



# The Benefits of Cognitive Stimulation or Training/Rehabilitation upon Brain Function as an Efficacious Treatment for Diagnosed Dementia or Mild Cognitive Decline

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## Abstract

Medication has had disappointing results seen in various recently failed drug trials. The role of medication has typically been more preventative as opposed to providing evidence of improved memory function reported by cognitive rehabilitation research. The interest held by our facility is based upon fifteen years of providing cognitive training and seeing some type of improvement in every patient following as minimal as three months of training (twice weekly for one hour). Differences are seen on neuropsychological evaluation completed prior to training and following three month treatment intervals. We employ the use of various games and activities that are specifically chosen based upon neurocognitive assessment. As a result this is not a broad based program but instead a specifically designed individualized treatment for various forms of dementia. This is consistent with a literature review of cognitive stimulation or rehabilitation.

**Keywords:** Cognitive stimulation; Dementia; Alzheimer-type dementia

## Introduction

Medication has had disappointing results seen in various recently failed drug trials. The role of medication has typically been more preventative than treating dementia citing even a minor amount of time as sufficient to result in improved functioning. The interest held by our facility is based upon fifteen years of providing cognitive training and seeing some type of improvement in every patient following as minimal as three months of training (twice weekly for one hour). Differences are seen on neuropsychological evaluation completed prior to training and following three month treatment intervals. We employ the use of various games and activities that are specifically chosen based upon neurocognitive assessment. As a result this is not a broad based program but instead a specifically designed individualized treatment for various forms of dementia.

Review of the literature confirms the above clinical findings. Cognitively stimulating activities has been associated with reduced late life cognitive decline in the aged population documented in a number of recent studies [1-6]. Cognitive stimulation throughout the lifespan has been seen as a protector against cognitive decline despite the onset of neuropathological conditions. It is also common for those afflicted with neurocognitive decline to restrict their activities leading to the cascade of poor sleep, food intake and physical inactivity. These are the two proposed mechanisms suggested as explanatory factors for those individuals who age gracefully versus those who reveal debilitating decline; the cognitive reserve hypothesis [6-8] and the reverse causality hypothesis [2,9].

Recent research identified higher levels of involvement in cognitive activities as an independent variable affecting late cognitive decline. Participation in cognitive activities across the life span was

associated with slower late life decline independent from common neuropathological conditions consistent with the cognitive reserve hypothesis (cognitive activity is a variable helping to delay the cognitive consequences of neuropathological disease). In dispute was the reverse causality hypothesis; cognitive activity or inactivity is a consequence of neuropathological decline as opposed to being an independent risk factor.

Regardless of the type of dementia or neuropathological condition, more frequent late life cognitive activity and early life cognitive activity were associated with a slower cognitive decline. The study by Wilson et al. [1] used a longitudinal clinical pathologic cohort study with the availability of neuropathologic measures of amyloid burden, tangle density, gross cerebral infarcts, microscopic cerebral infarcts and neocortical Lewy bodies allowing the authors to rule in the cognitive reserve hypothesis. Engagement in cognitively stimulating activities (early and late) slowed cognitive decline accounting for 14 percent of the residual variability (in cognitive decline) independent and beyond what would be explained by the neuropathology. Both frequent current and early life engagement in cognitively stimulating activities were shown to independently slow late life cognitive decline.

These results support the cognitive reserve hypothesis suggesting that individuals with high lifespan levels of cognitive activity can slow their decline despite the presence of underlying pathology. This suggests that the mechanism by which cognitive reserve exerts a protective effect is not directly through the reduction of pathology; leaving open the possibility that somehow cognitive activity offers protection against decline and may help preserve cognitive function despite the presence of pathology. In the study, current cognitive activity slowed the rate of cognitive decline years before death suggesting that this is a proactive action that any individual can undertake to slow down late life cognitive decline.

