Department for Transport

# Analyses from the National Travel Survey

## About this release

The National Travel Survey is a household survey of personal travel by residents of England travelling within Great Britain, from data collected via interviews and a one week travel diary.

The NTS is part of a continuous survey that began in 1988, following ad-hoc surveys from the 1960s, which enables analysis of patterns and trends.

Some key uses of the data include describing patterns, for example how different groups of people travel, monitoring trends in travel, including: sustainable modes; assessing the potential equality impacts of transport policies on different groups; and contributing to evaluation of the impact of policies.

## This publication presents three pieces of analysis using National Travel Survey data, demonstrating the breadth of information available from the NTS.

They include an exploration of the relationship between road safety and healthy mobility; a look at how commuting modes vary across England; and an exploration of driving patterns during the hours of darkness.

### Key findings:

- If half of the all short trips currently carried out by car were replaced with walking and cycling, and considering the effect of "Safety in Numbers", it is estimated that an increase in pedestrian and cyclist casualties would be mostly offset by a fall in car occupant casualties.
- Estimating the relationship between changes in mode type used for short trips, and casualties from different modes, is very sensitive to what you assume about the concept of "Safety in Numbers" for cyclists.
- The majority of workers use the same mode for their commuting trips. This proportion has been growing over time.
- The lack of variability in people's commuting mode suggests that many commuters in England would not be particularly resilient to the sudden unavailability of a travel mode.
- For both men and women in England, the number of car driver trips and miles driven in darkness reduces for ages over 55-60.
- The percentages of trips and miles in darkness are similar for car drivers and for travel by all modes, showing that older people are not switching to modes other than driving for night-time journeys.

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# Contents

## Introduction to this publication

**The 2017 National Travel Survey (NTS) publication released in July 2018 contained the latest results from the continuing series of household travel surveys, designed to provide a consistent source of data on personal travel behaviour across England.**

This statistical release contains articles showcasing different aspects of the NTS, and is the second of the series after a similar publication in January 2018.

## Accessing NTS data

In addition to the published statistics together with accompanying statistical tables, the underlying dataset and guidance for analysing it can be accessed from the UK Data Service, for users who wish to explore the data for themselves.

## Thank you

Very special thanks are due to our authors of the articles contained in this document ,who generously gave their time to produce them. These are Sally Panayiotou, Kit Mitchell, and Dr Fiona Crawford.

The help of the members of the public who give their time to respond to the survey is always gratefully acknowledged.

### What travel is included?

The NTS includes only personal travel within Great Britain, by residents of private households in England, along the public highway, by rail or by air. Travel off-road, or for commerical purposes (to deliver goods or to convey a vehicle or passengers) is not included.

### What is a trip?

The basic unit of travel in the NTS is a trip, which is defined as a one-way course of travel with a single main purpose.

### What is a stage?

Trips consist of one or more stages. A new stage is defined when there is a change in the mode of transport.

**Further information** about the NTS and its methodology

A range of supporting information is available which provides background to understand the source of the statistics presented in this publication, all available from the NTS collections page on GOV.UK.

# Using National Travel Survey data to explore the relationship between healthy mobility and road safety

***by Sally Panayiotou, TRL***

*(Based on: Healthy mobility and road safety PPR865: L Smith, S Chowdhury, J Hammond)*

## Introduction

At TRL we recognise that substituting short car journeys with an active mode of transport has the potential to reduce congestion, air pollution and encourage a healthier lifestyle. However, as shown in Figure 1, walking and cycling incurs a higher risk of road traffic injury than travelling by car. Therefore, there are important safety considerations in encouraging healthy mobility. This article presents the findings of analysis using National Travel Survey (NTS) and Stats19 data to explore the possible implications of increased healthy mobility on casualty rates amongst vulnerable road users (pedestrians and pedal cyclists).

The analysis in this article has only been possible because the NTS collects extensive data on the mode of the trip and also each of the individual stages, as opposed to some other studies which only report a single mode even for multi-stage journeys. In addition, the NTS captures trips for a variety of purposes, as opposed to studies which are restricted to travel only during the course of employment.

