# Changes in Fatigue Following a Behavioral Treatment for Memory Impairment in Multiple Sclerosis: A Randomized Clinical Trial.

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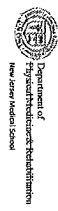
ABSTRACT

Fatigue is one of the most common and debilitating symptoms of Multiple Sclerosis (MS), negatively impacting individuals' cognitive functioning and overall quality of life. The objective of the current study was to evaluate the impact of a 10-session manualized memory intervention, the modified Story Memory Technique (mSMT), on self-reported fatigue in MS patients.

BACKGROUND

- 90% of MS patients report fatigue[1], and 40% of MS patients report fatigue as the most disabling symptom[2]
- At the same time, 40-65% of MS patients have memory impairments,[3,4] shown to be due deficits in initial learning. [5]
- The effect of such inefficient learning on self-reported fatigue has not yet been examined nor has the effect of a memory intervention on self-reported fatigue.
- This study examined the effect of a behavioral memory intervention on self-reported fatigue in daily life.

METHODS

PARTICIPANTS:
- Treatment Group: 78% female, 80% relapsing remitting
- Control Group: 74% female, 60% relapsing remitting

	Treatment Mean (SD) n = 37	Control Mean (SD) n = 34	p
Age (years)	47.57 (10.11)	49.79 (7.85)	ns
Education (years)	15.46 (2.50)	15.53 (2.51)	ns
Disease Duration (mos)	161.77 (119.78)	178.24 (108.84)	ns
Ambulation Index Score	2.97 (2.63)	3.41 (2.34)	ns
WASI Vocabulary T	52.49 (10.19)	51.38 (13.52)	ns
WASI Matrix Reasoning T	55.30 (7.67)	53.44 (8.73)	ns

PROCEDURE:
- mSMT teaches the use of context and imagery to improve learning[7]
- Sessions lasted five (5) weeks, occurring twice a week (total 10 sessions)
- During sessions 1-4, participants learned to use imagery to help them remember words imbedded in a paragraph
- During sessions 5-8, participants learned to use context and imagery to help them learn a list of words
- During sessions 9-10, participants learned to apply the techniques learned in previous sessions to a functional task
- Participants in control condition received the same tasks as treatment group but were not taught the use of strategies.

METHODS

DEFINITIONS:
- Participants in the treatment group were classified as *Responders* if they exhibited a 10% increase in CVLT-II Total Learning Slope for Trials 1-5
- Dependent Variable (DV) = Modified Impact of Fatigue Scale (MFIS) Total Raw Score at immediate follow-up.
- Covariate = MFIS Total Raw Score at baseline

HYPOTHESES:
- Hypothesis 1: The Treatment Group will report a significantly lower impact of fatigue compared to Control Group upon treatment completion, after controlling for the baseline report of fatigue
- Hypothesis 2: Responders to treatment will report a significantly lower impact of fatigue as compared to Non-Responders immediately after treatment completion, after controlling for the baseline report of fatigue

DATA ANALYSES:
- Two one-way Analyses of Covariance (ANCOVA) were conducted to evaluate the above hypotheses

RESULTS

- There was no significant difference in fatigue between the Treatment Group and Controls at follow-up (Table 1)
- There was no significant difference in fatigue between Treatment Responders and Non-Responders at follow-up (Table 2)
- In both analyses, self-reported fatigue at baseline was the most significant predictor of self-reported fatigue after treatment

Table 1: Treatment Group vs Controls ANCOVA

Source	df	Mean Square	F	Significance
Corrected Model	2	3472.070	18.267	.000
Intercept	1	1432.843	7.538	.008
MFIS Total baseline	1	6943.286	36.530	.000
Treatment Group	1	88.323	.465	.498
Error	70	190.071		

R Squared = .343 (Adjusted R Squared = .324)

Table 2. Responders vs Non-Responders to treatment ANCOVA

Source	df	Mean Square	F	Significance
Corrected Model	2	2268.725	8.028	.001
Intercept	1	560.330	1.983	.168
MFIS Total baseline	1	4533.695	16.042	.000
Response to Treatment	1	38.322	.136	.715
Error	34	282.612		

R Squared = .321 (Adjusted R Squared = .281)

DISCUSSION

- The behavioral memory intervention did not have an effect on the self-reported fatigue in our sample
- The lack of significant findings may be due, at least in part, to the fact that MFIS is a self-report measure designed to elicit participants' subjective perception of fatigue
- A variety of factors not examined in this study have been shown to contribute to one's subjective sense of being fatigued, such as depression, anxiety, a reduced sense of mastery over one's environment, decreased social relatedness, decreased self-acceptance, and reduced sense of having a purpose in one's life.
- Further, other disease-related factors that may contribute to the perception of fatigue, such as reduced cortical glucose metabolism and sleep disturbance, have been well documented in this population.
- These moderating factors may play a greater role in one's fatigue than inefficient learning and memory.
- Evaluation of relative contributions of these moderating factors was beyond the scope of this study, but future research is warranted to elucidate this question.

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