Statistical Analysis of Cycling Patterns in Great Britain before and After the COVID-19 Pandemic

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ABSTRACT

Cycling rose sharply across Britain in 2020. Five years on, it is unclear how much of that increase has held. This study uses 5.27 million hourly manual counts from 43,401 sites (2000–2025) to measure persistence, defines a persistence ratio, and examines changes in where and when people cycle. A flow-weighted, chain-linked index shows cycling at counted sites 50% above its 2019 level in 2020 and 11% above in 2025, a persistence ratio of 0.21. London retained three-quarters of its surge (+39%); the rest of Great Britain retained an eighth (+6%), and several regions ended below 2019. A site fixed-effects index, which weights each site equally, put the typical site 6% below 2019 by 2025: growth has become concentrated in London, whose busy routes dominate a flow-weighted measure. The share of cycling in the two commuting peaks fell 4.2 percentage points between 2019 and 2025 (SE 0.24), with the 07:00 hour hit hardest, while midday cycling grew. Contrary to expectation, the day-of-week pattern did not change once site composition was controlled for. The pandemic left a lasting mark on London's cycling and on the timing of trips, but outside the capital, cycling volumes have largely returned to their earlier trajectory.

Keywords: cycling; active travel; hybrid working; traffic counts; persistence; Great Britain

INTRODUCTION

In the spring and summer of 2020, cycling had its moment. With public transport discouraged and roads emptied of cars, people who had not ridden for years took their bicycles out, and cities raced to install temporary lanes. Buehler and Pucher (2021) documented increases across Europe and North America. Kraus and Koch (2021) estimated that pop-up bike lanes in European cities raised cycling by 11–48% on top of the pandemic effect. In Britain, the government's emergency active travel funding and London's Streetspace programme reshaped streets almost overnight, and low-traffic neighbourhoods spread across the capital (Aldred et al., 2021).

The question that matters now is what remains. Survey evidence is mixed. Some studies describe a "reactivated" population of cyclists (Fuller et al., 2021), others a temporary spike that faded as normal life resumed (Möllers et al., 2022; Rérat et al., 2022). City-level counter studies in North America and Europe find recoveries that differ widely between places (Adame Valenzuela et al., 2024; Buehler & Pucher, 2022; Young et al., 2024). The national picture for Britain is especially ambiguous. The Department for Transport's (DfT) modelled estimate of cycling on public roads in 2025 is just 1.2% above 2019 (DfT, 2026a), a figure that could mean almost nothing changed. It could equally mean that large gains in some places were offset by losses elsewhere.

This paper uses site-level manual counts to answer three questions:

1. How much of the 2020 surge in cycling had persisted by 2025, and how does persistence vary between London and the rest of Britain, between regions and between road types?

2. Has cycling become more or less concentrated on particular routes?

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3. Has the timing of cycling changed (by hour of day and day of week) in ways consistent with the shift to hybrid working?

The counts are well suited to these questions. They cover a large and varied set of roads, they have been collected in the same way for more than two decades, and they record cyclists hour by hour. They are less suited to measuring total cycling, because they miss off-road paths and are taken on single days. Comparisons are therefore built only from sites counted in both of the years being compared, and the results are interpreted as measures of cycling on Britain's roads.

The answers are more interesting than "the boom faded". Persistence is high in London and low elsewhere, so cycling on Britain's roads has become geographically more concentrated, and its timing has shifted away from the morning commute. Section 2 reviews related work, Section 3 sets out the data and methods, Section 4 presents results, and Section 5 discusses implications.

Related work

The 2020 surge and its aftermath

Early evidence on pandemic cycling came from automatic counters and bike-share systems. Buehler and Pucher (2021) reported widespread increases in cycling across Europe and North America in 2020. Kraus and Koch (2021), using counter data from 106 European cities, found that cities which installed provisional infrastructure saw much larger increases. In London, Heydari et al. (2021) found that the pandemic altered both the demand for Santander Cycles and the length of hires, with hire times rising. Bike-share studies elsewhere documented large changes in when, where and why people rode, and in how bike-share related to public transport (Jia et al., 2023; Kim & Cho, 2022; Rotaris et al., 2022; Shi et al., 2023).