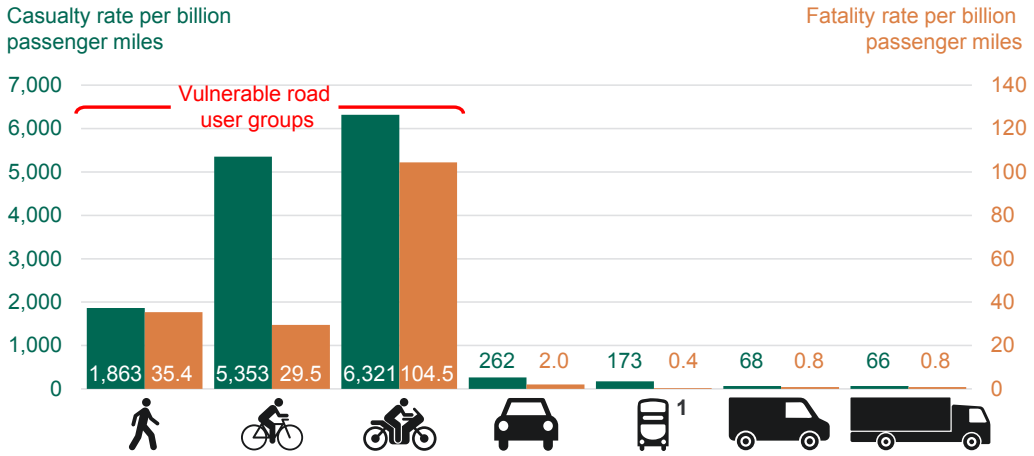
### Data Sources

#### Stats19

The Stats19 dataset contains road accidents reported to the Police where the accident resulted in personal injury, and where they occured on public roads.

Guidance on road accidents and safety statistics information can be found in the supporting technical documentation.

**Figure 1: Casualty and fatality rates per billion passenger miles by road user type**




*Source: Department for Transport, Casualities involved in reported road accidents RAS30*

*1. Bus passenger miles based on 2015 milage figure, as no 2016 figure was available at the time of the publication*

## Sources of uncertainty in the analysis

There are three sources of error in our estimates:

► The casualty rate for each mode. This is published by DfT and based on the Stats19 database of reported injury accidents divided by the amount of travel from NTS. In theory the number of casualties could have a Poisson confidence interval combined with the NTS sampling error, however as this is a short piece that is indicative this was not determined.

► The selection of trips in NTS that fit the criteria for potential active travel. NTS gives confidence limits on some statistics such as the average distance travelled by mode, but this could not be applied to estimating the number of trips that met our criteria. By applying the 0%, 25%, 50%, 75% and 100% scenarios this shows the sensitivity of the analysis to the criteria.

► The effect of safety in numbers. This is an estimate and as such no confidence intervals exist for this measure.

## Summary of findings

We used data from the National Travel Survey 2015 along with Stats19 data to explore the implications on casualty numbers if short car trips were replaced with walking and cycling.

We first looked at pedestrian casualties and estimated that if current levels of risk were to stay the same, there would be an additional 406 pedestrian casualties if half of the short trips currently carried out by car were replaced by walking.

Our model for cyclist casualties was based on first creating a simple estimate of the effect of 'Safety in Numbers' (SiN) on cycling risk. SiN is the phenomenon where if there are more cyclists, the collision risk per cyclist is reduced. SiN was first described by Jacobsen in 2004[1] and has been supported by multiple studies showing that there is a decline in collision rates as the number of vulnerable road users increases.

Taking SiN into account, we estimated that if half[2] of the short trips currently carried out by car were replaced with cycling there would be an increase in pedal cyclist casualties (of all injury severities) of 2,505.

The modelling predicted that alongside the changes in pedestrian and cyclist casualties, there would also be a reduction in car occupant injuries of 2,171 because of fewer people driving. This means that there would be a net increase in casualties overall of 740 (although note injury severity was not taken into account).

