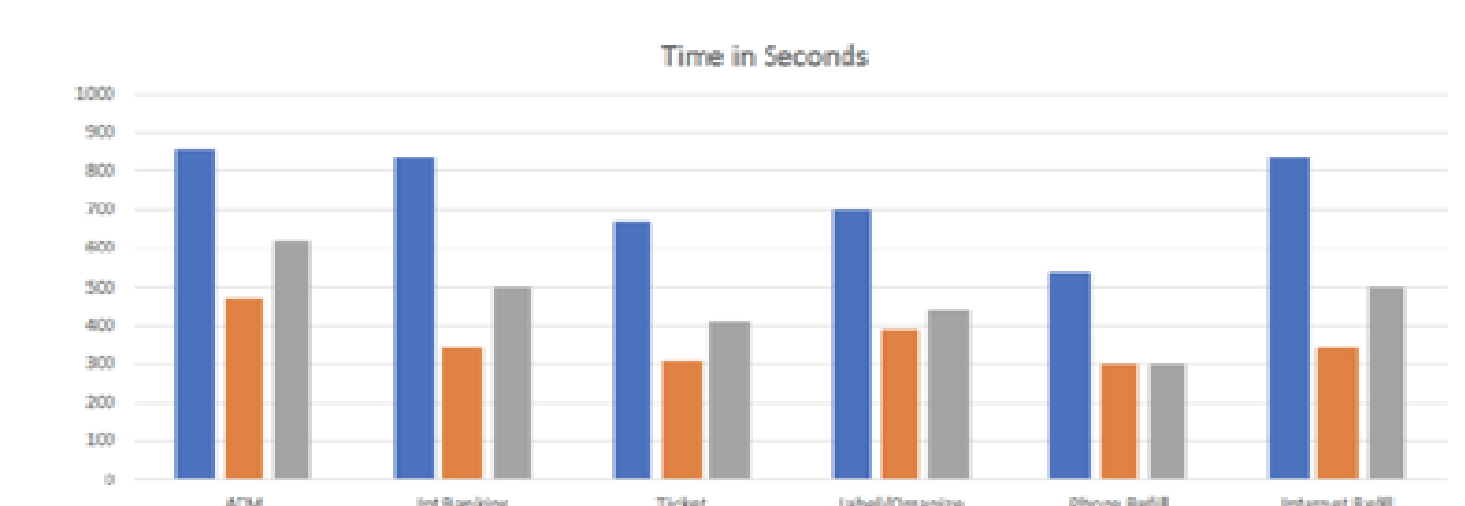
### Randomization

- Even split randomization
- Stratified by MCI Status

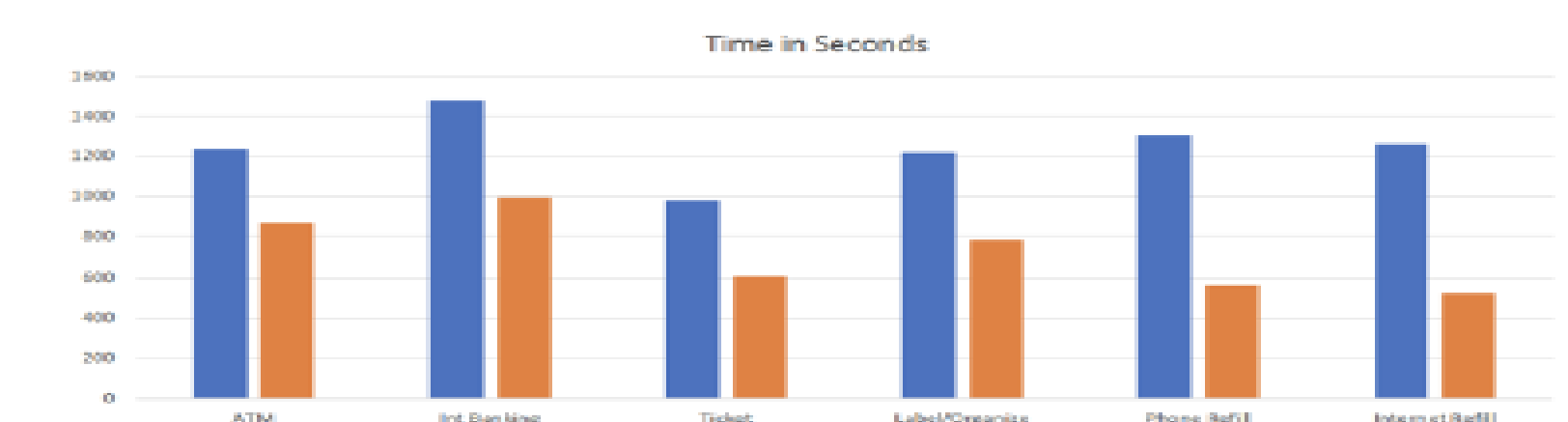
## RESULTS

- Thirty-two participants had fully completed the training program, either by mastering all 6 tasks prior to 24 training sessions (23) or completing 12 weeks of training.
- 26 participants had completed 4 or more training sessions on all 6 tasks so they were also analyzed for improvement up to their last training session.
- Total N=58
- Completion time for all 6 tests significantly improved from the baseline assessment to the final training assessment in both groups of participants, all ts >4.31, all ps <.001.
- Further, none of 6 tests improved differentially in the two samples, as indexed by percentage of improvement from baseline to end of training: all ts <1.66, all ps >.12.