What happened next is less clear. Rérat et al. (2022) examined how the pandemic and pop-up lanes affected cycling practices in Switzerland and found effects that differed between groups of cyclists. Möllers et al. (2022) showed for Germany that changes in active mobility were closely bound up with government intervention during the pandemic. Buehler and Pucher (2022), following 14 large bicycle-friendly cities, argued that those which expanded and made permanent their cycling infrastructure were best placed to keep their gains. Adame Valenzuela et al. (2024) reported divergent post-pandemic trajectories across four North American cities, and Young et al. (2024) found that Montreal's protected express network supported recovery on nearby lanes. In Lyon, temporary lanes were made permanent and became part of a broader shift in mobility policy (Ortar et al., 2025). Li et al. (2025) examined which pandemic-era behaviours persisted in Hong Kong. The common thread is that persistence depended on local conditions, above all on whether temporary measures were made permanent.

Infrastructure, low-traffic neighbourhoods and London

London's response was unusually large. The Streetspace programme added protected lanes and low-traffic neighbourhoods (LTNs) across many boroughs. Aldred et al. (2021) showed that the new LTNs were, if anything, located in more deprived areas, and Aldred and Goodman (2021) found early signs of more active travel and less car use among residents. Later work linked LTNs to fewer road traffic injuries (Furlong et al., 2025; Goodman et al., 2021). LTNs were also politically contested (Dudley et al., 2022), and studies outside London have documented mixed resident experiences (Pritchett et al., 2024). International evidence confirms that connected, low-stress infrastructure is what drives cycle commuting (Alimo et al., 2026; Smith & Fu, 2025), and network design mattered for the pop-up lanes of 2020 as well (Moran, 2022).

Working from home and the timing of travel

The rise of hybrid working matters for cycling because commuting has always made up a large share of urban cycle trips. Studies from several countries show that working from home reduces the number of commuting days but can increase non-commuting travel, including local walking and cycling (Balbontin et al., 2021, 2024; Caldarola & Sorrell, 2022; Greaves et al., 2024). Preferences for working from home have stayed well above

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pre-pandemic levels (Richards et al., 2024), and the effects on travel are reshaping urban mobility more broadly (Curtis et al., 2025; Hensher et al., 2022; Huang et al., 2023). If this is true for Britain, it should be visible in the hourly profile of cycle counts.

DATA AND METHODS

Data

The analysis uses the DfT's raw count file for 2000–2025 (DfT, 2026b): 5,269,632 hourly records from 43,401 count points, each counted on one or more weekdays between 07:00 and 19:00, mostly between March and October. Pedal cycles are counted alongside motor vehicles at every site. Hourly counts are aggregated to a 12-hour, two-way total for each site and count day (222,100 site-days) and to a site-year mean. The number of sites counted varies widely from year to year: minor roads were heavily sampled in the benchmark years of 2008–2009 and 2018–2019 (DfT, 2022), and from 2020 the sample fell to around 6,500 sites. Comparisons across years must therefore be made at matched sites.

Pedal cycles make up only about 0.5% of all vehicles counted, and many sites, especially rural minor roads, record no cyclists on a given day. Of the 2,575 sites counted in both 2019 and 2025, 16% recorded zero cyclists in both years. This sparsity shapes the choice of methods below.

Two indices of cycling

Chain-linked index. For each pair of consecutive years, the set M_t of sites counted in both years is identified and the ratio of their summed cycle flows is computed. The ratios are multiplied together:

$$I_t = I_{t-1} \times \frac{\sum_{i \in M_t} \bar{c}_{it}}{\sum_{i \in M_t} \bar{c}_{i,t-1}}, \qquad I_{2019} = 100 \tag{1}$$

where $\bar{c}_{it}$ is the mean 12-hour cycle count at site i in year t. Because it compares sums, this index weights sites by their cycle volume, so busy routes dominate it, as they would dominate total cycling.

