

Memory is damaged by air pollution, researchers find

October 16 2019, by Sheila Kiggins



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New research from the University of Warwick shows that human memory is significantly worse in parts of England with high levels of nitrogen dioxide (NO₂) and air particulates (PM₁₀). The difference in

memory quality between England's cleanest and most-polluted areas is equivalent to the loss of memory from 10 extra years of aging.

This is consistent with prior smaller-scale laboratory research on rats and other animals. But the new work, by Nattavudh Powdthavee, Professor of Behavioural Science at Warwick Business School, and Andrew Oswald, Professor of Economics and Behavioural Science, is some of the first to confirm the same in humans.

The researchers examined 34,000 English citizens randomly sampled from across England's local-authority districts. Everyone in the study was asked to remember 10 words in a standardized word-recall test. The analysis adjusted for a large number of other influences on the quality of people's memory—including people's age, health, level of education, ethnicity, and family and employment status. The report, revealing a strong link between air pollution and impaired memory, is to be published in the journal *Ecological Economics*.

Memory slowly worsens as people grow older. The authors estimate that the difference in memory quality between England's cleanest and most-polluted areas is equivalent to the loss of memory from 10 extra years of aging. The most polluted air in England is in places like Kensington and Islington. The cleanest is on the west coastline in districts like Devon and West Somerset.

"There is a little prior evidence of a negative association between levels of traffic pollution and memory using data on elderly individuals and in children," said Professor Powdthavee, "but almost all research in [human studies](#) on this topic has been based on elementary correlations and not on nationally representative samples of individuals in a country. We have tried to solve these two problems in our study."

Professor Andrew Oswald said "When it comes to remembering a string

of words, a 50 year old in polluted Chelsea performs like a 60 year old in Plymouth. We are still not exactly sure how nitrogen dioxide and air particulates act to do this."

Using a nationally representative sample in the UK Household Longitudinal Study—the Understanding Society—the researchers have been able to study the link between data on a standardized word-recall test that was done in the year 2011 by 34,000 randomly sampled English citizens with data on NO₂ and PM₁₀ across 318 geographical areas. By exploiting regional variations in the direction of prevailing westerly wind and population density as predictors of [air pollution](#) but not memory, they were also able to correct for the potential selection effect that might arise from people with impaired [memory](#) choosing to live in more polluted areas.

More information: Is there a link between air pollution and impaired memory? Evidence on 34,000 English citizens, *Ecological Economics*, 2019. in press

Provided by University of Warwick

Citation: Memory is damaged by air pollution, researchers find (2019, October 16) retrieved 20 March 2024 from <https://medicalxpress.com/news/2019-10-memory-air-pollution.html>

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