

Common Misconceptions of Active Travel Investment

A Review of the Evidence

LCWIP Strategic Support

July 2019



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About Sustrans

Sustrans is the charity making it easier for people to walk and cycle. We connect people and places, create liveable neighbourhoods, transform the school run and deliver a happier, healthier commute.

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1 Introduction

This research was carried out by the Sustrans Research & Monitoring unit between July and December 2018, on behalf of the Department for Transport (DfT) as part of strategic support provided under the Local Cycling and Walking Infrastructure Plan (LCWIP) programme.

A set of nine common myths about cycling and car infrastructure were agreed between the DfT and Sustrans for examination through this piece of research. Sustrans reviewed available evidence that is both in opposition to and in each myth. The purpose of this report is to enable a communications campaign to publicise evidence dispelling these nine commonly believed myths, and to support local authorities to make the case for increased investment in active travel infrastructure by providing robust information that can be used to influence stakeholders.

Sustrans carried out a desk-based review of appropriate government and academic sources to identify evidence relevant to each myth. Potential sources of evidence were quality assessed and only the strongest sources were included in this study.

Table 1: Quality assessment criteria

Quality assessment	Source	Location	Evidence type			Timeline
 Best quality	National Statistics	English towns and cities	Multiple locations	Counterfactual	Multiple measures	Most recent
	Peer reviewed academic literature	Other UK locations and London	Few locations		Few measures	
	Government sources					
	Research published with methodology	Industrialised towns and cities worldwide	Single location	No counterfactual	Single measure	Least recent

This report lists each of the myths and the best evidence that has been identified. The strength of evidence is a factor of the amount and quality of evidence in opposition to and support of each myth.

Each myth is reported in turn. There is a box showing the myth and a brief statistic or statement to refute the myth. Below that is a summary of the evidence and its quality. The quality of a piece of work is determined by the lowest of these categories applying to the evidence, rather than the highest or average. For example peer reviewed research that uses unreliable methods is still unreliable. An outdated National Statistic is considered outdated. Further information gives the full detail of the evidence.

Myth 1: There is no public support for investment in cycling infrastructure

Myth	Busted
There is no public support for investment in cycling infrastructure.	<p>75% of people would like to see more money spent on cycling in their city.</p> <p>The types of infrastructure people would find most useful are segregated on-road tracks (64%) and traffic-free cycling routes (60%).</p> <p>No study showing that the public do not support investment in cycling infrastructure has been found.</p>

Evidence

There is good quality evidence provided by the Bike Life survey that there is public support for investment in cycling, particularly for infrastructure that separates bicycles from other traffic and pedestrians. These results are supported by a 2017/18 government statistic in Northern Ireland, the Continuous Household Survey, showing that people are more dissatisfied with the provision for cycling than any other form of transport. High quality evidence from a survey of 400 cycling stakeholders in England shows that lack of funding and lack of political leadership are far greater perceived barriers to investment than public opposition.

Bike Life is an assessment of city cycling development including infrastructure, travel behaviour, satisfaction, the impact of cycling, and new initiatives with data collected from seven UK cities between May to July 2017. The seven cities include Belfast, Birmingham, Bristol, Cardiff, Edinburgh, Greater Manchester and Newcastle. A telephone survey¹ interviewed a representative sample² of 1,100 respondents aged 16 and above in each of the seven cities, with interview quotas set within each city in terms of age, gender, ethnicity, work status and population spread³. This was to ensure the representativeness of the core sample. The dataset provides a representative understanding of attitudes towards cycling across the seven cities, with all analysis weighted⁴ using mid-year population estimates from the 2011 Census.

In answer to the question “Whether or not you ride a bike, would you like to see more spent on cycling?”, the unweighted result across the cities was 75% in support (Sustrans, 2017), with 20% saying no more money should be spent, 2% saying the level of spending is about right, and 3% don’t know.

In answer to the question “How useful, if at all, would any of the following be to help you start cycling/cycle more?” in decreasing order of usefulness, the infrastructure was segregated cycle tracks (64% of people would find very useful), traffic-free routes (60%), painted cycle lanes (42%), shared pavements (37%), and bus lanes that allow cycling (32%).

¹ All interviews were conducted by telephone using random digit dialling combined with quotas (see footnote 2). The sample included an 85% landline / 15% mobile split. Average interview length was 15 minutes.

² Interview quotas were set within each city in terms of age, gender, ethnicity, work status and population spread (by local authority in Manchester, District Electoral Area in Belfast and ward in the other 5 cities).

³ Population spread was set by local authority in Manchester, District Electoral Area in Belfast and ward in the other five cities.

⁴ Four different weighting schemes were utilised in this project. All of the below weights were calculated using ONS statistics from the 2011 Census on age, gender, ethnicity, work status, and population spread by ward or local authority within each city.

Table 2 Bike Life 2017: How useful, if at all, would any of the following be to help you start cycling/cycle more? (Source: Sustrans, 2017)

Usefulness	More bus lanes that you can also cycle in (%)	More cycle lanes, painted on the road with a white line (%)	More cycle tracks along roadsides but physically separated from traffic and from pedestrians by kerbs or something similar (%)	More pavements shared with pedestrians you can legally cycle on (%)	More traffic free cycle routes away from roads through parks or along canals and former railway paths (%)
Very useful	32	42	64	37	60
Fairly useful	29	31	21	27	26
Not very useful	15	9	4	13	4
Not useful at all	20	15	9	21	8
Don't know	3	2	2	2	2

Together, this data indicates public support for more investment in cycling infrastructure, and that the infrastructure they would find most useful are segregated cycle tracks and traffic-free routes, both of which separate bicycles from motorised traffic.

Data from Northern Ireland also shows that people are more dissatisfied with the provision for cycling than any other form of transport, and that this dissatisfaction arises from the lack of cycle lanes. The Continuous Household Survey of people in Northern Ireland is a government statistic and last year (2017/18) included questions on satisfaction with walking, cycling and public transport (NISRA, 2018). The survey samples 9,000 households per year. The questions asked were different to those asked for Bike Life, but the results generally corroborate the Bike Life findings. An important aspect of this sample compared to Bike Life is that it includes many more residents of less populated and rural areas.