Fixed-effects index. A second index is estimated at the site-day level:

$$\ln(1 + c_{idt}) = \alpha_i + \gamma_t + \mu_{m(d)} + \delta_{w(d)} + \varepsilon_{idt} \tag{2}$$

with site effects α_i, year effects γ_t, month-of-count effects $\mu_{m(d)}$ and day-of-week effects $\delta_{w(d)}$. The year effects, expressed as $100\exp(\gamma_t - \gamma_{2019})$, track the typical site, with each site weighted equally regardless of its volume. When the chain index rises and the fixed-effects index falls, growth has been concentrated at busy sites while cycling at the typical site declined.

persistence ratio

To summarise how much of the 2020 surge has lasted, the persistence ratio is defined for group g as the share of the 2020 increase still present in year t:

$$P_{g,t} = \frac{I_{g,t} - I_{g,2019}}{I_{g,2020} - I_{g,2019}} \tag{3}$$

A value of one means the 2020 level was fully sustained, zero means a complete return to 2019, and a negative value means cycling fell below its pre-pandemic level. P is computed for 2025 from chain indices built separately for London and the rest of Great Britain, for each region and for each road category.

Timing of cycling

For each site-day, the share of cycling that falls in the four commuting-peak hours (07:00–08:59 and 16:00–17:59) is computed as

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$$s_{id} = 100 \times \frac{\sum_{h\in\{7,8,16,17\}} c_{idh}}{\sum_{h=7}^{18} c_{idh}} \quad (4)$$

Raw annual averages of this share would be distorted by the changing mix of sites, so the share is modelled at the site-day level for 2015–2025:

$$s_{id} = \sum_{\tau\neq 2019} \theta_\tau \, \mathbb{1}[t(d) = \tau] + \mathbf{z}_i'\boldsymbol{\phi} + \mu_{m(d)} + \delta_{w(d)} + \varepsilon_{id} \quad (5)$$

where $\mathbf{z}_i$ holds road-category and region indicators, and θ_τ measures the change in the peak share relative to 2019 in percentage points. To limit noise from near-empty sites, only site-days with at least 20 cyclists are kept (42,076 site-days), and observations are weighted by the square root of the daily total. Standard errors are clustered by site.

To test whether hybrid working has thinned cycling on Mondays and Fridays, the fixed-effects model in Equation (2) is extended with interactions between day of week and a post-pandemic indicator, for 2015–2019 and 2021–2025, excluding 2020. The model is fitted to 79,507 weekday site-days at 30,055 sites, and standard errors come from a site-cluster bootstrap with 40 replications.

Site-level change, 2019–2025

Finally, the kinds of sites that gained or lost cycling are examined using the 2,575 sites counted in both 2019 and 2025:

$$\Delta\ln(1 + c_i) = \beta_0 + \beta_1 \Delta\ln(1 + q_i) + \beta_2 \ln\left(1 + c_{i,2019}\right) + \mathbf{z}_i'\boldsymbol{\lambda} + u_i \quad (6)$$

where q_i is motor-vehicle flow and $\mathbf{z}_i$ contains road category and a London indicator. The coefficient β_1 indicates whether cycling grew where motor traffic fell, as a substitution story would predict, or where it rose. β_2 captures convergence. With heavy measurement noise at low counts, it will be pulled negative by regression to the mean, and should be read with that in mind. Robust (HC1) standard errors are reported.

Results

The long view

Figure 1 places the pandemic in context. On the chain-linked index, cycling on counted roads grew by roughly half between 2004 and 2014 and was broadly flat from 2014 to 2019. In 2020 it jumped to 150, while motor traffic fell to 69. By 2021 it was back to 117 and by 2024 to 104, and it ended at 111 in 2025. Motor traffic, meanwhile, recovered fully to 101.