Our analysis suggests that the impact of SiN for cyclists is considerable. For comparison, we also estimated the change in casualties if the current levels of risk by mode remained the same (again for half of short trips moving to active travel). In such a scenario there would be an additional 41,472 pedal cyclist casualties – clearly far more than the analysis taking into account SiN effects suggests.

Perceived safety is often given as a reason for not using active travel modes more frequently[3]. SiN has the potential to act as an enabler for active travel, but there is not currently a standard measure for SiN. In addition, more work is required to fully understand why SiN occurs. It is still unclear to what extent SiN occurs naturally, and how much is through careful planning of aspects such as infrastructure and behavioural change interventions.

This analysis of NTS and Stats19 data forms a good basis for future analysis of these datasets to understand the implications of active transport on casualty risk and inform the strategy for achieving increased active travel safely.

## Using the NTS to identify trips that could be walked or cycled

We used data from the NTS 2015, along with definitions used in previous studies[4] to understand the current rates of active travel and identify the number of short journey car trips in England that could potentially be walked or cycled.

For this analysis we defined short journey car trips as single-stage trips of less than 8km made by car:

- There were 96,345 of these trips recorded in the NTS in 2015.

**A trip was considered potentially walkable where:**

- The trip was less than 1 km in length;
- The person making the trip had no mobility difficulties that stopped them travelling by foot;
- The person making the trip was less than 70 years old.

There were 6,153 car trips of less than 1 km recorded in the NTS in 2015. Of these, 5,060 trips (82%) were made by people under 70 years old with no mobility difficulties. We took the total distance covered during these trips and divided it by the NTS total sample to calculate that an average of 12 km per person could have been walked instead of driven in 2015.

**A trip was considered a potential bicycle trip where:**

- The trip was between 1 km and 8 km in length;
- The person making the trip had no mobility difficulties that stopped them travelling by cycle;
- The person making the trip was between 10 and 70 years old;
- The person making the trip had access to a bicycle.

There were 90,192 car journeys between 1 and 8 km in length recorded in the NTS in 2015. Of these, 32,537 trips (36%) were made by people who had no mobility difficulties, were between 10 and 70 years old, and had access to a bicycle. We divided the total distance covered during these 32,537 trips by the total NTS sample to calculate that an average of 406 km per person could have been cycled instead of driven in 2015.

## Total distance that could be walked or cycled

We multiplied the estimated potential distance that could have been walked or cycled in 2015 per person by ONS 2015 mid-year population estimates[5] to calculate the total distance across the whole population of England in 2015. These were the figures used in our models (**Table 1**).

**Table 1: Total distance with potential to be walked or cycled**

| Trips with potential for: | Total number of trips | Average distance per person per year (km) | Total distance per year (million km) |
|---|---|---|---|
| **Walking** | 5,060 | 12 | 655 |
| **Cycling** | 32,537 | 406 | 22,225 |

## Estimating changes in casualties using NTS and Stats19 data

We derived estimates for the travel and casualty rates for England using Stats19 casualty data, NTS, and ONS population data[6]. Cyclists and pedestrians have a higher risk of casualty than car occupants **(Table 2)**.

**Table 2: Casualty, travel and risk for pedestrians, cyclists and car occupants, England 2015**

| Road user group | Casualties | Travel (billion passenger km) | Casualty rate (casualties per billion passenger km) |
|---|---|---|---|
| **Pedestrians** | 21,525 | 16.1 | 1,335 |
| **Cyclists** | 17,541 | 4.7 | 3,732 |
| **Car occupants** | 99,684 | 532.9 | 187 |

To estimate the SiN effect, we first plotted the cyclist casualty rate against the number of kilometres cycled per person per year in each local authority in England. We then fitted a power trend line to represent the relationship between kilometres cycled and casualty rate, and used this in the model to derive the SiN casualty estimates. The casualty rates calculated from this trend line were adjusted to ensure that the 0% uptake scenario matches the observed casualty data and the number of passenger kilometers cycled. Further information on this methodology can be found in the Appendix to the full report PPR865: Healthy mobility and road safety.

