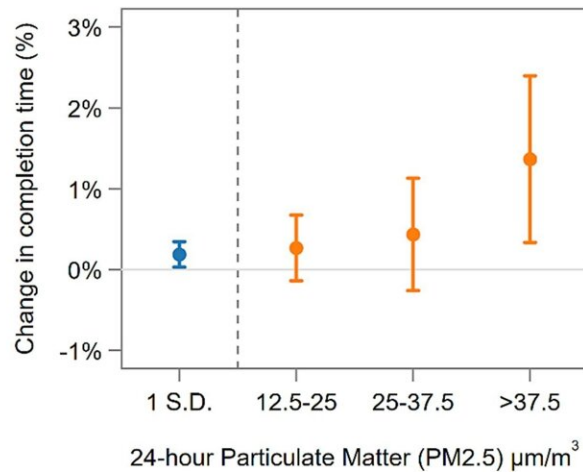
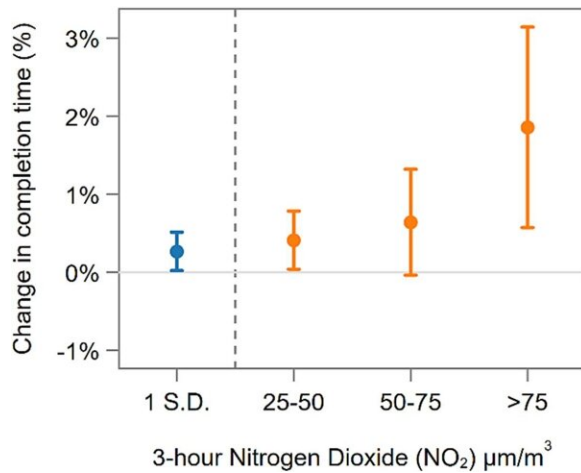
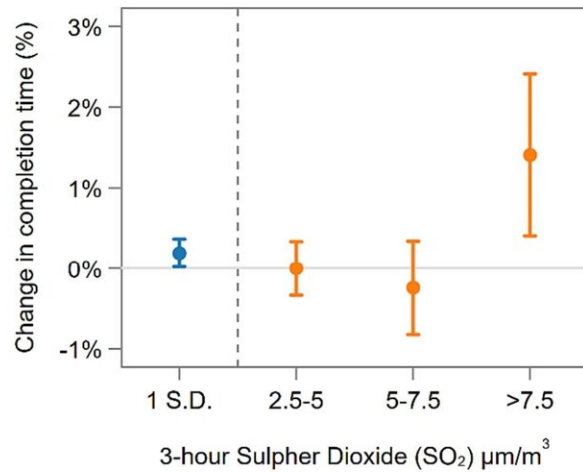
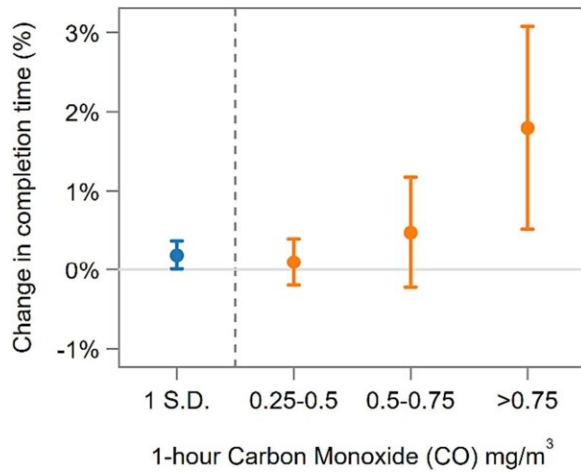