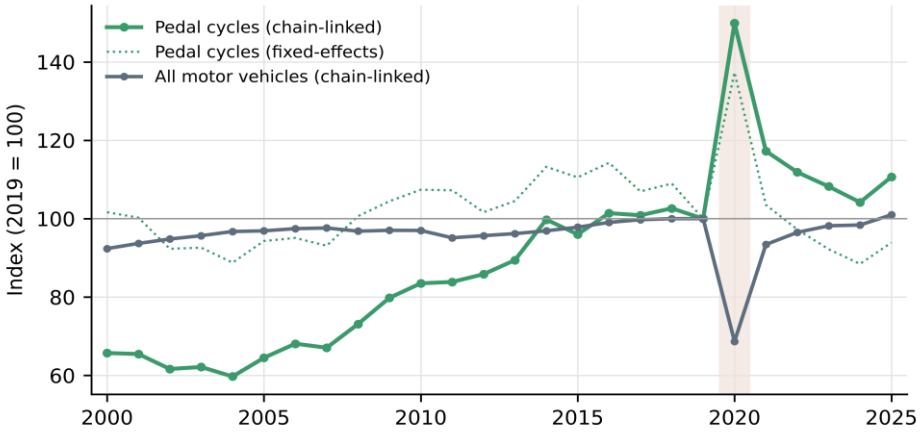


Figure 1. Chain-linked indices of 12-hour weekday flow for pedal cycles and all motor vehicles, and a site fixed-effects index for pedal cycles, 2000–2025 (2019 = 100).

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The fixed-effects index tells a different story. It rose less in 2020 (137) and fell further afterwards, to 94 in 2025, below its 2019 level and below its level in most years of the previous decade. The difference between the two indices is the first important result. The flow-weighted chain index is dominated by sites with many cyclists, a large share of them in London, while the fixed-effects index gives every site equal weight. Their divergence means that the post-2019 gains are concentrated in a minority of places, and that the typical counted site has no more cyclists than before the pandemic. The fixed-effects result should be read with care, though. Estimated separately, the index stood at 93 on major roads and 106 on minor roads in 2025, so the pooled figure of 94 owes much to major-road sites, which are counted more often and therefore anchor the year effects. Section 4.2 shows that the concentration is above all geographic.

Persistence differs sharply by place

Table 1 reports the 2020 surge, the 2025 level and the persistence ratio for each group.

Table 1. Surge in 2020, change by 2025 and persistence ratio, by group (chain-linked indices, 2019 = 100)

Group	Change 2019–2020 (%)	Change 2019–2025 (%)	Persistence ratio, P
Great Britain	+49.9	+10.7	0.21
London	+50.8	+38.5	0.76
Rest of Great Britain	+49.7	+6.3	0.13
Wales	+115.2	+57.3	0.50
Yorkshire and the Humber	+58.4	+26.3	0.45
North West	+55.5	+13.6	0.24
East of England	+52.0	+8.6	0.16
West Midlands	+48.6	+7.2	0.15
East Midlands	+48.6	+5.5	0.11
North East	+52.7	+5.9	0.11
South West	+38.7	+4.2	0.11
Scotland	+65.9	−7.0	−0.11
South East	+37.3	−13.3	−0.36
Principal A-roads	+13.6	−12.5	−0.92
B-roads	+42.8	+3.9	0.09
Minor roads (C/unclassified)	+56.5	+13.6	0.24

Note. $P = (I_{2025} - 100)/(I_{2020} - 100)$. Wales and the smaller regions rest on fewer matched sites and are less precise. Trunk-road and motorway estimates are omitted because of very small cycle counts.

London and the rest of Britain had almost identical surges in 2020 (+51% and +50%) and very different outcomes. London kept three-quarters of its increase; the rest of Britain kept an eighth. Figure 2 shows the two paths separating from 2021 onwards. London dipped in 2023 and then rose again, while the rest of Britain fell

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back to its 2019 level by 2024. At sites counted in both 2019 and 2025, cycle flows in London were 51% higher. Outside London they were 2% lower.

