

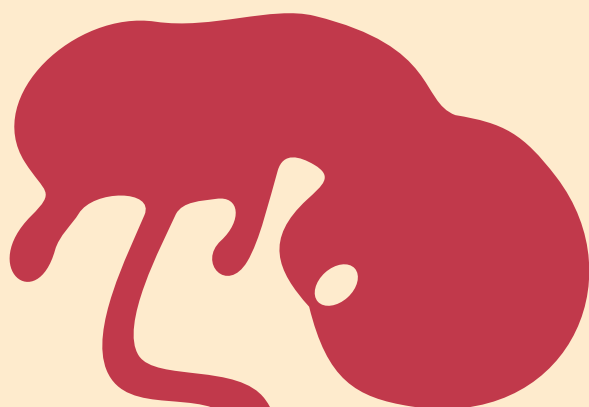
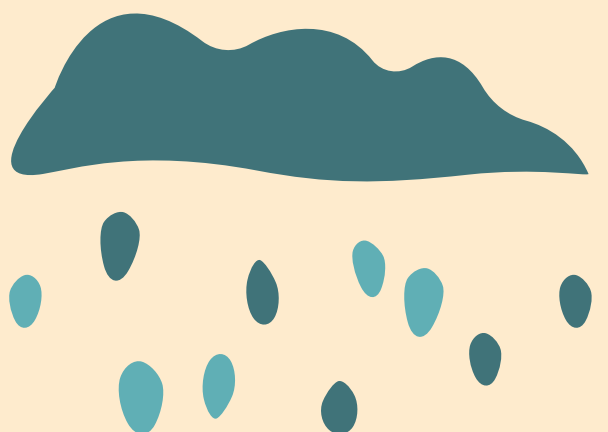
Exposed: The widespread societal costs of lead contamination

By Ludovica Gazze

The air we breathe, the water we drink, the soil our children play in – all of these can expose us to pollution and toxins with the potential to cause immediate and persistent harm to our bodies.

Lead is one such harmful pollutant that has been used extensively over time, for example in plumbing, paint, car batteries, and petrol. Like exposure to other forms of pollution, exposure to this toxic metal can lead to increased incidence of diseases, affect brain development and damage the nervous system. Its effects are particularly serious in children.

Higher lead exposure levels have been linked to a lower ability to perform in schools and even a lower ability to control one's impulses, leading to increased interpersonal conflict and even delinquency. Although much has been done across the world to reduce the use of this heavy metal in everyday products, lead does not decay. Therefore, its current levels in the environment are much higher than natural levels, including in the United Kingdom. A recent UNICEF study (2020) estimates that about 200,000 British children are likely to be affected by lead exposure. ►



“The effects of lead contamination from the air, water and soil are particularly serious in children.”

What are the societal costs of lead pollution?

One unexplored factor in determining the societal costs of pollution is the role of interactions. Aristotle famously said, 'man is by nature a social animal'. So, in the case of lead contamination, could it be that your cognitive and non-cognitive loss due to pollution is also my loss, if we spend time learning together? Losses in schools could be due to learning disruptions, or to teachers having to adapt their teaching to accommodate lead-poisoned children. Alongside Dr Claudia Persico and Sandra Spirovska, I tackled this question by examining the performance of students who did not test positive for lead exposure in early childhood but went to school with someone who did. We analysed unique anonymised student-level records for every student in North Carolina. The records detailed test scores, disciplinary actions, absences, high school graduation, and whether the student took a standardised test that is often necessary when applying for college. We had these data linked, securely, to blood lead levels measured during routine paediatric visits.

Lead exposure is widespread and affects educational attainment

We were shocked to see that virtually every child in our sample, even those who never tested positive themselves, went to school with at least one peer in their school-grade year who had tested positive for lead exposure. For more than half the children, over 10% of their peers had been exposed to lead in early childhood. These numbers show how widespread lead exposure is. Figure 1 shows that, in our sample, children with high blood lead levels (BLLs) are more likely to receive out-of-school suspensions and less

likely to graduate from high school. We show only correlations here, but other scholars (e.g., Aizer et al., 2018; Billings and Schnepel, 2018; Hollingsworth et al., 2020) have established a causal connection between lead exposure and school outcomes by exploiting data on lead

disadvantaged on average, and so are their peers. To establish a causal link between a student's outcomes and the share of their peers with high blood lead levels, we compare siblings who go to the same school. In this way, we ensure that differences we might find between

outcomes are not due to differences in students' backgrounds or school and neighbourhood characteristics. We exploit the fact that there is variation over time in how many children were exposed to lead in early childhood from year to year. With this strategy, we confirm that students who have a higher share of lead-exposed peers are indeed more likely to receive out-of-school suspensions and be chronically absent, and

less likely to graduate from high school and take an exam needed to enter college.

