



No. 6 Inside and outside of vehicles exposure

Top line: Evidence shows that in urban areas the greatest exposure to air pollution is among car occupants which may be the opposite of what parents think.

Public health professionals and researchers widely promote ‘active travel’ modes such as walking or bicycling as healthier alternatives to motorised forms of transport, especially car use. Active travel to school is regularly encouraged as part of a physical activity strategy for combating the growing problem of child obesity in many countries, as it is well-documented that children who walk to school benefit from higher physical activity levels than those who are driven. Nevertheless, little is known about how the choice of travelling to and from school by walking or biking versus being driven in a car or bus can affect children's exposure to health-damaging air pollutants.

Children are more susceptible than adults to the adverse health effects of air pollution due to greater physiological sensitivity to air pollutants, higher respiration rates, and more time spent outdoors. Pollution emissions from school buses and other motor vehicles in the US have been shown to concentrate in areas around schools which have been designated for dropping off and picking up students.¹ In a Canadian study, although it appeared that mean PM_{2.5} exposure was lowest among those who walked to and from school and higher among those who were driven by bus and car, the differences in mean exposure by transport mode were not statistically significant. Findings suggest that riding the bus can increase children's exposure to fine particulate matter, and may, therefore, exacerbate symptoms among children who are already vulnerable with asthma or other respiratory ailments. However, school buses should not be considered an unhealthy transport option for those who live too far to walk to school, as they serve to reduce the number of vehicles on the road, resulting in decreased overall air pollution levels.

Moreover, results from a quantitative method synthesizing the literature on air pollution exposure in travel microenvironments for use in health impact assessments² with relevant for the European context, showed that generally in car occupants had highest pollution exposure with lowest exposure in pedestrians. A key concern for the scientific community remains a seeming lack of awareness amongst the public as to the potential for high exposure rates in motor vehicles. There may be assumptions by motor vehicle occupants that air quality will be better inside a sealed vehicle (windows closed) than outside and that air conditioning may provide additional protection from poor air quality. This is likely to include parents making decisions to drive their children to schools in the erroneous belief that it is the safer option in terms of risks to health from polluted air.

¹ Gilliland, N. et al, 2019. Is active travel a breath of fresh air? Examining children's exposure to air pollution during the school commute, *Spatial and Spatio-temporal Epidemiology*, 29: 51-57.

² De Nazelle, A., Bode, O., Orjuela, J. 2017. Comparison of air pollution exposure in active vs. passive travel; modes in European cities: A quantitative review, *Environment International*, 99: 151-160.