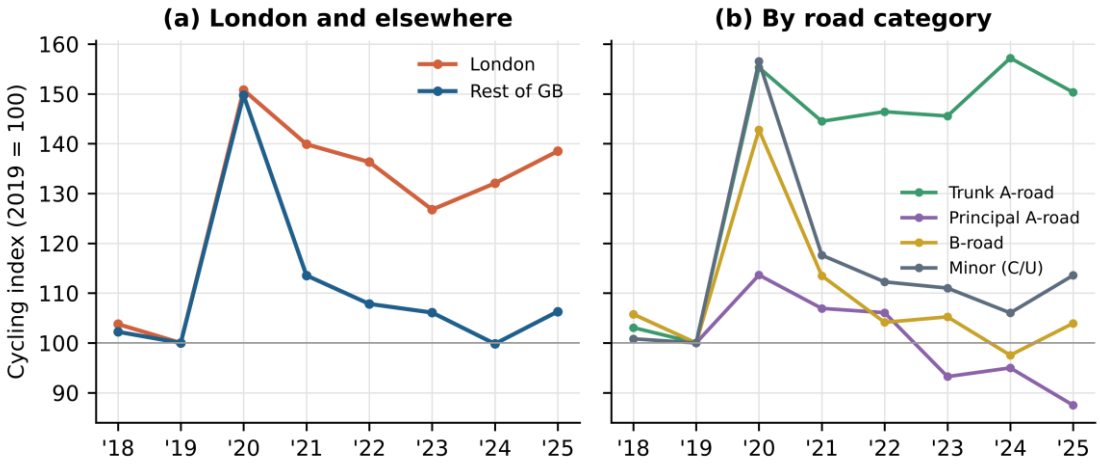


Figure 2. Chain-linked cycling indices (2019 = 100) for (a) London and the rest of Great Britain and (b) road categories, 2018–2025.

Regional results vary widely and some rest on small samples, but the pattern is consistent. Wales and Yorkshire and the Humber retained about half their surge. Scotland and the South East ended below their 2019 levels. By road type, minor roads (P = 0.24) held more of their gain than B-roads (0.09), and cycling on principal A-roads fell below its 2019 level. A plausible reading is that riders have moved off busy A-roads onto quieter routes and protected lanes, many of which are not on the counted network at all.

Cycling has moved away from the morning commute

At matched sites, the hourly cycling profile changed markedly between 2019 and 2025 (Figure 3a). The 07:00 hour's share of daily cycling fell from 10.2% to 7.9%, and the 08:00 hour's from 11.7% to 10.8%. Every hour from 10:00 to 16:00 gained, with the 12:00–14:00 hours rising by between 0.7 and 0.9 percentage points each. The evening peak changed much less. Car traffic shifted in the same direction but far less (Figure 3b).

