

# The Efficacy of a Neurocognitive Enhancement Intervention in Treatment-Resistant Major Depressive Disorder and the Predictive Role of Internet-Based Homework



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## BACKGROUND

- Individuals with major depressive disorder (MDD) have mild to moderate impairments in neurocognitive functioning.
- Impairment is present across a number of cognitive domains (e.g., attention, processing speed, executive functioning, and memory).
- These deficits persist across the course of illness, even following treatment response to antidepressant medications, and are linked to poor functional outcome in psychosocial adjustment, vocational aptitude, and interpersonal relationships.
- While research in other psychiatric populations has shown cognitive remediation therapy (CRT) to be effective in treating neurocognitive impairments, very few studies have evaluated this approach in the context of MDD.

## PURPOSE

Examine the effects of CRT with supplemental at-home internet-based treatment (Scientific Brain Training PRO) in MDD; it will be the first to present process data documenting the relationship between in-home use of CRT exercises and improvements in neurocognitive and adaptive functioning.

## METHOD

**Participants:** Community-dwelling patients with treatment resistant major depressive disorder ( $N=22$ ).  
**Procedure:** Patients were randomized to treatment or waitlist control conditions. Treatment consisted of standard weekly neurocognitive remediation for 10 weeks in small group sessions as well as in-home exercises assigned for two 20-minute blocks each day. Participants were assessed before, during, and after treatment on a variety of neuropsychological, mood, motivation, functional capacity and functional performance measures.  
**Measures:**  
*Neurocognition:* Hopkins Verbal Learning Test- Revised; Continuous Performance Test-Identical Pairs; Symbol Coding; Letter-Number Sequencing; Animal Naming; Stroop Colour-Word, Trail Making Test.  
*Symptoms:* Symptom Severity was assessed with the Beck Anxiety Inventory and the Hamilton Depression Rating Scale  
*Functioning:* Competence assessed with the advanced finances test; Real World Behaviour with the LIFE-RIFT  
*Homework Dose:* Total minutes during the study where the recommended usage is  $\geq 40$  min per day.

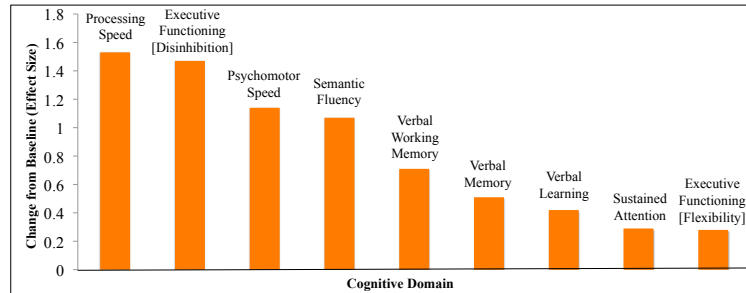
## RESULTS

Table 1. Mean group changes in pre- and post-measures

Measure	Wait-list Group (N=11)		Treatment Group (N=11)		SD*
	Pre	Post	Pre	Post	
<b>Cognition (raw scores)</b>					
Processing Speed	41.5	40.5	41.8	47.8	4.57
Sustained Attention	3.3	3.33	2.9	3.2	0.8
Psychomotor Speed	35	33	44	32	8.8
Executive Functioning (Cognitive Flexibility)	74	72	88	82	14.2
Semantic Fluency	20.1	20.3	16.2	20.9	4.2
Verbal Working Memory	11.2	11.2	9.8	11.3	2.1
Executive Functioning (Disinhibition)	32.1	26.5	28	36.8	9.82
Verbal Learning	25.8	26.6	25.9	28.6	4.5
Verbal Memory	8.9	10	9.1	11.2	1.98
<b>Symptoms (total score)</b>					
Anxiety	22.3	23.4	25.5	22.3	3.7
Depression	22.8	22.6	26.5	25.2	6.6
<b>Functioning (total score)</b>					
Financial Management	13.8	13.8	11	12.5	3.9
Functional Impairment	21	23.6	24.8	23.7	5.4

\*Pooled SD

Figure 1. Treatment group improvement in cognitive functioning



Figures 2 & 3. Treatment group improvement in symptoms and functioning

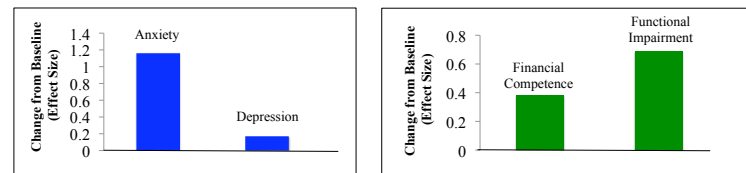
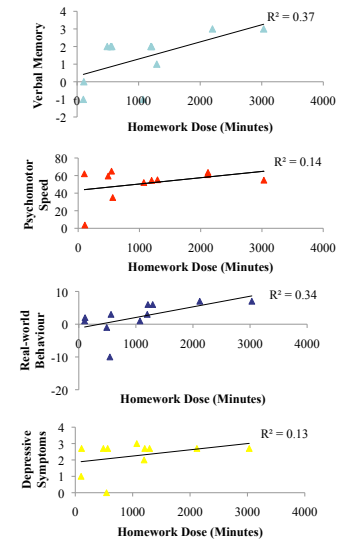


Table 2. Cognition change score correlates with change scores in symptoms & functioning

Measure	HAM-D	LIFE-RIFT
Processing Speed	-0.342	0.241
Sustained Attention	0.142	-.646*
Psychomotor Speed	-0.352	0.422
Executive Functioning (Cognitive Flexibility)	-0.014	0.543
Semantic Fluency	0.448	0.513
Verbal Working Memory	0.558	0.163
Executive Functioning (Disinhibition)	0.512	0.199
Verbal Learning	-0.242	0.429
Verbal Memory	0.093	0.511

\* Significant at the 0.05 level

Figures 4-7. Association of Treatment Change Scores with Homework Dose



## CONCLUSIONS

- Cognitive remediation therapy may be an effective treatment option for improving neurocognitive functioning, and may even play a role in alleviating affective symptoms, in treatment-resistant depression.
- Inclusion of home-based Internet exercises allows for examination of potential dose effects of CRT; total time engaging in homework is robustly associated with gains in memory, psychomotor speed, functional outcome and mood symptoms.
- Future research may benefit from the inclusion of at-home internet-based exercises; they serve as a useful tool for real-time monitoring of progress and allow participants to actively partake in the advancement of their own treatment.