The casualty rates for car occupants and pedestrians were assumed to be constant.

For comparison we created a second model that assumed casualty rates remain constant at the rates shown in **Table 2** (a model to show what would happen if no SiN effect occurred for cyclists).

We included uptake scenarios of 0%, 25%, 50%, 75% and 100% to estimate the change in casualty rates with different levels of active travel uptake. The ‘current scenario’ of 0% uptake is where there is no change in active travel. Each of the other scenarios estimates the change in casualty rates where the total distance travelled by car is replaced by walking or cycling. For example, the 75% uptake scenario considers the outcome if 75% of the total distance that could be walked instead of driven is walked; and if 75% of the total distance that could be cycled instead of driven is cycled.

**Table 3** shows the results for each of these uptake scenarios in the two models.

**Table 3: Casualty estimates for different active travel uptake scenarios**

| Uptake scenario | Car occupants | Pedestrians | Cyclists | | Total casualties | |
|---|---|---|---|---|---|---|
| | | | Model 1: Constant casualty rate | Model 2: Constant SiN adjustment | Model 1: Constant casualty rate | Model 2: Constant SiN adjustment |
| **Current 0% uptake** | 99,684 | 21,525 | 17,541 | 17,541 | 138,750 | 138,750 |
| **25% uptake** | 98,583 | 21,712 | 38,276 | 19,101 | 158,571 | 139,396 |
| **50% uptake** | 97,513 | 21,931 | 59,013 | 20,046 | 178,457 | 139,490 |
| **75% uptake** | 96,443 | 22,150 | 79,749 | 20,735 | 198,342 | 139,328 |
| **100% uptake** | 95,374 | 22,368 | 100,485 | 21,282 | 218,227 | 139,024 |

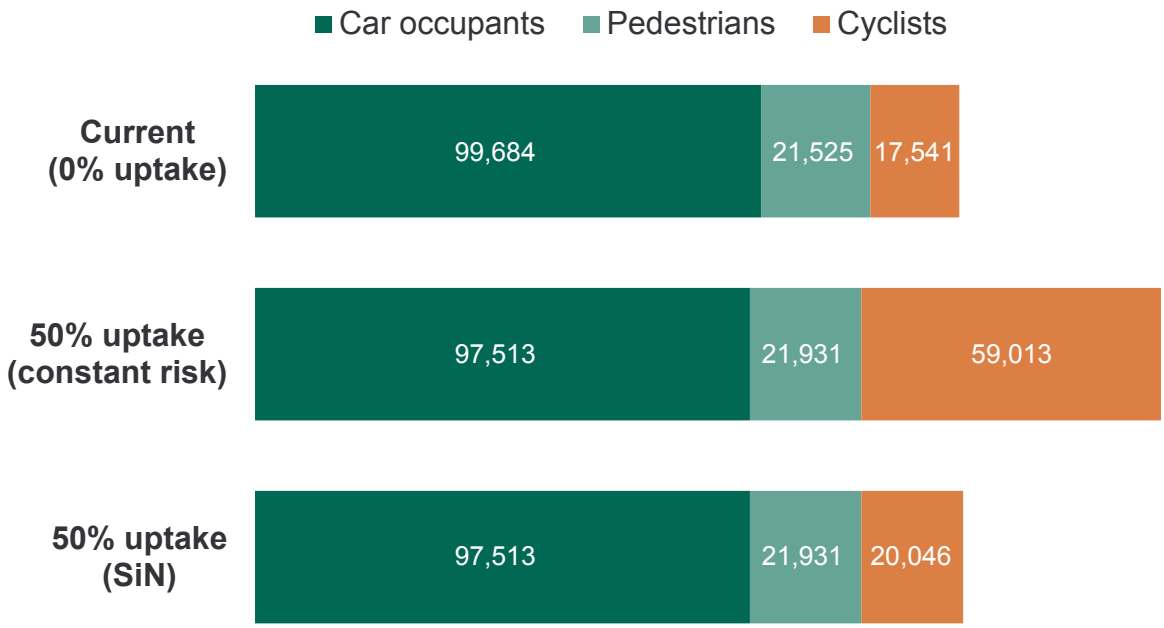
**Figure 2** shows the number of casualties in the current scenario by mode and those estimated in the 50% scenarios (this scenario is selected as an illustration - each scenario gives a similar overall picture, as shown in **Table 3**).