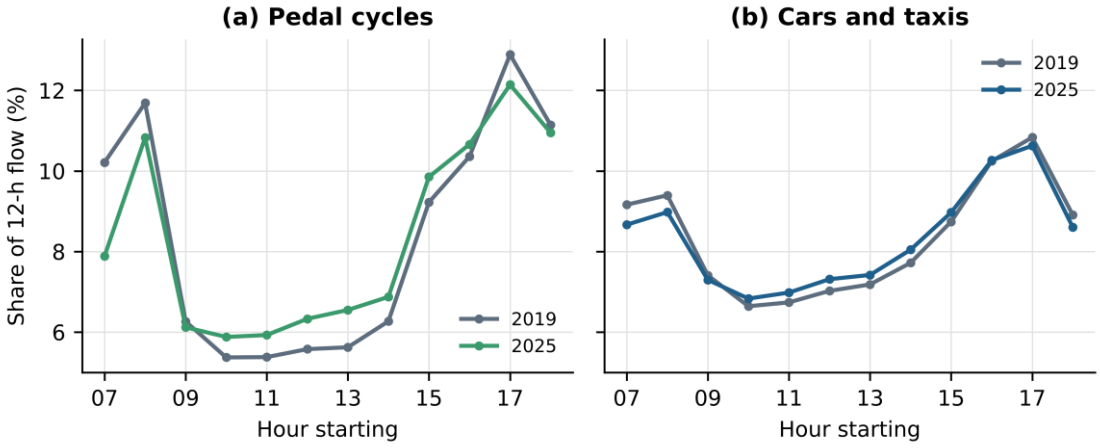


Figure 3. Hourly share of 12-hour weekday flow at sites counted in both 2019 and 2025: (a) pedal cycles, (b) cars and taxis.

The regression in Equation (5) confirms that this is not an artefact of the changing sample (Figure 4). Relative to 2019, the share of cycling in the four commuting-peak hours was 8.8 percentage points lower in 2020 and 5.0 points lower in 2021. It recovered partly to −2.4 points in 2022 and has since drifted down again: −2.8 in 2023, −3.4 in 2024 and −4.2 (SE 0.24) in 2025. Before the pandemic, the peak share was, if anything, slightly

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declining (+1.7 points in 2015 relative to 2019). The 2019 mean share was 43.4%, so the 2025 estimate implies that roughly one in ten peak-hour cycle trips has moved elsewhere in the day, or disappeared.

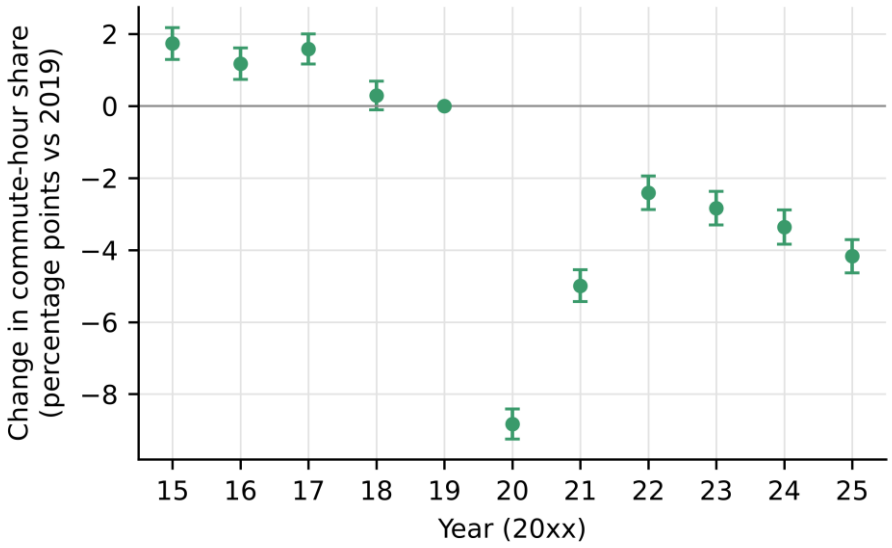


Figure 4. Estimated change in the share of daily cycling in the commuting-peak hours (07:00–08:59 and 16:00–17:59) relative to 2019, controlling for road category, region, month and day of week. Bars are 95% confidence intervals with site-clustered standard errors.

The continuing slide since 2022 is notable. If the change were simply the aftermath of lockdowns, the peak share should be drifting back toward its pre-pandemic level. Instead it has moved further away, which is the pattern expected if hybrid working had become a stable arrangement and leisure and local trips had become a larger share of cycling (Caldarola & Sorrell, 2022; Greaves et al., 2024).

