

**To:** Transport & Health Policy Makers, & Practitioners  
**From:** Professor Adrian Davis  
**Date:** 20<sup>th</sup> September 2021  
**Subject:** Essential Evidence 4 Scotland No.44 The climate change mitigation impacts of active travel

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Top Line: Switching one trip from car to bicycle per week can contribute a substantial reduction to the average per person per capita CO<sub>2</sub> emissions from transport.

There is growing consensus that technological substitution via electrification will not be sufficient or fast enough to transform the transport system. Active travel (walking or cycling for transport) is considered the most sustainable and low carbon form of getting from A to B. Yet the net effects of changes in active travel on changes in mobility-related CO<sub>2</sub> emissions are complex and under-researched. Through the European Union-funded PASTA project,<sup>1</sup> researchers collected longitudinal data on daily travel behaviour, journey purpose, as well as personal and geospatial characteristics in seven European cities and derived mobility-related lifecycle CO<sub>2</sub> emissions over time and space.<sup>2</sup> Statistical modelling of the longitudinal panel data was performed to assess how changes in active travel, the 'main mode' of daily travel, and cycling frequency influenced changes in mobility-related lifecycle CO<sub>2</sub> emissions.

The final sample included 1,849 participants completing 3,698 travel diaries reporting 12,793 trips. The sample was well balanced between male and female, and between the seven cities (included London). Participants were highly educated with 78% of the participants having at least a secondary or higher education degree. Aged between 16 and 79 at baseline, the majority of participants were employed full-time (63%), with 72% on middle to high household incomes (i.e. >£23,350) and 32% reported having children living at home. Participants without access to a car was 22%. Mobility-related lifecycle CO<sub>2</sub> emissions totalled 2.8 kilograms of CO<sub>2</sub> (kgCO<sub>2</sub>) per day at baseline, with slightly higher emissions of 3.1 kgCO<sub>2</sub>/day at follow-up. These higher emissions were largely due to an increase in emissions from driving. Driving a car or van made up the majority of these emissions averaging 1.9 kgCO<sub>2</sub>/day at first travel diary use and 2.2 kgCO<sub>2</sub>/day at second travel diary use. The travel diaries and questionnaires were completed on average 282 days apart. Direct tailpipe emissions from all travel activity made up 70% of mobility-related lifecycle emissions at 1.9 kgCO<sub>2</sub>/day at first survey and 2.2 kgCO<sub>2</sub>/day at second survey.

The researchers found that changes in active travel have significant lifecycle carbon emissions benefits, even in European urban contexts with already high walking and cycling shares. An increase in cycling or walking consistently and independently decreased mobility-related lifecycle CO<sub>2</sub> emissions, suggesting that active travel substituted for motorised travel – i.e. the increase was not just additional travel over and above motorised travel. To illustrate this, an average person cycling 1 trip/day more and driving 1 trip/day less for 200 days a year would decrease mobility-related lifecycle CO<sub>2</sub> emissions by about 0.5 tonnes over a year, representing a substantial share of average per capita CO<sub>2</sub> emissions from transport. The largest benefits from shifts from car to active travel were for business trips, followed by social and recreational trips, and commuting to work or place of education. Changes to commuting emissions were more pronounced for those who were younger, lived closer to work and further to a public transport station.

Importantly, the finding that an increase in cycling or walking at follow-up independently lowered mobility-related lifecycle CO<sub>2</sub> emissions suggests that active travel indeed substitutes for motorised travel. This also suggests that even if not all car trips could be substituted by bicycle trips the potential for decreasing emissions is considerable and significant.

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<sup>1</sup> [PASTA Project :: HOME](#) Declaration: A Davis was an Expert Adviser to the PASTA Project but made no contribution to the drafting of papers.

<sup>2</sup> Brand, c. et al, 2021 The climate change mitigation impacts of active travel: Evidence from a longitudinal panel study in seven European cities, *Global Environmental Change*, 67: 102224