



To: Place Directorate

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Subject: Essential Evidence on a Page: No 129 Respiratory responses to short-term exposure to traffic related air pollution

Top line: Recent evidence shows that intermittent moderate physical activity increases pulmonary function irrespective of high levels of traffic-related air pollution.

Exposure to traffic air pollution is associated with adverse health effects such as respiratory symptoms, and also increased illness and premature death.¹ Exposure to traffic-related air pollution (TRAP) has been associated with adverse respiratory and other outcomes. Physical activity (PA) in polluted air may increase ventilation and this may result in substantial increases in the inhaled dose of traffic-related air pollutants and potentially lead to adverse health effects. Past studies have found differing results in terms of health effects both from PA and from TRAP. However, they were generally not designed to separate the effects of air pollution from those caused by physical activity, nor their possible interaction.

In a 2014 study, researchers used a real world exposure study, in Barcelona. This compared in 28 healthy, non-smoking, participants pulmonary and inflammatory responses to four different exposure scenarios: 2 hours exposure in a high and low TRAP environment, each at rest and in combination with intermittent moderate PA, consisting of four 15 min rest and cycling intervals.² The impacts were observed in a healthy population using volunteers without clinical symptoms. All exposures and measurements were conducted at the same hours during the day as well as during the same days of the week to account for variations in traffic characteristics. Lung function tests and blood samples were taken before and shortly after exposure. Physical activity was through cycling on an exercise bicycle in a heavily polluted air location (on a pedestrian bridge 5 metres above a heavily trafficked road) and in a low polluted air environment (pedestrian-friendly market square).

The study findings suggest that in healthy participants, intermittent moderate PA has beneficial effects on pulmonary function even when performed in a highly polluted traffic environment. The study also suggests that particulate air pollution is inducing airway and other inflammatory processes. No consistent evidence was found for an interaction between TRAP and PA for lung function, lung inflammation and systemic inflammation markers, suggesting that PA does not modify the effect of air pollution.

This study adds to the limited body of evidence of small studies with inconclusive and often mixed results of the effects of air pollution while physically active. The study provides a possible explanation of some of the unexpected results of previous studies and stresses the importance of assessing air pollution and also PA levels when assessing health effects.

¹ Hoek, G., Krishnam, R., Beelen, R. et al Long term air pollution exposure and cardio-respiratory mortality: a review. *Environmental Health*, 12:43.

² Kubesch, N., de Nazelle, A., Westerdahl, D. et al 2014 Respiratory and inflammatory responses to short-term exposure to traffic-related air pollution with and without moderate physical activity, *Occupational and Environmental Medicine*,0:1-10. Doi: 10.1136/oemed-2014-102106