No detectable Monday and Friday effect

If hybrid working concentrates office attendance on Tuesday to Thursday, Monday and Friday cycling should have fallen relative to mid-week. Raw averages appear to show exactly that: comparing 2017–2019 with 2023–2025, the Friday cycling index fell from 101 to 90 of the weekday mean. Once site effects are controlled for, however, the pattern largely disappears (Figure 5). Fixed-effects estimates of the day-of-week profile were nearly identical before and after the pandemic. None of the four post-pandemic interaction terms was statistically distinguishable from zero (Tuesday −0.028, Wednesday −0.012, Thursday +0.008 and Friday +0.013, relative to Monday, with bootstrap standard errors of 0.019–0.023). The raw-data pattern came from different kinds of sites happening to be counted on different days.

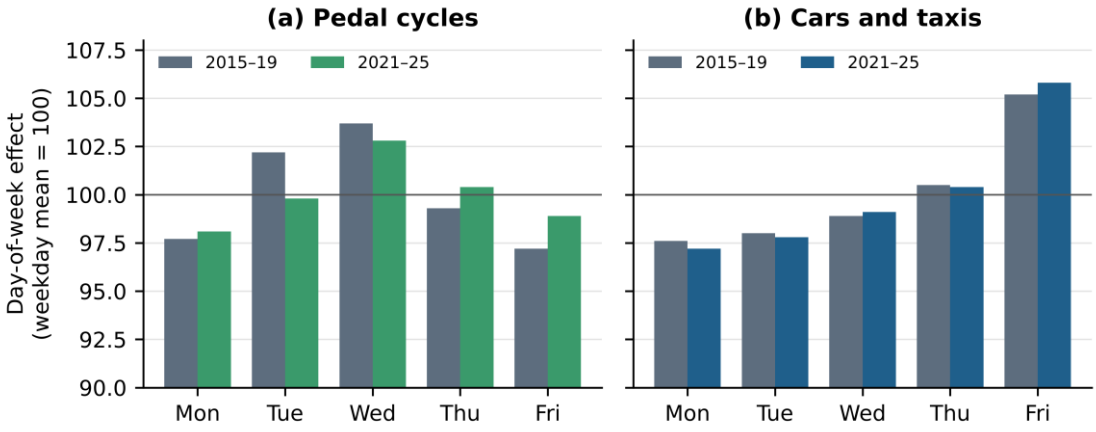


Figure 5. Day-of-week effects from a site fixed-effects model of log cycle and car flow, before (2015–2019) and after (2021–2025) the pandemic (weekday mean = 100).

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This null result is useful in its own right. It suggests that, at least on the roads counted, the hybrid-working effect operates through the time of day rather than the day of the week. People who do cycle to work still ride on all weekdays, while some have stopped commuting at all or now ride later.

Where cycling grew

The site-level model (Table 2) adds one more piece. Sites where motor traffic increased between 2019 and 2025 also tended to see cycling increase (β_1 = 0.31, SE 0.13). That is the opposite of a simple substitution story in which cyclists replace drivers on the same road, and it is more consistent with both modes responding to local growth in activity, such as new housing or employment. London sites gained about 0.55 log points more than sites elsewhere, holding the other variables constant. The convergence coefficient is negative, as expected, but it mostly reflects measurement noise at low counts rather than a real catching-up of quiet routes. Only 41% of matched sites recorded more cyclists in 2025 than in 2019.

Table 2. Site-level change in log cycle flow, 2019–2025 (n = 2,575)

Variable	Coefficient	Robust SE	p
Δ ln(1 + motor-vehicle flow)	0.309	0.127	.015
ln(1 + cycle flow, 2019)	−0.195	0.013	<.001
Rest of Great Britain (vs London)	−0.547	0.064	<.001
Trunk A-road (vs principal A-road)	−0.016	0.090	.862
Trunk motorway	−0.138	0.077	.074
B-road	0.514	0.085	<.001
Minor road (C/unclassified)	0.477	0.075	<.001
Constant	0.677	0.101	<.001
R^2	0.136		

Note. OLS with HC1 standard errors. Six principal-motorway sites are included in the model but not shown.