In the comparison model (model 1) using the current casualty rates we estimated an additional 406 pedestrian casualties and 41,472 pedal cyclist casualties if half of the short trips currently carried out by car were replaced with these active travel modes.

In the cycling SiN scenario (model 2) we estimated an increase of 2,505 cycling casualties if half of the short trips currently carried out by car were replaced with bicycle trips.

The disparity in these numbers illustrates the magnitude of the SiN effect, and the importance of ensuring that it occurs if active travel modes are to be encouraged.

**Chart 2: Number of casualties by mode in baseline and 50% uptake scenarios**




## Limitations of the analysis

This work was intended as an indicative analysis to highlight the road safety considerations in encouraging active travel and there are a number of limitations to the models (not limited to those below).

- As noted in the opening summary, although the concept of SiN has been demonstrated in a range of studies, further research is required to quantify its effect robustly and to understand the mechanisms through which it might arise.
- Our estimates are based on a modelled relationship between cycling risk and cycle travel which is not necessarily causal, as there are additional factors likely to contribute to different safety levels in different areas. For example, local authorities which have high levels of cycling and lower cycling risks may also have good cycling infrastructure. Again this relates to the precise mechanism by which SiN occurs.
- The short trip selection criteria will have excluded some longer journeys that could be cycled. Conversely, some trips identified as having potential for active travel could not be walked or cycled in practice, due to factors such as hilliness, driver behaviour, illness, or weather.
- We specified that someone must have access to a bicycle in our model assumptions – removing this condition from the criteria would almost double the potential number of cycle trips.
- Stats19 is the national database of reported injury collisions and only includes those collisions

reported to and by the police. There is evidence that some serious and slight collisions are not reported to the police, especially cyclist casualties and single-cycle collisions[7] therefore the casualty rates should be considered underestimates.

## Possible next steps

Our work estimated the change in total casualties if a number of active travel scenarios were adopted, but the analysis could be adapted to estimate the differences in casualty numbers by injury severity, specifically the changes in fatal and seriously injured casualties. Since cyclists and pedestrians are more vulnerable than car occupants when involved in a collision, these severities would be expected to show greater percentage differences in the increased active travel uptake scenarios when compared with the current baseline.

As the purpose of this exercise was to identify casualty numbers, the benefits of active travel to health, the environment, and congestion, were not considered in these models. There are robust measures for quantifying the value of casualty reduction and health benefits[8], which could be combined with an estimated cost of a proposed scheme to calculate the benefit-cost ratio.

There is a range of options for more detailed analysis of National Travel Survey data, incorporating geography and demographics to understand who makes journeys and where these occur. This could be used to enable targeted interventions to increase active travel in particular areas.

## Variability in commuting mode in England

***by Dr. Fiona Crawford, Centre for Transport and Society (University of the West of England)***

## Introduction

The National Travel Survey (NTS) found that commuting trips accounted for 20% of the distance travelled in England in 2016. Evidence regarding the modes used for commuting is essential for peak period planning and for developing strategies to reduce road traffic congestion. Often, transport planners simplify the issue by assuming that each commuter always uses the same mode for commuting. This assumption implicitly suggests that commuters have very little familiarity with other modes for commuting and therefore have low levels of resilience to a particular mode being unavailable. Also, the number of commuting trips made by different modes may be over- or under-estimated if commuters are assumed to use their 'typical' or 'usual' commuting mode all of the time.

This article examines the extent to which the assumption of a single commuting mode per person is valid for a large sample of commuters. For commuters who do vary their mode, the combinations of modes used are also examined. This provides insights into alternative modes which might be feasible if a commuter's usual commuting mode is unavailable. Arguably, the findings may also be relevant for commuters who currently always use the same mode.

