

## The cross-sectional relationship between tobacco smoking and cognitive performance in the UK Biobank

David Plevin<sup>1,2</sup>, Liliana Ciobanu<sup>1</sup>, Will Liaw<sup>3</sup>, Muktar Ahmed<sup>1</sup>, Scott Clark<sup>1</sup>

<sup>1</sup>*Discipline of Psychiatry, University of Adelaide, Adelaide, Australia*, <sup>2</sup>*Ramsay Clinic Adelaide, Adelaide, Australia*, <sup>3</sup>*Drug and Alcohol Services South Australia, Adelaide, Australia*

Presenter's email: [david.plevin@adelaide.edu.au](mailto:david.plevin@adelaide.edu.au)

**Introduction:** Smoking has been associated with poorer neuropsychological performance and increased risk of late-life cognitive impairment. The UK Biobank comprises extensive information about health-related outcomes, including cognitive assessment data, for 500,000 participants from the UK. Our group has previously identified three key cognitive factors that represent the multifactorial structure of cognitive assessment data within the UK Biobank. These factors include: visuospatial reasoning, verbal-numerical reasoning and processing speed.

**Method:** We assessed the relationship between smoking status and pack-year history and cognitive factors using UK Biobank data, in participants without a history of diagnosed psychiatric and neurological disorders, using linear regression modelling.

**Results:** In 2,103 participants (mean age 55.4 years, 52.2% female), smoking status and increasing pack-years were associated with poorer visuospatial reasoning scores ( $R^2 = 0.007405$ ,  $p < 0.001$  and  $R^2 = 0.006767$ ,  $p < 0.001$ , respectively) and processing speed ( $R^2 = 0.007088$ ,  $p < 0.001$  and  $R^2 = 0.006128$ ,  $p < 0.001$ , respectively), which were no longer significant when adjusted for age and tertiary education status. An increase in adjusted pack-year history was associated with a statistically significant improvement for verbal-numerical reasoning (adjusted  $R^2 = 0.1243$ ,  $p = 0.0131$ ). No other relationships were observed.

**Discussions and Conclusions:** Although there are clear long-term cerebrovascular risks of smoking, in the absence of pre-existing psychiatric or neurological disorder, there does not appear to be any clinically significant relationship between neuropsychological outcomes and smoking. Further research should investigate the relationship between smoking and in individuals with psychiatric and neurological diagnoses.

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