The Continuous Household Survey shows that people in Northern Ireland are least satisfied with the current situation for cycling and cyclists in their area (55% satisfied), compared to the current situation for walking (64% satisfied) and public transport (72% satisfied) (NISRA, 2018). The results on satisfaction with current cycling provision for urban and rural dwellers were 60% satisfied and 48% satisfied respectively. The reasons people gave for dissatisfaction were no cycle lanes (69%), too much traffic (42%) and traffic goes too fast (41%).

Table 3 CHS 2017/18 result: Why are you not satisfied with the current situation for cycling and cyclists in your local area at present? (Source: NISRA, 2018)

Response	All respondents (%)
No cycle lanes	69
Too much traffic	42
Traffic goes too fast	41
Personal safety - I don't feel safe cycling	34
Roads are too narrow	32
Poor street provision for cyclists / Unable to cycle on the street	26
There are no safe places to cycle such as greenways or parks	25
Poor quality cycle lanes	21
Poor lighting at night	20
No direct cycling links to where I want to get to	17
Not enough crossing points for cyclists	16
Cars parked in cycle lanes	16
Nowhere safe to leave your bike	14
Too many fumes from traffic	8
It's too hilly to cycle	7
Other	3

High quality evidence from a recent survey of 400 cycling stakeholders in England published in a journal showed that the far greater perceived barriers to investment are lack of funding and lack of political leadership.

Lack of funding and lack of leadership are seen as far bigger barriers to investment in cycling than lack of public support (Aldred *et al*, 2018). A recent study used an online survey to capture data from a purposive sample of over 400 stakeholders. Only a third of respondents said that public opposition was one of the top three barriers, compared to 67% who said funding was one of the top three barriers and 60% who said leadership. Only 7% of stakeholders said that public opposition was the top barrier to investment in cycling. This study shows that public opposition is unlikely to be the main barrier for a proposed scheme.

Table 4 Quantitative response to barriers to investing in cycling (rounded) (Source: Aldred *et al*, 2018)

Barrier (from eight pre-defined barriers)	Percent saying barrier 'top'	Percent saying barrier in 'top three'
Financial/funding barriers	36	67
Lack of political leadership	29	60
Public opposition	7	36
Lack of support within transport authority	5	27
Transport planning tools	4	19
Business opposition	4	17
Lack of technical expertise	2	16
Local media opposition	2	11

Myth 2: Road space reallocation to bicycles will bring urban areas to a grinding halt

Myth	Busted
Road space reallocation to bicycles will bring the city to a grinding halt.	<p>A three-metre wide lane can move 700 to 1,100 people per hour in cars, whereas for bicycles and walking this increases to 2000 to 6,500.</p> <p>Two weeks after opening, cycle superhighway corridors in London were moving 5% more people per hour than they could without cycle lanes.</p>

Evidence

There is published research on theoretical and modelled use of space, government sources stating that moving from car to cycling or walking eases congestion, and several case studies from industrialised cities showing that, on the whole, traffic speeds are maintained or improved from road space reallocation schemes. This evidence is indicative and may not hold in all cases, but the evidence also shows that congestion is not the only outcome of road space reallocation schemes. There are co-benefits (e.g. public realm improvements and mode shift) that can help meet additional local strategic priorities.

Cars are the least space efficient way of moving people and goods around. A 3 metre width lane can typically move 700 to 1,100 people per hour in a private motor vehicle (Bracewell, 2018). This increases to 2,000 to 3,000 persons per hour in a 2-way protected bike lane and 5,000 to 6,500 persons per hour on a sidewalk (Bracewell, 2018). Reallocating road space according to the most efficient transport modes will ease congestion by increasing the capacity of a corridor.

The congestion benefit of switching car journeys to bicycle is quantified in the Department for Transport's transport appraisal guidance (WebTAG), which contains information on marginal external congestion costs to estimate decongestion benefits resulting from mode switch away from car use (DfT, 2018). The marginal external costs of congestion under WebTAG are modelled based on the time lost relative to free flow traffic conditions, and include both individual costs (fuel and personal travel time) and external social costs. For London in 2015, the marginal external cost that represents the benefit of decongestion when car kilometre use is reduced is 62.1 pence per kilometre, at 2010 market prices (DfT, 2018). In 2020, the marginal external cost for decongestion is 81.0 pence per kilometre (ibid).

Over 70 case studies and the opinions of over 200 transport professionals suggest that it is rare that road space reallocation schemes cause substantial levels of congestion and disruption (Cairns *et al*, 1998)⁵.

Not every proposal for giving more space to buses, cyclist or pedestrians will be problem-free, but evidence suggests that if designed and implemented well, such as with a high quality resulting streetscape for all users or where alternative modes are made more attractive, they can be (Cairns *et al*, 2002).

A paper prepared for TfL on behalf of the Greater London Assembly on understanding and managing congestion makes two very pertinent statements: 'even in cases where allocation of space to walking and cycling reduces the capacity of an individual corridor, this may still be desirable if it supports city-wide modal shift to walking and cycling.' And 'a review of the research literature on cycling

⁵ This evidence is drawn from implemented schemes only.

interactions and potential contribution to traffic conditions and congestion highlights a general lack of understanding in this area, and one which in the absence of strong numeric evidence will also be poorly represented in traffic models' (Bradley, 2017).

In support of this latter statement, recent research into planning frameworks for urban space shows that it is possible to maximise space for bikes while maintaining the same level of service for cars but that it is not necessarily general practice (Burke & Scott, 2016).

Closing streets can lead to traffic evaporation, which is defined as a decrease in car traffic due to change in travel mode or reduced travel demand overall. A study looking at nearly sixty locations where road space had been reallocated from cars to other uses found these resulted in significant reductions in the total amount of traffic on the networks (Cairns *et al*, 1998). In these case studies, a behavioural response to the road space reallocation caused traffic evaporation as individuals make adjustments to their travel behaviour, causing large changes in traffic flows. The impact varies according to the scheme, with 14-25% of traffic not observed to be displaced onto neighbouring streets, as is commonly assumed.

There are multiple case studies from industrialised cities showing that changing car space to bicycle space does not adversely affect car travel times, and can improve them. There are only isolated examples of increased journey times for motorised traffic, and these were on specific routes that are part of a wider network where improvements in, or maintenance of, traffic speeds were measured.

Examples of the positive outcome on congestion of reallocation of road space to bicycles in a sample of cities is set out below.