A fairly large sample of commuting behaviour has been examined using NTS travel diary and survey data from 1998 to 2016. Data for a seven day period is recorded in the travel diary, therefore the stability of mode choice can only be examined over this period of time.

Commuting trips as defined within the NTS are the focus of this analysis. This is only a subset of all trips to and from work as it excludes trips to secondary workplaces and trip chains between home and work, for example including a stop to drop off a child at school or to go shopping. Examining only trips satisfying the NTS 'commuting'

### Definitions

#### Trip

This is a one-way course of travel with a single main purpose. Outward and return halves of a single trip are treated as two separate trips.

A trip cannot have two separate purposes, and if a single course of travel involves a mid-way change of purpose then it, too, is split into two trips. However, trivial subsidiary purposes (e.g. a stop to buy a newspaper) are disregarded.

#### Trip Weight

Values applied to each data point to reduce the effect of bias. This takes account of non-response, reduced reporting during the travel week etc.

More details on statistical weights, as well as the weighting process applied to NTS data, can be found in the NTS technical report.

#### Main Mode

This is the mode used for the longest stage of the trip by distance.

With stages of equal length the mode of the latest stage is used.

definition ensures that there is a comparable frame of reference. Comparable data is required as travelling to a different location or making a stop en-route may necessitate the use of a different mode of travel rather than it being optional. This analysis has only examined the main mode used for each trip although the travel diary also collects data on other modes used within a trip which could be analysed in future work.

## Data Examined

Data for England has been examined as NTS data has been collected in England only since 2013. Trip weights have not been applied in this research as they are designed to account for under-reporting in the number of trips by type, but do not take into account the mode of travel.

The analysis in this article has only been possible because the NTS collects travel diary data over multiple days alongside a comprehensive individual survey and because the data has been collected on a consistent and frequent basis over a sufficiently long time to analyse trends over time. The analyses only examine a week of data for each respondent, however, and additional research would need to be undertaken to determine the degree of variability in commuting mode over longer periods of time.

## Commuting Trips

Between 1998 and 2016, 88,661 employed people included at least two commuting trips within their seven day NTS travel diary. These commuters made 664,265 commuting trips during their surveyed week, including 416,603 as a car driver. Each commuting trip consists of travel from work to home or from home to work and therefore multiple commuting trips per person might be expected on each working day. This article focuses on the number of trips as opposed to the number of days, as commuting mode may differ within days.

**Chart 1: Commuting modes used per person during a seven day period (NTS 1998 to 2016)**

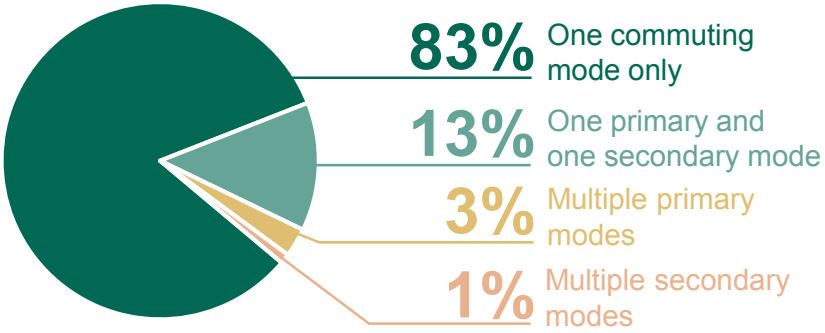


**Chart 1** shows that a large proportion of commuters (83%) used the same mode of travel for all commuting trips during the surveyed week. This group rely on one mode for commuting, either by choice or due to a lack of suitable alternatives, and therefore are more vulnerable to the impacts of a mode being unavailable, for example due to a public transport strike.

The second largest group in **Chart 1** contains commuters who primarily used one mode for commuting in the seven-day travel diary, but also had a distinct secondary mode which they used for the second highest number of commuting trips. They may also have used other modes for fewer commuting trips during the week. This group comprises 13% of commuters who made 15% of commuting trips. These commuters vary their commuting mode, although the NTS data does not provide information about whether the variability is due to circumstances, such as vehicle availability, or by choice.

