

# Associations between an individual's need for cognitive stimulating activities, brain damage and cognitive functioning: Results from The Maastricht Study

Lotte Truin<sup>1</sup>, Sebastian Köhler<sup>1</sup>, Miranda Schram<sup>2</sup>, Martin van Boxtel<sup>1</sup>, Walter Backes<sup>1</sup>, Jacobus Jansen<sup>1</sup>, Martien van Dongen<sup>3</sup>, Nanne de Vries<sup>4</sup>, Hein de Vries<sup>4</sup>, Simone Eussen<sup>2</sup>, Coen Stehouwer<sup>2</sup>, Marjolein de Vugt<sup>1</sup>, Kay Deckers<sup>1</sup>

<sup>1</sup>School for Mental Health and Neuroscience (MHeNs), Maastricht University, Maastricht, The Netherlands

<sup>2</sup>School for Cardiovascular Diseases (CARIM), Maastricht University, Maastricht, The Netherlands

<sup>3</sup>Department of Epidemiology, Maastricht University, Maastricht, The Netherlands

<sup>4</sup>Department of Health Promotion (CAPHRI), Maastricht University, Maastricht, The Netherlands

**Background:** Dementia is a global health challenge. Currently, there is no curative treatment for dementia and therefore risk reduction through lifestyle modifications has become more prominent with high cognitive activity as a promising target. This study explored the association between an individual's need to engage in cognitively stimulating activities, brain damage and cognitive functioning in the Dutch general population.

**Methods:** This study used cross-sectional data from the population-based cohort The Maastricht Study (N = 4,209; mean age 59.06 ± 8.58 years, 50.11% women). Need For Cognition (NFC) was measured with the Need For Cognition Scale. Cognitive functioning was tested in three domains: verbal memory, information processing speed and executive functioning and attention. Standardized volumes of white matter hyperintensities (WMH) and cerebrospinal fluid (CSF) and presence of cerebral small vessel disease (CSVD) were derived from 3 Tesla MRI. Multiple linear regression analysis was used to explore the association between NFC and cognitive functioning, NFC and WMH and NFC and CSF. Binary logistic regression analysis was used to assess the association between NFC and cognitive impairment and NFC and CSVD. Interaction between brain damage or cognitive impairment (a score of <1.5 standard deviation below the mean on any of the three cognitive domains) and NFC on

cognitive functioning or CSVD was tested by including interaction terms in the regression analyses.

**Results:** High NFC was positively associated with cognitive functioning ( $\beta$ : 0.21,  $p = <0.001$ ) and negatively associated with CSVD (OR: 0.74,  $p = 0.005$ ). These associations were independent of demographic and somatic factors. A dose-response relationship between NFC and cognitive functioning was observed. There was no statistically significant association between NFC and WMH or CSF. No interaction between CSVD, WMH or CSF and NFC on cognitive functioning was found. Cognitive impairment did not moderate the association between NFC and cognitive functioning or CSVD.

**Discussion:** A high need for engaging in cognitively stimulating activities is associated with better cognitive functioning and less brain damage. This is in line with previous research. These results indicate that, in middle-aged populations, stimulating cognitive activity may be an opportunity for risk reduction of cognitive decline and dementia.