London

London has been building segregated Cycle Superhighways since 2015. Five months after their launch there was a more than 50 per cent increase in the number of cyclists using the East-West and North-South Cycle Superhighways (TfL, 2016). Initial findings into the road space efficiency of Cycle Superhighway East West (CSEW) and Cycle Superhighway North South (CSNS) suggest that at peak times, the new cycling infrastructure moves an average of 46 per cent of people along the route at key congested locations, despite occupying only 30 per cent of the road space. Most importantly in relation to busting this myth, two weeks after opening, the CSEW and CSNS corridors were moving five per cent more people per hour than they could without cycle lanes, with capacity for more cyclists.

On the segregated Victoria Embankment Cycle Superhighway (CS3), during peaks, cyclists make up half of all vehicle traffic on this corridor despite occupying under a third of the space. Cycling numbers have increased by 54% since the opening of the scheme.

On Blackfriars Bridge (CS6), cyclists make up 70% of vehicles at the busiest times and cycling numbers have increased 55%.

On Vauxhall Bridge (part of CS5), cycling levels have increased by 73% in the year since the Superhighway was completed.

Among the many examples of Cycle Superhighways in London maintaining car journey times, there was one example of a slight increase in journey times on the road adjacent for Cycle Superhighway 5. The report states: "Inbound journey times for motor traffic in the morning peak are approximately 20 minutes, compared to [...] 15 - 20 minutes prior to works. In the evening peak, journey times are now about 15 minutes compared to [...] just less than 15 minutes prior to works. This has been achieved despite the removal of a traffic lane". This amounts to at most a 25% increase in travel time in the morning peak only.

Copenhagen

In Copenhagen, there are 230 miles of segregated cycle lanes, using just 7% of the city's street space. Some 41% of journeys to work or education are cycled (City of Copenhagen, 2017).

Dronning Louises Bridge is one of the busiest routes into central Copenhagen. Between 2009 and 2013 space for cars was reduced to increase the width of existing protected cycle lanes, alongside improvements to the pedestrian space and bus conditions. This led to an increase from 81,000 to 97,000 people using the bridge each day. Cycle use rose by 60%, walking by 165% and bus use by 5%. There was also an increase in the number of people visiting the bridge to socialise and the number of tourists enjoying the space.

New York

New York has undergone a period of street redesign in recent years involving a reduction in space for cars in order to create 30 miles of protected cycle lanes. Despite this reallocation speeds across the Central Business District remained steady (NYCDOT, 2014). On individual corridors within the district there were some rises in traffic speed, some stayed level, but in some cases there were falls in speeds during some of the daily peaks. Cycle trips increased by over fifty percent.

Myth 3: Removing car parking spaces will harm the local economy

Myth	Busted
<p>Removing car parking spaces will harm the local economy.</p>	<p>Retailers overestimate how many of their customers travel by car by a factor of 100%.</p> <p>Per square metre, cycle parking delivers five-times higher retail spend than the same area of car parking.</p> <p>Converting car parking spaces to seating and planting to improve 'place' impact can contribute to regeneration and improvement in retail performance. Removal of car parking spaces from a shopping street in Seattle was followed by a 400% increase in retail sales.</p>

Evidence

There is some evidence from peer-reviewed papers, reviews, and meta-analysis with studies that review multiple locations. Studies in Toronto, Graz and Bristol found that retailers overestimate how many of their customers travel by car by around double. One study found only a weak relationship between parking and retail vitality. In combination with appropriate case studies, there is a consistent message of either no negative impact (or positive impact) on retail from removing car parking spaces.

Many of the subject areas were outside of the UK, and have been limited to cities in developed countries for this report. A limitation of the evidence is that it is largely focused on the high street context.

Retailers over-estimate the contribution of drivers to footfall. In Toronto they thought 25% of customers arrived by car whereas in fact it was only 10%. (Smith Lea *et al*, 2017). The differences were 58% to compared to 32% in Graz, and 41% compared to 22% in Bristol (Sustrans, 2006). Many studies find those arriving to shop using sustainable modes of transport spend more per month than those who travelled by car (Clifton *et al*, 2013).

A review of the value of cycling for the Department for Transport found that per square metre, cycle parking delivers five-times higher retail spend than the same area of car parking (Rajé & Saffrey, 2016). The review drew on evidence from a study of a shopping strip within a suburb of Melbourne that combined evidence from a visitor intercept survey with mapping of uses of public space. Although people who drove a car spent more on average than those who rode a bike, the space efficiency of bicycles resulted in each square metre of space allocated to cars reaping AU\$6 an hour in expenditure, compared to AU\$31 per hour for space dedicated to cycle parking (Lee & March, 2010). A study of the City of Copenhagen (2013) found similar results. It estimated that eight bikes could be parked in one car parking space. One bicycle parking space potentially generated 4.5 times more retail revenue than one car parking space.

Parking doesn't have a clear impact on retail vitality (Marsden, 2006), seemingly holding low importance in determining a shopper's choice of place to shop. Drivers seem most likely to trade off price, convenience and duration of parking and express a willingness to change mode where this is available, before seeking an alternate shopping location. However, in situations where several other more important factors are similar between a town/city centre retail offering and an out of town/city

retail offering, removing parking in the town/city centre could lead shoppers to using out of town/city option, dis-benefiting local businesses.

A meta-analysis of over twenty research studies of the impact of pedestrianisation and traffic calming on retailing in the UK and Germany concludes that such measures generally have a positive impact (Hass-Klau, 2014). Car parking availability and price do not seem to impact on shop vacancy rates, according to a study of six Midlands towns in 1994, which showed that “parking provision does not have an influence on whether shops close or remain trading”. The overall quality and attractiveness of the centres had more impact on trade (Mason, 1994).

Newcastle

In 2015, Acorn Road in Newcastle was converted through road space reallocation from a two-way street, to a layout involving two-way access for cycling and one-way access for motor vehicles. The implementation involved removing 20 car parking spaces. Local business owners were initially concerned about loss of trade as a result of the scheme, but have found that the environment has resulted in an improved atmosphere for business with better access for pedestrians and cyclists (Sustrans, 2017). Out of a total sample of 500 people, 77% agreed with the statement that ‘Acorn Road is a thriving retail area’ after the introduction of the traffic calming features (Clarkson, 2018).

