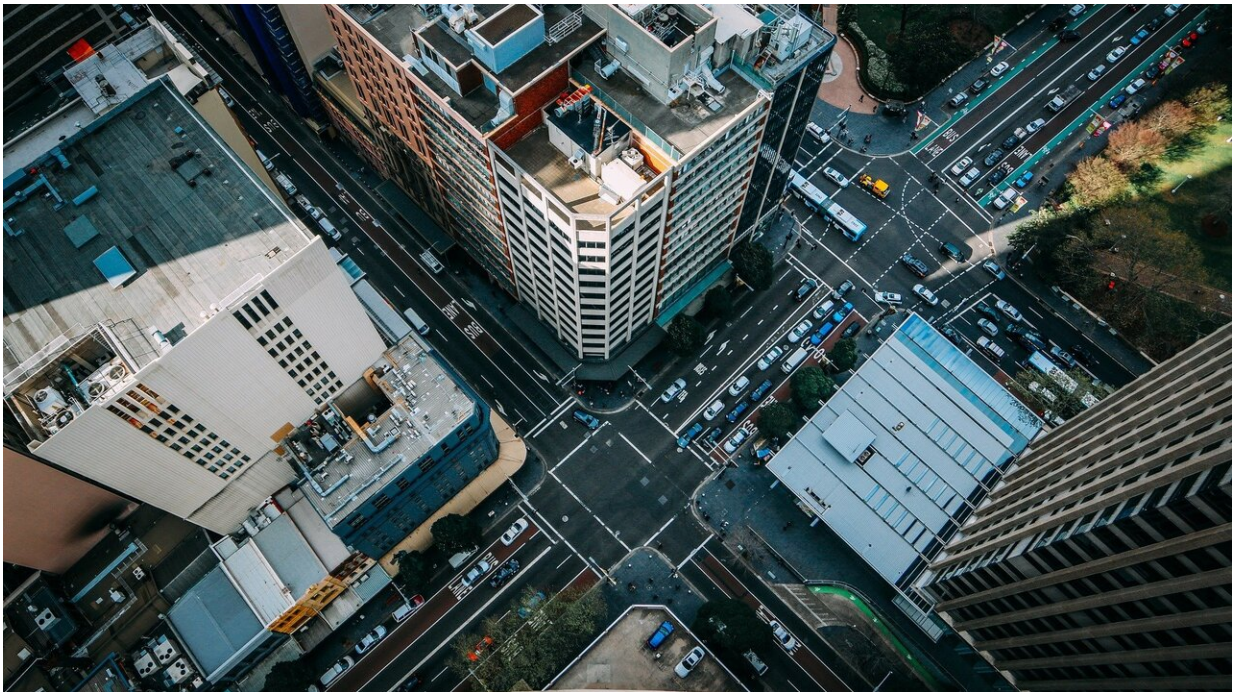


Study supports link between traffic-related air pollution and mental disorders

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Researchers at King's College London, Imperial College London and University of Leicester have found first UK evidence that adults exposed to high levels of traffic-related air pollution are more likely to experience mental disorders.

The study is funded by the National Institute for Health Research

(NIHR) Maudsley Biomedical Research Center (BRC) and Applied Research Collaboration South London (ARC), and has been published in *Social Psychiatry and Psychiatric Epidemiology* journal today (24 October 2020).

Ambient air pollution includes gasses such as nitrogen dioxide (NO₂) and particulate matter (PM), made up microscopic solid and liquid particles. Polluted air has several sources including industry, bonfires and road transport and, particularly within our congested cities, tire and brake wear and diesel exhaust fumes.

In this study, researchers analyzed data from over 1,600 participants of the South East London Community Health (SELCoH) study, a survey of Southwark and Lambeth adults. Participants were assessed for common mental disorders, psychotic experiences and physical symptoms indicative of mental distress based on clinical interviews and validated questionnaires over a five-year period.