DISCUSSION

Persistence is real, but local

The national question ("did the boom last?") turns out to have two answers. Measured by volume on Britain's counted roads, cycling in 2025 was about 11% above 2019, and a fifth of the 2020 surge remains. That is broadly consistent with the DfT's modelled estimate of +1.2% for total road cycling (DfT, 2026a), once allowance is made for the heavier weight that London's busy cycle routes receive in a count-weighted index. Measured at the typical site, cycling is no higher, and probably lower, than before the pandemic. Both statements are true, and the gap between them is the story: cycling gains in Britain have become concentrated in a few places, London above all.

London is the main reason. The capital's persistence ratio of 0.76 stands out against 0.13 for the rest of Britain, and it is hard not to connect this with the scale and permanence of London's infrastructure response. That is what international studies would predict. Cities that kept and extended their pandemic infrastructure kept their gains (Buehler & Pucher, 2022; Kraus & Koch, 2021; Ortar et al., 2025; Young et al., 2024). The data cannot attribute London's persistence to any particular scheme, and other explanations are possible. London's

commuters are more likely to work in jobs suited to hybrid patterns, its public transport recovered more slowly, and congestion charging raises the cost of driving. But the contrast with the rest of the country is too large to ignore. Wales, which retained half of an exceptionally large surge, has had national active-travel legislation and investment since 2013, and it may be another case worth examining.

Cycling has changed its purpose, not just its volume

The shift away from the morning peak is the most robust result in this paper. It survives controls for site composition, road type, region, month and day of week, and it has deepened rather than faded since 2022. The fall in the 07:00 share is far larger for cycles than for cars, consistent with cycling being more sensitive than driving to changes in commuting. This matters for policy and for monitoring. Infrastructure is often justified by peak-hour commuter flows, and counts taken on the assumption that the morning peak is busiest may understate how much midday riding a route now carries. The decline in morning commuting by bike, if not offset elsewhere, also lowers the health and congestion benefits that commuter cycling delivers day after day.

What the counts cannot see

Manual counts on the road network miss off-road paths, parks, canal towpaths and many of the new protected routes built since 2020, which is where some of the pandemic's new cyclists may have gone. The flat or declining figures for principal A-roads may partly reflect riders choosing quieter, safer routes that are not counted. The counts are one day per site, weekdays only, and mostly in spring, summer and early autumn, so weekend leisure cycling, a large part of the 2020 boom, is invisible. Cycle counts at many minor-road sites are close to zero, which makes site-level change noisy. The chain-linked index also depends on the matched sites in each pair of years; small samples for some regions make their persistence ratios imprecise. These limitations argue for caution about levels, but they affect pre- and post-pandemic years alike, so the comparisons of change and of timing are more robust than any single year's estimate.

Implications beyond Britain

For cities in countries such as Nigeria, where cycling is mostly a mode of necessity rather than choice and dedicated infrastructure is scarce, the British evidence carries a clear message. Behaviour changes in a crisis, but it persists only where the physical environment makes the new behaviour easy. The pandemic produced a natural experiment: the same shock, almost everywhere at once, followed by very different outcomes depending on what was built. Where low-stress, connected routes were installed and kept (Alimo et al., 2026; Smith & Fu, 2025), gains lasted. Where they were not, cycling slid back to its former trajectory.

CONCLUSION

Five years after the pandemic, Britain's cycling boom has neither vanished nor endured. On counted roads, a fifth of the 2020 surge remains, almost all of it in London, where three-quarters persisted. Elsewhere, cycling is roughly where it was in 2019, and at the typical counted site it is no higher. The geography of cycling growth has narrowed to the capital, and its timing has shifted away from the morning commute toward the middle of the day. Day-of-week patterns, contrary to expectation, are unchanged. For policy, the lesson is that temporary disruptions create opportunities that only permanent infrastructure can hold. For monitoring, the lesson is that cycling now looks different from the commuter-dominated pattern around which counting programmes were designed.

Data availability

The raw count data are published by the Department for Transport under the Open Government Licence v3.0 at https://roadtraffic.dft.gov.uk/downloads. Analysis code is available from the author on request.

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