Seattle

Removing 12 car parking spaces and installing a climbing lane for bicycles on a hilly street in a neighbourhood business district in Seattle did not have a negative economic impact, with an indicator of retail sales showing a large increase in sales (400%), whereas a control street and area-wide saw little change (Rowe, 2013). The author states that without modal split before and after it is not possible to conclude that the bicycle access was the cause of the economic change, but it is clear that the change did not have a negative impact.

At another site in Seattle, conversion of space for cars to cycle infrastructure resulted in no economic difference with comparison sites.

New York

New York has undergone a period of street redesign since 2007 to allocate more space to people, whether travelling by bus, bike or on foot. In Brooklyn, they turned (underused) car parking spaces into seating and planted areas. Here, in the following three years, retail went up 170%, outperforming adjacent areas (Sadik-Khan, 2013).

Myth 4: Closing streets to cars will harm the local economy

Myth	Busted
Closing streets to cars will harm the local economy.	<p>Retailers overestimate how many of their customers travel by car by a factor of 100%.</p> <p>Shop vacancy rates are five times higher on streets with high levels of traffic</p> <p>Retail turnover in pedestrianised areas generally outperforms non-pedestrianised areas.</p>

Evidence

There is some convincing evidence that pedestrianisation generally has a positive or neutral effect economically, but only some of the evidence is good quality with some data over a decade old. More recent studies in Toronto, Graz and Bristol find that retailers overestimate how many of their customers travel by car by around double. Older studies find that shop vacancy rates increased as traffic levels increased (Wiggins *et al*, 1992) and pedestrianisation of shopping areas in the UK and Germany have had similar positive outcomes on overall trade and turnover (Lane, 2001).

The most commonly used measures of economic activity are pedestrian flow (a good economic indicator when combined with another indicator), retail turnover, business costs (e.g. market rent), business profits and the number of vacant premises (Lane, 2001). Only some of the evidence is good quality, using comparator streets/areas and more than one indicator of economic vitality and some data over a decade old. The best examples are shown here. Many studies show or describe that benefits may follow a one to two year lag (Hass-Klau, 1993; Lane, 2001, among others).

There have been several studies showing that traders generally overestimate how many of their customers arrive by car. Retailers over-estimate the contribution of drivers to footfall with a perception of 25% of customers arriving by car but the reality was 10% in Toronto (Smith Lea *et al*, 2017), 58% vs. 32% in Graz, and 41% vs. 22% in Bristol (Sustrans, 2006). Many studies (Bent and Singa, 2008; Trendy Travel, 2010; Fietsberaad, 2011; Transport for London, 2011; Transportation Alternatives, 2012) find users of sustainable modes spend similar or more per month than those who travelled by car (Clifton *et al*, 2013)⁶.

There was a strong association between vacancy rates and motorised traffic flow in Leicester, with shop vacancy rates increasing as the level of traffic increased (Wiggins *et al*, 1992). Retail property vacancies on streets that had zero vehicles per hour had a vacancy rate of 3%, fewer than 200 vehicles per hour had a vacancy rate of 6%, 200-500 vehicles per hour was 10%, and over 500 was 15%.

One study looked at changes in UK rents in prime pedestrianised and prime vehicular shopping streets and found that on average the rates of rental growth were not different between the two shopping street types (Lewis, 1995), indicating there was no harm to the local economy from closing streets to cars across the UK.

⁶ Clifton *et al*. cites the following studies as evidence that automobile-based consumers spend more per trip, but when frequency is accounted for, non-automobile customers spend similar or greater amounts: Bent and Singa (2008), Trendy Travel (2010), Fietsberaad (2011), Transport for London (2011) and Transport Alternatives (2012).

A Berlin Research Institute of Trade survey of 1,800 business that had introduced pedestrianized areas in 11 German towns between 1967 and 1970 showed that eight years after pedestrianisation business turnover had outperformed non-pedestrianised areas. Retail and restaurants saw the greatest benefit, and hotels less so. The methodology was robust including a counterfactual comparison of performance (Lane, 2001). The same study showed that business costs increased faster in pedestrianised than non-pedestrianised areas, which could also indicate a healthier economy in the latter. Businesses in pedestrianised areas had a greater percentage of businesses reporting an increase in profits than non-pedestrianised areas, and slightly fewer reporting a decrease in profits.

Retailers in towns and cities in England in 1989 indicated that on the whole their trade had increased as a result of pedestrianisation measures that created more space for the pedestrian and a more attractive streetscape (described in Lane, 2001). Pedestrianisation of shopping areas in the UK and Germany have had similar outcomes on retailing. There is generally a positive effect for those shops inside the pedestrianised area, and for landlords who are able to increase rent. The more ambitious schemes tend to have the most positive benefits. However, there can be a transition period of 1-2 years (Hass-Klau, 1993).

Oxford city centre was pedestrianised in 1999. The local economy experienced a period of difficult trading around the time of implementation, and there was a 17% reduction in car trips to the centre, which did not affect overall visitor numbers (Parkhurst, 2008).

Exeter

Between 2000 and 2010 Exeter City Centre removed traffic from several streets and invested in the public realm (e.g. increase in pedestrian and shared spaces, seating, public art, high quality paving) of existing shopping areas, during development of the new Princesshay shopping centre. Between 2002 and 2010 there was an increase in footfall of around 30% across these shopping areas. In addition, the retail rent in these shopping areas increased from £220 per square foot in 2006 to £225 per square foot in 2008, compared with declining rents in towns in the region (Sinnott *et al*, 2011).

Brighton

Following the redesign of New Road, a busy commercial street in Brighton, into a shared space, there was a 93% reduction in traffic volume, with research participants from the business community being in unanimous agreement that the scheme had benefited their businesses (Sinnott *et al*, 2011).

Herne Hill, London

Part-pedestrianisation of the shopping street Railton Road between 2010 and 2012 included the introduction of a Sunday market and promotional activities. Six months after the changes, the majority of survey respondents said that they shopped and used services more often (72%), and spent more on each trip (62%). Of local businesses surveyed, 92% thought the changes had been worthwhile. 38% thought people spent more and only 11% thought people spent less (SRA, 2012).

