

Higher education may be protective against MS-associated cognitive deficits

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Multiple sclerosis (MS) can lead to severe cognitive impairment as the disease progresses. Researchers in Italy have found that patients with high educational levels show less impairment on a neuropsychological evaluation compared with those with low educational levels. Their results are published in *Restorative Neurology and Neuroscience*.

MS is a progressive immunologic brain disorder with neuropsychological deficits including [selective attention](#), [working memory](#), executive functioning, information processing speed, and [long term memory](#). These deficits often impact daily life (ability to do [household tasks](#), interpersonal relationships, employment, and overall quality of life).

In this study, investigators first assessed the role of cognitive reserve, the brain's active attempt to focus on how tasks are processed, in compensating for the challenge represented by [brain damage](#). Earlier studies had reported that higher cognitive reserve protects MS subjects from disease-related cognitive inefficiency but in these studies cognitive reserve was mainly estimated through a [vocabulary test](#). Here, investigators considered educational level and occupational attainment instead of vocabulary. They also evaluated both educational and occupational experience, hypothesizing that an individual's lifetime occupational attainment could also be considered a good proxy of CR, similar to the way in which higher occupational attainment reduces the risk of Alzheimer's disease.

The second aim of the study was to investigate the possible role of

perceived fatigue. Fatigue can have a great negative influence on daily life, so that higher perceived fatigue might result in lower [cognitive performance](#).

Fifty consecutive clinically diagnosed MS patients took part in the study. A control group included 157 clinically healthy subjects, with no psychiatric or [neurological diagnosis](#). Individuals in both groups were, on average, of the same age, education level and gender. The mean age was 40.41 (± 9.67) years, with 12.37 (± 4.42) years of education.

Cognitive performance was evaluated using the Paced Auditory Serial Addition Test (PASAT), in which a series of single digit numbers are presented and the two most recent digits must be summed. This test has high sensitivity in detecting MS-related cognitive deficits as it relies strongly on working memory and information processing speed abilities. Fatigue was evaluated through the Modified Fatigue Impact Scale (MFIS), which assesses the effects of fatigue in terms of physical, cognitive, and psychosocial functioning.

Of the 50 clinically diagnosed patients, 17 had less than 13 years of schooling, without obtaining any secondary level diploma, and 33 had received more than 13 years of schooling, leading to a diploma at university level. Both groups were administered a short neuropsychological battery including standardized tests for vigilance, alertness and divided attention. None of the tasks showed differences between the groups.

Patients were also classified using the US census categories into low occupations (student, housewife, unskilled/semiskilled, skilled trade or craft, clerical/office worker) and high occupations (manager business/government and professional/technical), where the occupational attainment categories are based on the cognitive complexity and cognitive effort needed to carry out the job efficiently. They were then

further divided into three groups: low occupation and low education, low occupation and high education, and high occupation and high education.

The researchers found that high speed PASAT versions were more suitable for identifying compensatory capacities compared to low speed PASAT versions. MS patients with low education performed worse than matched healthy controls at faster PASAT speeds. By contrast, no difference was observed between MS patients with high education and matched healthy controls, regardless of PASAT speed. On the other hand, neither occupational attainment nor fatigue had any impact on cognitive deficits in MS.

"These results indicate that low education is a risk factor for cognitive impairment in people with neurological disease such as MS, whereas a high educational level could be considered a protective factor from disease-associated cognitive impairment," observes lead investigator Elisabetta Làdavas, PhD, Director of the Center for Studies and Research in Cognitive Neuroscience, Cesena and Professor of Neuropsychology at the Department of Psychology of the University of Bologna, Italy. She concludes that "The protective effects of education on the cognitive profile of MS patients should be considered in longitudinal studies of cognitive functions, and in therapeutic attempts to improve cognition in these patients."

More information: "Education protects against cognitive changes associated with Multiple Sclerosis," by C. Scarpazza, D. Braghittoni, B. Casale, S. Malagù, F. Mattioli, G. di Pellegrino, and E. Làdavas. *Restorative Neurology and Neuroscience*, [DOI 10.3233/RNN-120261](https://doi.org/10.3233/RNN-120261)

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