How air pollution can harm team performance

February 28 2024



Main Results – Linear and non-linear effects of pollution on team performance. Note: The left panel of each graph depicts the linear effect of a one standard deviation increase in pollution on team performance (Eq. (1)) for the respective pollutant (N = 15,397). The right panel of each graph depicts the non-linear

effect of pollution on team performance for three pollution exposure bins, relative to levels below the lower bound specified for each pollutant. The dependent variable is completion time as a percentage of average completion time. Standard errors are clustered at the room-month-year level. Error bars indicate 95 % confidence intervals. Full regression outputs are provided in Online Appendix Tables A6 and A7. Credit: *Journal of Economic Psychology* (2024). DOI: 10.1016/j.joep.2024.102705

High levels of air pollution can harm the performance of teams, which are vital for solving complex problems such as developing clean energy technologies and vaccines, and this could harm economic development in highly polluted emerging economies, says a new study co-authored at Cambridge Judge Business School.

The study used data from 15,000 live escape-room games in London. It estimated, based on the data and the study's equations, that for about 3,500 teams that participated in team-building exercises (usually from a corporate background) on high-pollution days, the escape teams could take up to 5% longer to solve a sequence of non-routine analytical tasks of the collaborative type seen in a modern workplace.

The authors say that the mostly corporate team-building subsample may be more representative of the workplace effect than the full sample (which includes birthday parties and other [leisure activities](#)); there was no significant effect of pollution on young teams under the age of 16, the subgroup least reflecting the modern work environment.

These negative results "only occur at high levels of air pollution, which are, however, commonplace in many developing countries. As team efforts predominantly drive innovation, [high levels of air pollution](#) may significantly hamper economic development," says the study [published](#) this month in the *Journal of Economic Psychology*.

Co-authors of the study include Paul Lohmann of the El-Erian Institute of Behavioural Economics and Policy at Cambridge Judge Business School, and Andreas Kontoleon of the Department of Land Economy at the University of Cambridge.

"Breakthroughs in science and other fields require teams to work together to combine knowledge and solve complex problems, so it's important to understand external factors that can affect team performance," says co-author Paul Lohmann.

"Our findings that air pollution has a sizable and statistically significant negative effect on teams undertaking [complex tasks](#) has implications for workplaces all over the world, but particularly in emerging economies that have high air pollution levels."

The research uses data from escape room games between 2018 and 2022 in which team members need to solve a series of puzzles and use the information to figure out a way to escape the room before time runs out, usually 60 minutes. The teams ranged from 2 to 6, and the study is based on how many minutes it took them to complete the task, as this reflects team effectiveness in working together.

"Escape rooms provide an ideal setting to study team performance on non-routine, cognitive tasks emblematic of the modern work environment because they require a high level of creativity, collaboration, and communication between [team members](#) to complete the game," the study says.

The research studies the effect of the four most common air pollutants—carbon monoxide (CO), [sulfur dioxide](#) (SO₂), nitrogen dioxide (NO₂), and particulate matter smaller than 2.5 micrometers in diameter (PM 2.5).

Pollution data were obtained from 16 monitoring stations in Greater London maintained by the Automatic Urban and Rural Network and provided by the Department for Environment, Food and Rural Affairs. Weather data comes from the UK's Met Office.

The study reveals that all 4 pollutants have a significant negative impact on team performance. Interestingly, these effects occur at levels much lower than the current World Health Organization (WHO) Air Quality Guidelines for 2 pollutants studied (CO and SO₂).

The study concludes with a comment on the potential implication on all workplaces, but particularly in emerging economies.

"Our results have implications for all settings that require team-based non-routine analytical and interpersonal work, which characterizes large parts of the modern work environment. Many low- and middle-income economies face much higher levels of pollution, which could possibly be a drag on economic development and poverty alleviation."

"As these countries intend to increase the share of service-sector jobs that entail team innovation in their economies, reducing air pollution may be an important contextual factor that can affect innovation capacity, which is critical for [economic development](#)."

More information: Paul M. Lohmann et al, High levels of air pollution reduce team performance, *Journal of Economic Psychology* (2024). [DOI: 10.1016/j.joep.2024.102705](https://doi.org/10.1016/j.joep.2024.102705)

Provided by University of Cambridge

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