- Finally, combined CCT plus CFST did not differ from CSFT alone on any of the %-change score measures: all t <1.64, all p >.11.

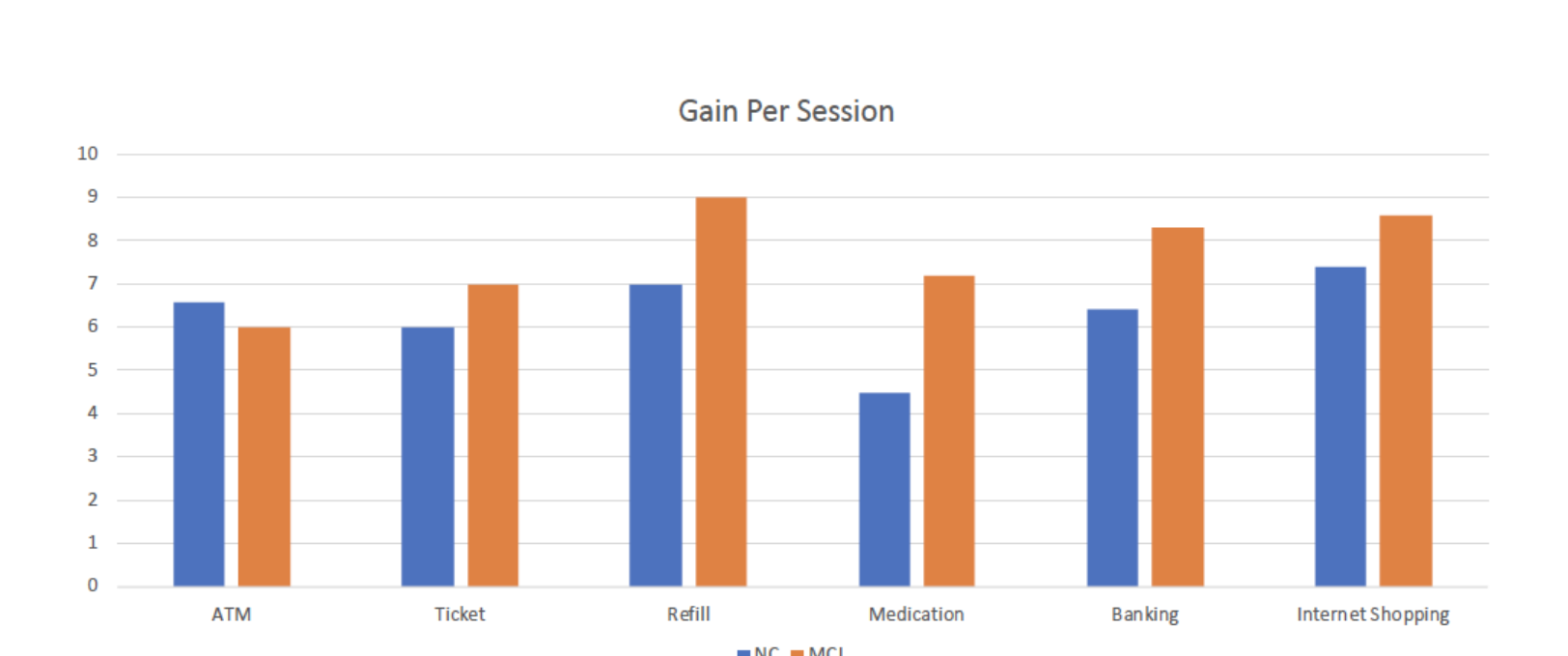
Time to Completion for All Six Training Tasks at Baseline, end of Training, and Post-test



Training Results for MCI Cases: Baseline to Final Session Completed to date



Percentage Gain in Speed per Training Session



## Discussion

- Skills training can be delivered in a fully computerized manner to MCI and NC participants
- CCT facilitated functional skills gains: Just as much in gains in 50% of the training sessions
- Gains per session were remarkably close across the two samples: MCI patients were much slower at first.
- Anecdotal evidence of real world transfer: next study will use EMA
- Many MCI patients only partially remembered their sessions and the details: procedural skills made rapid gains at the same time

## Acknowledgements.

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