Mental and physical [health](#) data from the survey were linked with quarterly average concentrations of air pollution (20x20 meter grid points) at the residential address of the participants. Southwark and Lambeth are inner-city London areas of high-traffic flows and high averages air pollution concentrations compared to other UK urban areas. These densely populated boroughs also reflect London's diversity in terms of ethnicity and wealth.

Study findings

The researchers found that for each 5 microgram per cubic meter increase in very small particulate matter (PM_{2.5}) and 3 microgram per cubic meter increase in nitrogen dioxide (NO₂) odds of common mental disorders were increased by 18% to 39%.

They also estimated a two fold increase in terms of common mental disorder cases directly attributable to residential exposures to PM_{2.5} above 15.5 micrograms per cubic meter which is below the EU value air quality target value of 25 microgram per cubic meter.

Common mental disorders comprise different types of depression and anxiety. The researchers used the revised Clinical Interview Schedule (CIS-R), which is a validated tool for assessing common mental disorders. The CIS-R is also used to produce a score that reflects overall severity of symptoms of common mental disorders. A CIS-R score of 12 or more denotes more severe or pervasive symptoms and was used to calculate the proportion of participants experiencing symptoms indicative of a presence of common mental disorder.

Results also showed increases in PM_{2.5} and NO₂ were associated with 18% to 29% increased odds of poor physical symptoms indicative of mental distress (such as stomach pain, shortness of breath, trouble sleeping) measured using the Patient Health Questionnaire subscale.

The study also assessed the relationship between exposure to air pollution (PM₁₀) and psychotic experiences and found an associated 33% increased chance of psychotic experiences.

"The findings suggest that people exposed to high levels of air pollution over a long-period of time are more likely to experience poor mental health. Air pollution is not the only factor that may have an impact on the presence of [mental disorders](#), but it is a preventable one," says Dr Ioannis Bakolis, lead author and Senior Lecturer in Biostatistics and Epidemiology, Institute of Psychiatry, Psychology & Neuroscience (IoPPN), King's College London.

He continued, "Although we cannot reverse adverse childhood experiences or the genetic makeup of people, introducing measures to

reduce air pollution may represent a potentially impactful and rare primary health measure for the prevention of psychiatric disorders."

The underlying mechanism for this association is largely unknown, however recent studies have linked this association with inflammation and oxidative stress of the body and central nervous system as well as neurogenerative processes that have been observed following air pollution exposures.

Recent evidence has also demonstrated elevated numbers of combustion derived magnetite nanoparticles in the brains of people living in urban areas associated with pathological changes in the brain. Inflammation and toxins in the brain appear to be important both in depression and psychosis for both short- and long-term effects of air pollution.

"We are familiar with the evidence linking air pollution to effects on the heart and lungs, but there is now an increasing body of evidence suggesting that air pollution isn't great for the brain either, impacting on the learning of children, mental health and wellbeing and even promoting dementia," says Dr. Ian Mudway, NIHR Health Protection Unit in Environmental Exposures and Health and MRC Center for Environment and Health, Imperial College London.

He added, "These impacts are clearly significant and have not been incorporated into the economic evaluations of the burden of air pollution on our health and social care systems. As strange as it may seem we may actually have been underplaying the adverse effects of air pollution on our health from cradle to grave."

The association between poor air quality and health has been highlighted in many previous studies, and this risk has been ranked as a major environmental cause of premature death by the World Health Organization (WHO). However, very few studies to date have tried to

understand the dynamics of air pollution and their links with poor mental health.

Therefore, new research and innovative designs over long periods of time are needed on the impact of [pollution](#) reduction policies on mental health, in order to strengthen the findings of the current and previous studies so that public health researchers and policy makers can understand the societal and economic implications in order to intervene. This is an urgency which is now more apparent during the COVID-19 pandemic era, where the quality of urban areas needs to be protected.

More information: Ioannis Bakolis et al. Mental health consequences of urban air pollution: prospective population-based longitudinal survey, *Social Psychiatry and Psychiatric Epidemiology* (2020). [DOI: 10.1007/s00127-020-01966-x](#)

Provided by King's College London

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