The Hague

In 2009 the Hague in the Netherlands closed part of the city centre to motorised traffic and reallocated space to walking and cycling. Following implementation the areas saw a lower increase in retail property vacancies and lower fall in the number of passers-by than in comparator cities during a period of recession. Rent prices rose faster than elsewhere. (Tiemens and Molenaar, 2014).

Myth 5: Our streets are too narrow to accommodate cycle lanes

Myth	Busted
Our streets are too narrow to accommodate separated cycle infrastructure.	<p>Design decisions should reflect the characteristics of particular streets. Many streets can accommodate high quality cycling infrastructure by removing car parking, or making streets one-way to motorised traffic.</p> <p>On narrow streets, reducing traffic volume and speed can mean no special infrastructure is required.</p>

Evidence

The evidence here is from Transport for London's cycling infrastructure design standards and guidance, and focuses on solutions for when streets are too narrow to accommodate separated cycle infrastructure. In these cases, there are still ways to improve the experience of cycling on that street through traffic calming or road space reallocation.

The degree of separation required between people cycling and motorists, to provide good quality cycle infrastructure that is accessible to a wide range of users, depends on the characteristics of particular streets. (TfL, 2014) (Updated LTN replacing LTN 2/08 in 2019).

Where motor traffic speeds and volumes are above a certain level the majority of people will be put off cycling unless there is fully protected, separated infrastructure.

Where a street is not wide enough to accommodate separated cycle infrastructure two options should be considered:

- 1) Can the motor traffic speed and volume be reduced to a level at which the majority of people cycling will feel comfortable mixing with the motor traffic? Reducing motorised traffic speed and volume along with other measures can increase an area's sense of place, which will improve how people use and enjoy the space. This can be achieved through:
 - Reducing motor traffic volumes by implementing area-wide measures to reduce the permeability of streets to motor traffic.
 - Reducing motor traffic speeds by implementing area-wide traffic calming measures.

- 2) Can the space in the street be allocated in a more efficient way to reflect the needs of all people using the street, and so provide space for separated cycling infrastructure? This may be achieved through:
 - Reducing the width of the motor traffic lanes. In many situations lane widths of 3.0 or 3.25m may be sufficient for urban streets.
 - Reconfiguring the road network to enable roads to be closed to motor traffic in one or both directions.
 - Removing on-street parking. Questions should be asked around who is the parking for, why is the parking needed? (see Myth 3)

When providing infrastructure for cycling consideration should be given to the impact on pedestrian facilities, for movements both along and across a street. It is rarely, if ever, appropriate to remove

space from the footway to accommodate cycling infrastructure. A user hierarchy is commonly applied when designing streets with pedestrians at the top, to be considered first in any road design, followed by cyclists (Department for Transport, 2007).

Similarly, providing shared use space for walking and cycling will rarely provide high quality infrastructure for either cyclists or pedestrians. Shared space does not involve a specific set of features or street layout, but typically involves reduced separation between people and vehicles in a way that seeks to reduce vehicle dominance and promote equality between motorised transport and people walking and cycling (Scottish Government, 2010; Department for Transport, 2007). Combined use of a space by people and vehicles is not suitable for all spaces. Shared space schemes without appropriate traffic restraint and speed-reducing measures can increase danger and exclude vulnerable groups (Scottish Government, 2010), making a space less accessible and less supportive of people walking and cycling.

Myth 6: Cycling is not safe

Myth	Busted
Cycling is not safe.	<p>The safety of cycling is determined by the conditions in which people have to cycle. Most cyclist casualties (77%) occur on 30 mph roads, which is a strong argument for reducing traffic speeds where people want to cycle.</p> <p>Cycling is not inherently unsafe. This is demonstrated by the difference in fatality and injury rates between Denmark where 17% of all trips are made by bicycle, and 9 out of 10 Danes own a bicycle and the UK. Denmark's cyclist fatality rate is half that of Great Britain.</p> <p>High quality cycling infrastructure is vital to reduce road dangers for people cycling, and improve the perception of safety to attract more people (and types of people) to cycle.</p>

Evidence

Cycling is not an inherently unsafe activity. Casualty rates from Great Britain data under Stats 19 provide an objective measure of actual cyclist safety; per mile travelled pedestrians are more likely to suffer a fatality than cyclists, although cyclists' risk of injury is three times higher. The risk for both fatalities and casualties is higher for motorcyclists. The safety of cycling in the UK is determined by road conditions. Both actual and perceived safety levels are improved by investment in high quality infrastructure, shown by Canadian studies in Toronto and Vancouver and the UK Bike Life survey.

In terms of actual risk, per mile travelled pedestrians are more likely to suffer a fatality than pedal cyclists. However, pedal cyclists' risk of injury is three times higher than pedestrians'. The casualty and fatality rate for motorcyclists is higher than that of both pedestrians and pedal cyclists. Pedal cyclist fatalities have fallen by 30% since 2006 (although in the same time frame, car occupant fatalities have fallen by 49%, and pedestrian by 34%) (DfT, 2018). Most cyclist casualties (77%) occur on 30 mph roads (ibid.), which is a strong argument for reducing traffic speeds where people want to cycle. There is a clear reduction in cycling injury rates on 20 mph roads compared to 30 mph roads, and there is a relationship between motor traffic volumes and cycling injury risk, suggesting that reducing motor traffic volumes would reduce pedal cyclist injury risk (Aldred *et al*, 2018) as well as benefitting other vulnerable road users.

Table 5 Casualty and fatality rates per billion passenger miles by road user type: GB, 2017 (Reproduced from "Reported road casualties in Great Britain: 2016 annual report" Department for Transport, 2018)

Road User Group		Fatality rate (per billion passenger miles)	Casualty rate (per billion passenger miles)
Vulnerable road users	Pedestrians	35.6	1,801
	Cyclists	30.9	5,604
	Motorcyclists	116.9	6,043
Car occupants		1.9	238

High quality cycle provision, like protected or segregated cycle lanes, help to make cycling safe. In Toronto and Vancouver, protected bike lanes with physical barriers separating cyclists from other traffic had one ninth the risk of cyclist injury compared to streets with parked cars and no specific cycle infrastructure. Bike lanes on major streets with no parked cars, and off-street bike paths had nearly half the risk of cyclist injury compared to major streets with parked cars and no cycle infrastructure (Teschke *et al*, 2012). One third of the bicycle accidents in Vancouver and Toronto were collisions with motor vehicles, and the resulting injuries were more severe than in other crash circumstances, indicating the importance of separating cyclists from motor vehicle traffic (Cripton *et al*, 2015). Infrastructure that minimise slopes, have lower vehicle speeds, and that are designed for bicycling rather than shared with pedestrians reduce the risk and severity of cycle injuries (ibid.).

