

Health & Physiology

City living and psychotic experiences: exploring the role of air pollution

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ABSTRACT

City living increases the risk for psychosis, but little is known about the role of air pollution in this relationship. We explored the link between outdoor air pollutants and sub-clinical psychotic experiences in a study of over 2000 UK teenagers.



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Understanding the impact of city living on mental health has never been more important. By 2050, 70% of the world's population will live in towns, cities, and megacities like London, New York, Tokyo, and Shanghai. Growing evidence links urban living to psychotic disorders such as schizophrenia. A child born and raised in an urban (versus rural) setting is roughly twice as likely to develop a psychotic disorder in adulthood. But what drives this association? There is a growing interest in the potential role of air pollution. Air pollution is a pervasive environmental health problem and is nowadays mostly produced by manmade combustion from industry, transport, and domestic activity. Air pollution is therefore particularly problematic in cities.

To understand the relationship between cities and psychosis further, we examined the link between air pollution and sub-clinical psychotic experiences in teenagers in the UK. Psychotic experiences include phenomena such as hearing voices that others cannot hear, intense feelings of paranoia, and other unusual experiences such as believing that your thoughts are being read by someone – which are often referred to as hallucinations and delusions. These experiences are surprisingly common among young people in the general population and are usually transitory. However, early psychotic experiences can signal risk for later mental health problems including psychotic disorders such as schizophrenia. We investigated whether psychotic

experiences are more common among teenagers exposed to higher levels of air pollution and whether air pollution levels might explain the link between living in a city and having psychotic experiences.

To do this, we used data from a study of over 2000 children born in the UK in 1994-1995 who have been followed since birth until age 18. A range of data has been collected on these children over the years, including information about their family environment, neighbourhood conditions, and mental health. At age 18 the participants were privately interviewed about whether they had psychotic experiences. Estimates of outdoor air pollutants were linked to the participants' home addresses and two other locations that they commonly visited when they were aged 18.

We found that teenagers living in cities were more likely to report psychotic experiences than those living in towns and villages. Not surprisingly, air pollution levels were highest in the cities.

Second, teenagers exposed to higher levels of air pollution were more likely to report psychotic experiences than those living in areas with lower levels of pollution, even after taking into account growing up in a poor family or unpleasant neighbourhood, having a family member with mental health problems, and whether the teenager smoked or did other drugs.

Finally, exposure to higher levels of air pollution appeared to explain over half of the association between living in a city and teenagers' reports of psychotic experiences when they were aged 18.

Thus, in a study of over 2000 UK teenagers, we found initial evidence linking air pollution to psychotic

experiences. These associations were not explained by other common risks in cities such as poverty. Air pollution also appeared to partly explain why teenagers living in cities are more likely to hear voices and be paranoid.

How could air pollution increase the risk for psychotic experiences? One possibility is that air pollutants could damage the development of the brain in childhood and teenage years when it is very sensitive, or change the way it functions. This, in turn, could result in individuals perceiving the world differently and eventually becoming paranoid or hearing things that are not actually there. More research is required to investigate this possible explanation.

Interestingly the strongest associations with psychotic experiences were found for pollutants that arise mainly from road vehicles – particularly the slow-moving traffic that you typically find in cities. Since traffic also creates noise which can be stressful and disrupt sleep (both of which are linked to psychotic experiences), it is possible that our findings could be explained by high levels of noise in cities rather than air pollution. Unfortunately, we did not measure noise and thus cannot rule out this possibility.

It is also important to acknowledge that we are not able to say from these findings whether air pollution *caused* teenagers to have psychotic experiences because we measured both of these things at the same time. Therefore, future research is needed to better understand whether air pollution impacts on teenagers' mental health and how this happens so that we can find ways to make city living a healthier experience for everyone.