The above study is a more robust example than typical for research in this area. Clinical studies tend to lack an experimental design and large community samples lack more specific testing and/or treatment protocols. Nonetheless the results are consistent and point to the positive impact of cognitive training. A literature review found consistent evidence of the benefit of treatment for cognitive function over and above medication effects, which remained evident at follow-up for as much as three months post treatment. Secondary analyses with smaller sample sizes reported significant benefits for quality of life and well-being. Staff ratings reported improved communication and social interaction although there were no differences reported for mood, activities of daily living or challenging behaviour [10]. Another review of eleven randomized control studies, however, did not find positive or negative effects associated with the reported outcomes; citing the quality of the trials as low to moderate and suggesting that more definitive evidence requires well designed studies of cognitive training. Only one study was indicated as providing promising results related to patient and caregiver variables [11].

The process of cognitive therapy or treatment is morphing into specific therapeutic regimes. Goal oriented rehabilitation was seen as a clinically effective intervention for early stages of Alzheimer disease, vascular or mixed dementia, and a multi-centre study is ongoing [12]. Studies are investigating the dual effects of cognitive training and progressive resistance training to capture the combined impact of physical and cognitive variables [13]. A seven week program (Cognitive Stimulation Therapy) was shown to be beneficial; however, there was less conclusive evidence for the effects of this therapy over an extended period prompting another study with the addition of 16 weeks of maintenance.

Specificity of the training appears to be a primary variable for improved functioning. The effectiveness and durability of cognitive training interventions has been seen to improve targeted cognitive abilities despite training that was limited in time as well as number of training sessions. Cognitive training (ten sessions) using a large population resulted in improved cognitive abilities specific to the abilities trained over a period of five years. Booster training for reasoning and speed of processing revealed significantly better performance. Participants reported diminished difficulty in performing daily activities.

Intervention for only 8 to 10 weeks resulted in significant increase in task specific performance and the gains continued to be present three months post training for memory. Improvement was seen using a 14 week computerized training program on primary and secondary working memory maintained five months after completion of training [14-18].

It is not surprising that effects of treatment have varied based upon the disease process. We find the same phenomenon clinically especially when trying to treat Lewy body and frontal lobe dementia as opposed to cardiovascular or Alzheimer's. Undiagnosed ongoing issues such as that associated with cardiovascular dementia present problematic challenges to the cognitive training and in a few cases we were helpless to stop the onslaught of decline. Suggested is the need for medical professionals to be continually partnering and working together to address any emerging factors affecting brain function. Sleep is often an under diagnosed phenomenon.

Cognitive training has had specific results as well as generalized impact upon daily living activities, mood and memory. There is overall agreement that cognitive therapy (cognitive stimulation therapy,

cognitive training, and cognitive rehabilitation) offers positive benefits for improved cognition and quality of life and is an efficacious method to address dementia with or without medication. The rationale behind cognitive training is the use of neuropsychological testing as well as brain behaviour principles to identify the specific problems and provide focused treatment to address the identified areas of deficit [19-22].

The concept of focused treatment based upon neuropsychological deficits (identified through neuropsychological evaluation) as well as the provision of specific activities based upon brain behaviour relationships (addressing specific aspects of memory, executive reasoning, attention, language and visual perceptual functioning) appears to be the necessary dual combination needed to make a significant impact upon cognition. Cognitive or brain enhancing activities have been systematically studied and labelled for the effect they are expected to have in remediating brain function; memory (short and long term, retrieval and recognition, visual and verbal) executive reasoning processes (selective attention, integration, perseveration, sequential analysis, cognitive flexibility) language (word retrieval) and visual perceptual. Treatment two times per week for extended periods of time from two to six months is a more feasible model in the private therapeutic setting. Neuropsychological testing completed as a baseline and re-evaluation at distinct intervals throughout the cognitive training has resulted in significant improvement suggesting the benefit of this treatment. Studies have been completed on a population that is more often on medication (Donepezil and Memantine) which began following testing and/or medication had been instituted prior to the initial testing [23-24].

What is clear from research spanning over ten years is the benefit of cognitive training/rehabilitation upon brain function in helping to remediate the effects of dementia beyond that of medication intervention.

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