New York

Between 2000 and 2012, 470 miles of bicycle routes were added to the streets of New York. The city experienced a 72% fall in the risk of serious injury experienced by cyclists in New York, despite a three-fold rise in the number of bike trips. (NYCDOT, 2013).

The quality of cycle infrastructure is an important factor in determining people's perception of the safety of cycling, too. Based on data from the seven Bike Life 2017 cities 77% of residents felt that safety needed to be improved for cyclists, and 64% of residents said they would cycle more if more cycle routes, physically separated from traffic, were created (Sustrans, 2017). On a sample of protected cycle lanes in five US cities, 96% of cyclists felt safer cycling on the street as a result of there being protected lane provision (Monsere *et al*, 2014), suggesting that protected cycle lanes have a large impact on the perception of cycling safety. Women are more likely than men to express a desire for segregated routes (Sustrans, 2017).

London

Cycling in London has continued to grow, with average increases in cycling levels of 5.8% per year between 2000 and 2017, and an overall increase of 24% between 2012 and 2017. Simultaneously, there has been a significant decrease in the risk of being killed or seriously injured while cycling in London since 2000 (TfL, 2018). Since 2016, there has been a doubling of the amount of protected cycling infrastructure built in the capital across the Superhighways, Quietways & Central London Grid and mini-Holland programmes and selected other schemes (GLA, 2019). The evidence from London shows the importance of high-quality infrastructure for both increasing cycling trips and improving cyclist safety.

The Continuous Household Survey of people in Northern Ireland is a government statistic and last year (2017/18) included questions on satisfaction with walking, cycling and public transport (NISRA, 2018). The survey samples 9,000 households per year. In the survey, respondents were asked about whether they would cycle a journey of distance up to three miles. Only 17% said yes. The reasons given for not doing so were not owning a bike (54%), followed by too much traffic / too dangerous (27%). Two of the top three reasons are related to interaction with motorised traffic.

Table 6 CHS 2017/18 result: Which of the following options, discourage you from cycling short journeys of up to 3 miles/5kms? (Source: NISRA, 2018). Top 10 reasons only, full table available from NISRA.

Response	All respondents (%)
Don't own / have access to a bicycle	54
Too much traffic / too dangerous	27
Motorists driving without consideration of cyclists	21
Bad weather	19
Lack of cycle lanes / poor cycling infrastructure	18
Poor road conditions, e.g. potholes	16
My health or mobility makes cycling difficult or impossible	14
No room to carry things on bicycle (e.g. shopping, work related items)	11
I'm not the type of person who rides a bicycle	10
Takes too long - the car is quicker	9

Cities with high levels of cycling tend to have lower casualty rates (ECF, 2012). Modelling of the year 2030 UK urban environment in which there was increased cycling and walking found there was an overall reduction in road traffic injuries in all cases, with the scenario where car traffic was significantly reduced bringing the highest benefits compared to scenarios where car use was maintained or where public transport increased (Woodcock *et al*, 2013).

Countries with higher cycling rates tend to have lower fatality rates. The table of data below shows that the Netherlands and Denmark (where the rate of cycling per person is much higher than the UK) have less than half the UK rate of cyclist fatalities.

Table 7 Cycle distance travelled and fatality rates in European countries, reproduced from ECF, 2010

Country	Cycle use (km per person per year)	Cyclist fatality rate (per billion km cycled)
Spain	20	105
UK	75	29
France	75	61
Netherlands	848	15
Denmark	936	12

Another way of framing the safety argument is to determine whether the health benefits outweigh the risks to health. The life years gained due to the health and fitness benefits of cycling in Britain outweigh the life-years lost through injuries by a factor of around 20:1 (Hillman, 1993). Cycling and walking are recommended by NICE (National Institute for Health and Care Excellence) as a public health intervention (NICE, 2018). A recent evidence review on active travel and physical activity finds strong and substantial evidence that active travel interventions are effective at increasing physical activity, with 61 out of 84 identified interventions effective (Sport England and Sustrans, 2019). Public Health England (PHE) has established there are important health gains to increasing walking and cycling at the population level, for improved metabolic health, reduced risk of premature mortality, reduced risk factors for a number of diseases and improved mental health and wellbeing (PHE, 2018).

Myth 7: Investing in road building always makes the most economic sense

Myth	Busted
Investing in road building always makes the most economic sense.	<p>There are published ex post evaluations of active travel schemes that show better value for money than road schemes.</p> <p>Road projects produce returns of £3 to £5 for every £1 spent.</p> <p>Walking and cycling schemes produce returns of £4 to £19 for every £1 spent.</p>

Evidence

Ex post evaluations⁷ of road schemes claim to demonstrate that schemes have met their economic aims, but a review by Sloman (2017) investigates these studies further and refutes this. There are published ex post evaluations of active travel schemes that show better value for money than road schemes.

Impact evaluation of transport schemes is often poor quality. However, a meta-analysis of good quality evaluations concluded that in general, transport can have a positive impact on the local economy, although the role of transport in stimulating growth is not as clear-cut as assumed by many decision makers as the impact depends on the size of the local population and whether the project is urban, suburban or rural (WWCLEG, 2015). There is some evidence that road schemes can positively impact local employment (but the effects are not always positive and a majority of evaluations show no (or mixed) effects on employment) (WWCLEG, 2015). Road projects may increase new business entry, but this does not necessarily increase the overall number of businesses since new arrivals may displace existing firms (WWCLEG, 2015). Road projects tend to have a positive effect on property prices, but the effects depend on distance to the road and can vary over time (WWCLEG, 2015). There is some evidence that road projects have positive effects on wages/income (one study) and productivity (two studies) (WWCLEG, 2015).

The economic growth (local and national) argument is often included in the case for new road-building schemes, but the empirical evidence does not clearly establish this (Melia, 2018). It is more appropriate to view transport investment as a facilitative factor, responding to the mobility needs of economy and society than as the cause of economic growth (Melia, 2018).

