# The Impact of Severe Cognitive Fatigue and Anxiety on MS patients and Visual Learning

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**Abstract**

Objectives: This study tested the relationship of anxiety and severe cognitive fatigue on three trials of visual learning.

Methods: Data was collected from MS patients (N=112) who underwent full neuropsychological evaluation. Anxiety was measured using the self-report measure, Hospital Anxiety and Depression Scale. Cognitive fatigue was measured using the cognitive subscale of The Fatigue Scale for Motor and Cognitive Functions. Patients were also administered the Brief Visuospatial Memory Test Revised, a neuropsychological measure of visual learning and memory. A multivariate general linear model was conducted using SPSS 24.0. Anxiety and severe cognitive fatigue were entered as the predictor variables, and BVMT Trials 1-3, were entered as the outcome variables.

Results: When controlling for gender, age, and years of education, there was a significant effect of severe cognitive fatigue on visual learning (Wilks' Lambda= .903 , F(3,104)=3.715, *p*=.014). Severe cognitive fatigue had a significant effect on BVMT Trial 2 (F= 5.529, *p*=.021). There was not a significant effect on BVMT Trial 1 (F=3.408, *p*=.068) or Trial 3 (F= 35.702, *p*=.662). When controlling for severe cognitive fatigue, anxiety had a significant effect on visual learning (Wilks' Lambda= .877, F(3,104)=4.870,*p*=.003). Anxiety had a significant effect all three trails, BVMT Trial 1 (F=13.060, *p*<.001), BVMT Trial 2 (F= 9.935, *p*=.002), and Trial 3 (F= 4.394, *p*=.038).

Conclusions: Severe cognitive fatigue and anxiety were found to have an effect on MS patients' visual learning.

## Background

Cognitive impairment due to fatigue is a frequently occurring symptom of multiple sclerosis (MS) and can often be disabling[1]. Additionally, anxiety is prevalent amongst the MS population and has been found to be associated with impairment in cognition and fatigue[2,3,4]. Previous studies have indicated that visual learning is weaker in individuals with MS compared to healthy controls[3]. This study aims to examine the relationship between cognitive fatigue and anxiety in relation to visual learning in MS.

## Methods

Sample: Data was collected from 112 patients with confirmed MS diagnoses who had been referred for neuropsychological testing within the context of general MS care at the MS Center at Holy Name Medical Center in Teaneck, NJ.

Materials: The *Hospital Anxiety and Depression Scale* was used to measure anxiety. The cognitive subscale of *The Fatigue Scale for Motor and Cognitive Functions* was given to assess cognitive fatigue. All of the instruments have been well validated in the MS population.

Statistics:

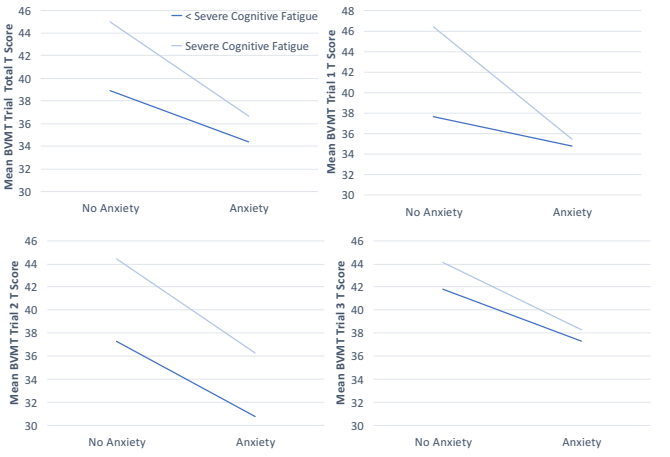
- Multivariate General Linear Model using SPSS 23.0.
- Analysis aimed to analyze the impact of severe cognitive fatigue and anxiety on visual learning when controlling for gender, age, and years of education.

| Characteristic | N (M) | % (SD) |
|---|---|---|
| Gender | | |
| Female | 83 | 74.1% |
| Male | 29 | 25.9% |
| Age | 48.65 | 12.31 |
| Years of Education | 14.73 | 3.31 |
| BVMT Trial 1 | 38.03 | 11.75 |
| BVMT Trial 2 | 37.40 | 12.78 |
| BVMT Trial 3 | 40.14 | 13.67 |
| FSMCC | 36.77 | 9.52 |
| Severe Cognitive Fatigue | 71 | 63.4% |
| No/Mild/Moderate Cognitive Fatigue | 41 | 36.6% |
| HADSA | 8.62 | 4.32 |
| No Anxiety | 50 | 44.6% |
| Anxiety | 62 | 55.4% |

## Results

- **Severe cognitive fatigue:** There was a significant effect of severe cognitive fatigue on visual learning (Wilks' Lambda= .903 , F(3,104)=3.715, *p*=.014).
  - **Trial 1:** not significant effect (F=3.408, *p*=.068)
  - **Trial 2:** significant effect (F= 5.529, *p*=.021)
  - **Trial 3:** not significant effect (F= 35.702, *p*=.662)
- **Anxiety**: There was a significant effect of anxiety on visual learning (Wilks' Lambda= .877, F(3,104)=4.870,*p*=.003).
  - **Trial 1:** significant effect (F=13.060, *p*<.001)
  - **Trail 2:** significant effect (F= 9.935, *p*=.002)
  - **Trial 3:** significant effect (F= 4.394, *p*=.038)

## Conclusions




Severe cognitive fatigue and anxiety were found to have an effect on MS patients' visual learning. Specifically, cognitive fatigue had an effect on visual learning, such that cognitive fatigue had a significant effect on Trial 2. When controlling for severe cognitive fatigue, anxiety had an effect on patient's learning for Trials 1,2, and 3. Anxious MS patients on average scored lower on all three visual learning trials than those without the aforementioned symptoms. Surprisingly, those with severe cognitive fatigue scored higher on visual learning than those with mild, moderate, or no cognitive fatigue, particularly in the absence of anxiety. This suggests that cognitive fatigue may have a protective function.

## References

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