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“Education Level Moderates the Effect of Brain Atrophy on Cognition in Multiple Sclerosis”

The cognitive reserve theory refers to how clinical manifestations of brain pathology are affected by the brain’s ability to use preexisting cognitive processes to cope with and adapt to neurological insult or damage. Studies suggest that greater intellectual ability leading to greater educational attainment may attenuate the negative cognitive effects of brain atrophy by increasing cognitive reserve, protecting against cognitive impairment. Based on this theory, we were interested in seeing if the cognitive effects of brain atrophy, measured by the third ventricle width (TVW), would be attenuated in people with multiple sclerosis (MS) who had more than 12 years of education.

The study included 84 participants with MS. Years of education was measured as the number of years completed: less than high school (<12 years), high school diploma or Associate’s degree (12 years), Bachelor’s (16 years), Master’s (18 years), or Doctorate (20 years). Cognitive ability was assessed using the Montreal Cognitive Assessment (MoCA), which screens for cognitive impairment; Symbol Digits Modalities Test (SDMT), which measures information processing speed; and King-Devick Test (K-D Test), which measures visual scanning and attention. The MoCA score was calculated by adding the sum of each subsection, and a t-score was determined for the SDMT and K-D tests based on norms provided by the test makers. In addition, the participants provided their most recent clinical MRI scans, which were used to measure the TVW. Specifics about MRI acquisition were not available as these were clinical scans acquired at a wide variety of MRI sites following various acquisition protocols. TVW was measured by hand using the FreeSurfer software. The axial slice with the longest segment of the third ventricle was chosen, and a vertical line was drawn along the length. The length of the segment was then measured and divided in half. A horizontal line was drawn halfway down, and its length represents the TVW. The data are still being collected and analyzed, but both inter-rater and intra-rater reliability will be calculated using intraclass correlation.

It was hypothesized that education level moderates the effect of brain atrophy on cognition in multiple sclerosis. If found to be significant, this would support other findings that educational attainment has a protective effect on cognition and may suggest its use as a predictor of neuropathological manifestation in patients with multiple sclerosis.