The value for money of transport schemes is appraised through cost benefit analysis. An attempt is made to monetise all impacts of a scheme and produce a benefit cost ratio (BCR). In reality it is very hard to monetise some impacts. The non-monetisable elements of a cycling scheme BCR include other positive benefits: schemes frequently provide improvements to severance⁸, security, and accessibility or travel options available.

Among major schemes, A-roads and motorways, delivered by Highways England (in England) only widening schemes are estimated to have a 'very high' BCR (greater than 4:1), with other scheme types averaging a BCR of 'high' (between 2:1 and 4:1) (Highways Agency, 2013). Please note that

⁷ Value for money of transport schemes is calculated before the event (ex ante) in order to create the case for investment and in some cases is also calculated afterwards based on usage data (ex post). The better data comes from ex post evaluation, but both methods involve forecasting over a number of years (usually 30).

⁸ Severance refers to the physical or psychological separation of urban areas i.e. neighbourhoods

the evidence in this section only applies to Highways England roads on the Strategic Road Network, not local roads that local authorities directly invest in.

Post Opening Project Evaluation (POPE) studies are undertaken by Highways England for all major schemes at one and five years after opening to identify the extent to which the expected impacts of highway schemes have occurred. POPE shows that journey time benefits are the key monetary benefits of major road-building schemes (ibid.). The POPE studies and meta-analysis published by Highways England were reviewed on behalf of the Campaign to Protect Rural England (Sloman *et al*, 2017), in addition to four case studies that reviewed longer terms impacts (up to 20 years after scheme opening).

Actual evidence of economic impacts was non-existent or weak in the majority of cases, and was mixed where evidence was present. In addition to economic impacts, the review showed that building roads induced traffic, and the longer intervals of the case studies showed that induction increased over time (ibid.). This induction would nullify much of the expected economic impact.

Furthermore, evidence submitted to parliament on the UK’s experience of road-building finds that schemes often cost considerably more than estimated and are delivered later than planned (House of Commons, 2007). This evidence is supported by a meta-analysis of Highways England Major Projects, showing that outturn value for money assessments are below forecasts, with only 72% of all schemes achieving high value for money, 19% less schemes achieving this compared to forecasts (Highways England, 2016). Additionally, 89% of major road-building projects included in the Highways England evaluation had outturn costs higher than estimated. This indicates a pattern of outturn economic performance being lower than anticipated for major road-building schemes.

The table gives a summary of BCRs for different types of transport schemes⁹. Road schemes range between 3.1 and 5.1. Cycling schemes range between 4.7 and 32.8.

Table 8 Benefit cost ratios for transport schemes (Sources are foot noted)

Scheme Type	Mode(s)	Delivery body	BCR	Rating	Before/after
HS2 ¹⁰	Rail	High Speed Two (HS2) Ltd	2.3	High	Ex ante
Motorway upgrade ¹¹	Road		3.1	High	Ex post
Junction improvements ¹¹	Road		3.6	High	Ex post
Bypass ¹¹	Road		3.7	High	Ex post
Road widening and other online improvements ¹¹	Road ¹²		5.1	Very high	Ex post
Local Sustainable Transport Fund ¹³	Cycling	Local authorities	2.0 to 8.0 ¹⁴	High	Ex post
Cycling Demonstration Towns ¹⁵	Cycling ¹⁶	Local authorities	4.7 to 6.1	Very high	

⁹ These benefit-cost ratios reflect highway or motorway roads and may not reflect the full range of BCRs observed on other types of roads (e.g. local roads).

¹⁰ HS2 (2019)

¹¹ Highways Agency (2013)

¹² Many of these are motorway schemes

¹³ DfT (2015)

¹⁴ An assessment of twelve large schemes found that the average BCR was 5:1. (DfT, 2015)

¹⁵ Same as footnote 12: DfT (2015)

¹⁶ Mix of infrastructure and behaviour change interventions

Scheme Type	Mode(s)	Delivery body	BCR	Rating	Before/after
Cycle City Ambition Grant ¹⁵	Cycling	Local authorities	5.0 to 6.0	Very high	
Connect2 ¹⁷	Cycling and walking	Sustrans	6.3	Very high	Ex post
Linking Communities 2012/13 <small>Error! Bookmark not defined.</small>	Cycling and walking	Sustrans	3.7 to 32.8 ¹⁸	Very high	Ex post
Linking Communities 2013/4 ¹⁹	Cycling and walking	Sustrans	7.6	Very high	Ex post
Mix of walking and cycling schemes from across the UK ²⁰	Cycling and walking	Mix of delivery agents	5.6	Very high	Ex post

A report aiming to provide advice on the best value for money for transport spending on the basis of benefit cost ratios, concluded that the first £2 billion should be spent on small, relatively cheap projects aimed at local safety schemes, smarter choices, cycle improvements and some quality improvements to bus services (Goodwin, 2010). The report states “spending on these schemes is not yet sufficiently ‘on the agenda’ in proportion to their potential benefit, or in other words spending on these is being displaced by poorer value, but higher profile, infrastructure projects”. The calculated economic benefits from this £2 billion will be in the order of £10 billion to £30 billion, as compared with benefits of £3 billion to £4 billion which would be available from average infrastructure schemes which pass current BCR tests.

¹⁷ Sustrans (2014)

¹⁸ The average BCR across the programme was found to be in excess of 10:1 (DfT, 2015).

¹⁹ Sustrans (2016)

²⁰ Davis (2014)

Myth 8: People don't support road space reallocation to bicycles

Myth	Busted
People don't support road space reallocation to bicycles.	78% of residents in UK cities support building more protected roadside cycle lanes, even when this could mean less space for other road traffic.

Evidence

There is good quality evidence provided by the Bike Life survey that there is public support for reallocation of road space for cycle infrastructure. The Bike Life results are supported by a 2018 survey of urban Canadians, carried out by an independent research institute, in a representative randomised sample who said that separated bike lanes are a good thing, and that there are too few where they live.

Bike Life is an assessment of city cycling development including infrastructure, travel behaviour, satisfaction, the impact of cycling, and new initiatives with data collected from seven UK cities between May to July 2017. The seven cities include Belfast, Birmingham, Bristol, Cardiff, Edinburgh, Greater Manchester and Newcastle. A telephone survey²¹ interviewed a representative sample²² of 1,100 respondents aged 16 and above in each of the seven cities, with interview quotas set within each city in terms of age, gender, ethnicity, work status and population spread²³. This was to ensure the representativeness of the core sample. The dataset provides a representative understanding of attitudes towards cycling across the seven cities, with all analysis weighted²⁴ using mid-year population estimates from the 2011 Census.