The third group of commuters have two or more primary commuting modes that they used for the same number of commuting trips during the surveyed week. The group contains 3% of commuters. These commuters made only 2% of commuting trips as they made fewer commuting trips per week on average (6.3 compared to 7.5 for other commuters). The final group contains only 888 people over the 19 year period and they all have a primary mode and two or more other modes which are tied for the second most commuting trips made during the week.

**Table 1** shows the commuting mode choice for the two largest groups, namely the commuters who always use the same commuting mode and those with one primary and one secondary mode. Car drivers account for over two thirds of commuters who always use the same mode but make up a much smaller proportion of commuters who vary their commuting mode. Other modes, particularly travelling by local bus (outside London), walking and being a passenger in a car, are more common for people who vary their commuting mode during the week.

For commuters with one primary and one secondary mode, cycling, driving a car and public transport (other than buses in London) were more common as primary modes rather than secondary modes. Travelling as a car or van passenger or by taxi/minicab were more commonly observed as secondary modes.

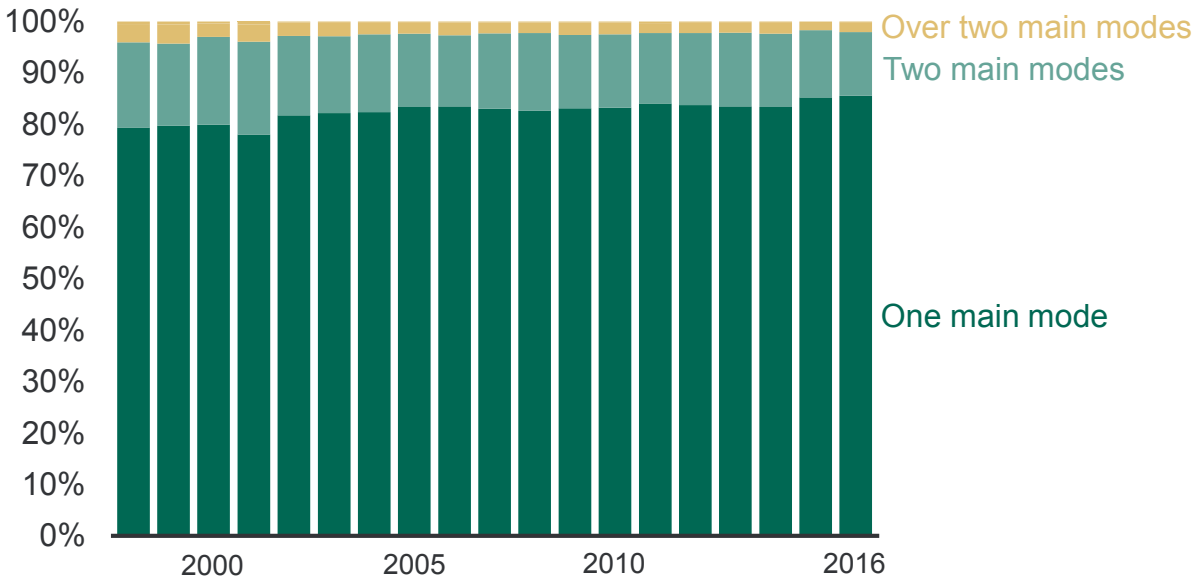
**Table 1: Commuting mode for people using only one mode, or one primary and one secondary mode for commuting: England, 1998 to 2016**

| | Commuters always using the same mode (n=73,537) | Commuters with one primary and one secondary mode (n=11,631) | |
|---|---|---|---|
| Main mode for commuting trips | Percentage by commuting mode | Percentage by PRIMARY mode | Percentage by SECONDARY mode |
| **Walk** | 6% | 12% | 12% |
| **Bicycle** | 3% | 7% | 4% |
| ***Car/van driver*** | *69%* | *30%* | *19%* |
| **Car/van passenger** | 6% | 23% | 37% |
| **Bus in London** | 2% | 3% | 3% |
| **Other local bus** | 4% | 12% | 10% |
| **London Underground** | 2% | 3% | 2% |
| **Surface rail** | 5% | 6% | 4% |
| **Taxi/minicab** | 0% | 1% | 5% |
| **Other** | 2% | 3% | 3% |

## Commuters who use the same mode all week

**Chart 2** shows that the proportion of commuters using the same mode of transport for all commuting trips during the surveyed week has gradually increased between 1998 and 2016. The percentage increased from 80% in 1998-2000 to 85% in 2014-2016.