The effects of lead pollution are likely exacerbating existing inequalities

Pollution holds people back, preventing them from reaching their full potential. What's more, even those children who escape exposure but live in highly polluted environments will suffer indirectly from interacting with exposed peers. But pollution does not affect everyone equally. In fact, the data shows that it can exacerbate existing social inequalities. The Black students in our sample are more likely both to be lead-exposed and to have more lead-exposed peers. Moreover, we find that they are disproportionately affected by lead-exposed peers. This needs to be taken into consideration when devising policy to tackle the negative effects of a polluted environment. Reducing exposure in minority and poor neighbourhoods could have even larger positive effects than previously thought. ◀

“So, in the case of lead contamination, could it be that your cognitive and non-cognitive loss due to pollution is also my loss, if we spend time learning together?”

clean-ups and the de-leading of regular and racing gasoline. Given that almost every student in North Carolina interacted with at least one of these lead-exposed children in the classroom or during lunch or recess, could everyone else also be affected by the detrimental impacts of lead exposure?

Lead-exposed children affect the education outcomes of their peers

Lead-exposed children might disrupt learning in the classroom or take away teacher time. Lead's effects on behaviour might also mean lead-exposed students are more likely to pick fights with other children, and other children might imitate this misbehaviour. But is this borne out in the data? Figure 2 shows that students with a higher share of peers who had been lead-exposed in early childhood were more likely to receive out-of-school suspensions and less likely to graduate from high school. However, there might be many reasons why we observe these correlations. For example, lead-exposed children are more

10%

FOR MORE THAN 50% OF THE CHILDREN, OVER 10% OF THEIR PEERS HAD BEEN EXPOSED TO LEAD IN EARLY CHILDHOOD

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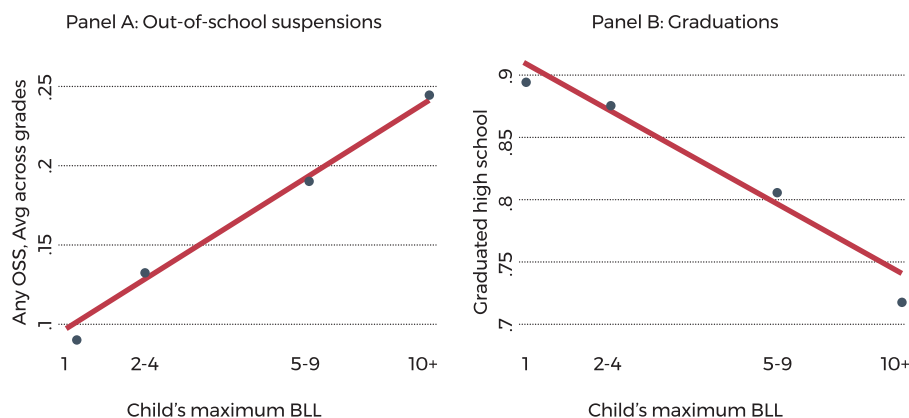
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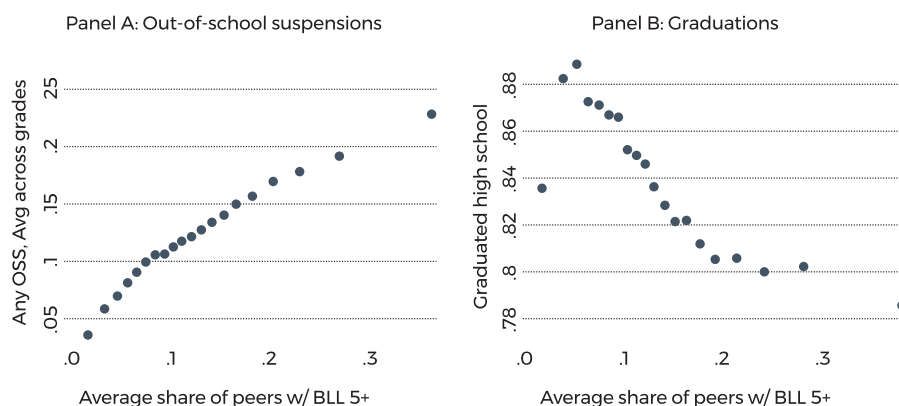
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Figure 1: Children with higher blood lead levels are more likely to receive out-of-school suspensions (OSS) and less likely to graduate from high school



Notes: The figure plots out-of-school suspension rates (Panel A) and graduation rates (Panel B) by students' blood lead levels and adds the line of best fit.

Figure 2: Children with a higher share of peers with high blood lead levels are more likely to receive out-of-school suspensions (OSS) and less likely to graduate from high school



Notes: The figure plots out-of-school suspension rates (Panel A) and graduation rates (Panel B) by vigintile of students' share of peers with blood lead levels at or above 5µg/dL.

“Pollution holds people back, preventing them from reaching their full potential.”