When asked about the creation of more roadside cycle lanes, the unweighted²⁵ result across the cities showed 78% in support (tend to support and strongly support). Some 15% opposed (tend to oppose and strongly oppose). Of those people in the seven cities who do not ride a bike, 74% of people were in support which shows that it is not only people who ride bikes that would like the segregated infrastructure.

Table 9 Bike Life 2017: To what extent do you support or oppose the creation of more roadside cycle lanes? These are physically separated from traffic and pedestrians by kerbs or something similar, and can mean less room for other road traffic? (Source: Sustrans, 2017)

	Support (%)	Strongly support (%)	Tend to support (%)	Neither support or oppose (%)	Tend to oppose (%)	Strongly oppose (%)	Oppose (%)	Don't know (%)
All 7 Bike Life cities	78	42	36	5	8	7	15	2

A 2018 survey of urban Canadians conducted by the Angus Reid Institute showed that 65% of those surveyed thought separated bike lanes were a good thing. 64% of car drivers and 85% of cyclists

²¹ All interviews were conducted by telephone using random digit dialling combined with quotas (see footnote 2). The sample included an 85% landline / 15% mobile split. Average interview length was 15 minutes.

²² Interview quotas were set within each city in terms of age, gender, ethnicity, work status and population spread (by local authority in Manchester, District Electoral Area in Belfast and ward in the other 5 cities).

²³ Population spread was set by local authority in Manchester, District Electoral Area in Belfast and ward in the other five cities.

²⁴ Four different weighting schemes were utilised in this project. All of the below weights were calculated using ONS statistics from the 2011 Census on age, gender, ethnicity, work status, and population spread by ward or local authority within each city.

²⁵ Each city's data was weighted to be representative of the city. The unweighted average of these was used to refer to all cities.

thought separated bike lanes were a good thing. 46% of people surveyed thought there were not enough segregated bike lanes where they lived, and only 17% of people thought there were too many. These results were taken from a representative, randomized sample of 5,423 Canadian adults who are members of the Angus Reid Forum between the 6th and 15th March 2018.

Table 10 Bike Lanes: For the last several years, cities and towns across Canada have been building separated bike lanes on major roads in their jurisdictions. Some people say these lanes are a good thing because they make roads safer for cyclists, which encourages more people to use bikes for transportation. Other people say these lanes are a bad thing because they take up road space that could be used by cars, leading to greater traffic congestion. Which of these perspectives is closer to your own – even if neither is exactly how you feel? (Source Angus Reid, 2018)

	Separated bike lanes are a GOOD thing (%)	Separated bike lanes are a BAD thing (%)	Not sure/Can't say (%)
Urban Canadians	65	17	18

Table 11 Bike Lanes: Let's think about separated bike lanes – that is, dedicated paths for bicycles that are separated from the rest of the roadway by some kind of physical barrier, such as a curb, fence, or vegetation. How would you describe the number of separated bike lanes where you live? Would you say there are... (Source: Angus Reid, 2018)

Sub-sample	Too many separated bike lanes (%)	About the right amount (%)	Too few separated bike lanes (%)
Urban Canadians (excluding those who chose "not applicable...")	17	37	46
Urban Canadians who ride a bicycle multiple times per week	6	33	61
Urban Canadians who drive cars multiple times per week	17	39	44

Myth 9: Cycling infrastructure is expensive

Myth	Busted
Cycling infrastructure is expensive.	<p>High specification cycling schemes cost £1.3 million per kilometre on average.</p> <p>Road schemes cost around £50 million per kilometre. The HS2 rail scheme is predicted to cost £77 million per kilometre.</p> <p>As well as relatively low capital outlay compared to other types of transport investment, cycling and walking schemes have high benefit to cost ratios making them better value for money.</p>

Evidence

There is evidence from construction schemes that high specification cycling schemes cost considerably less per kilometre than road schemes.

Improvements to cycling and walking infrastructure involve low capital outlay compared to other types of transport scheme improvement such as public transport and roads. Costs of cycling and road schemes are summarised in the table.

Actual costs of capital cycle schemes funded by the Cycle City Ambition Grant were £1.15-1.45 million per kilometre for a two-way physically separated cycle superhighway; £0.46-0.88 million per kilometre of mixed strategic cycle route; and £0.14-0.19 million per kilometre to resurface a route (e.g. towpath) to make it suitable for cycling (Taylor & Hiblin, 2016).

The average cost of construction for Community Links (Scotland) and Linking Communities (England) in 2012-2013 was approx. £104,000 per km and per scheme was approx. £128,000 (Sustrans, 2016). For comparison, the same reference lists some example road scheme costs as £56 million per kilometre (for the M47), and £23 million per kilometre on the M8/M73/M74 (see Table 12).

Once capital projects have been implemented, operating maintenance costs per bicycle or pedestrian kilometre are likely to be several orders of magnitude smaller than for motorised transport (DTMR, 2011).

Table 12 Costs per kilometre and cost of a scheme for transport infrastructure projects (Sources are foot noted)

Scheme ²⁶	Cost (£ million) per scheme	km	Cost per kilometre (£ million)
Cycling / Cycling and Walking			
Cycle Superhighway (CCAG) ²⁷			average 1.30
Mixed strategic cycle route (CCAG) ²⁷			average 0.67
Resurfacing (CCAG) ²⁷			average 0.17
Community Links / Linking Communities ²⁸	0.128		average 0.10
Road / Rail			
Road Investment Strategy schemes ²⁹	190		
Forth Bridge replacement (Road) ³⁰	1,600	2.7	592
M47 (Road) ³⁰	445	8	56
M8/M73/M74 (Road) ³⁰	415	18	50
HS2 Phase 1 (Rail) ³⁰	17,160	224	77
M4 relief road (proposed)	1,000	22.5	44

²⁶ These costs do not include local road scheme costs, as the data available for this research was based on highway or motorway roads.

²⁷ Taylor & Hiblin (2016)

²⁸ Sustrans (2016)

²⁹ DfT (2015)

³⁰ Sustrans (2017)

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