**Chart 2: Number of main commuting modes used per person: England, 1998 to 2016**



Over the whole period from 1998 to 2016, 69% of single mode commuters drove a car or van to work, compared to 63% for all of the commuters combined. The percentage of single mode commuters who drive their car to work has decreased over time, however, from 74% in 1998 to 67% in 2016. This has been offset by an increase in the proportion of single mode commuters using public transport (from 9% in 1998 to 17% in 2016).

A higher percentage of males than females always use the same commuting mode (85% compared with 80%). There is also a gender difference when considering full time workers only. Males working full time are more likely to always use the same commuting mode than males working part time (86% to 82%). For females, however, there is no difference when comparing full and part time workers.

**Table 2** shows that the percentage of people always using the same commuting mode generally increases with age. It is possible that this is influenced by generational effects, for example differences in the status attached to owning a car or the confidence in using a range of transport options available through mobile devices.

**Table 2: Percentage of commuters who always use the same mode by age group: England, 1998-2016**

| Age group | Percentage of commuters who always use the same mode for commuting |
|---|---|
| **11 – 16 years** | 73% |
| **17 – 20 years** | 71% |
| **21 – 29 years** | 80% |
| **30 – 39 years** | 84% |
| **40 – 49 years** | 84% |
| **50 – 59 years** | 84% |
| **60 years +** | 86% |

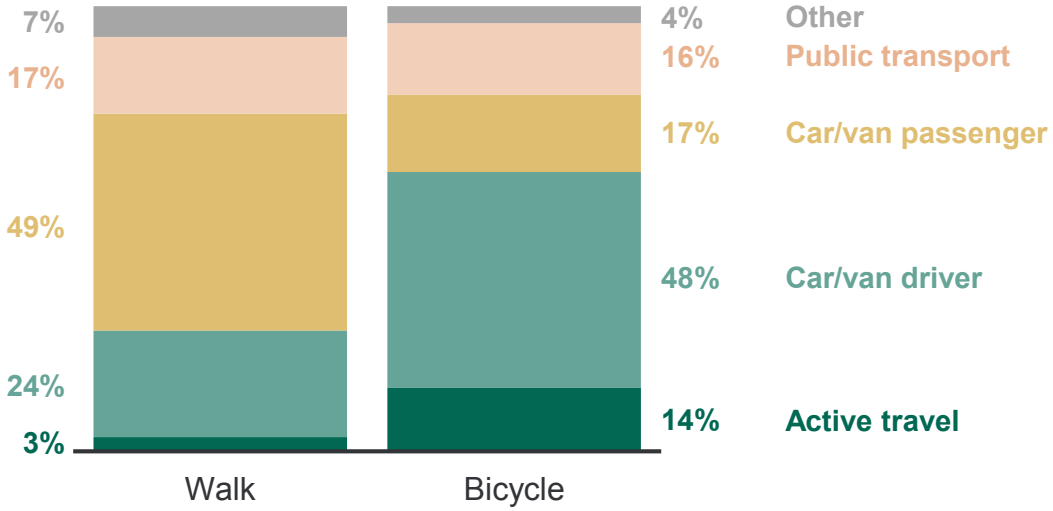
A higher percentage of self-employed people always use the same mode for commuting than employees (88% versus 83%). Commuters who always the same commuting mode are more likely to drive a car to work if they are self-employed (80%) than if they are an employee (68%). These two differences could be due to job-related factors such as needing a car for business trips during the day or the need to carry equipment or other supplies, which may be more relevant for self-employed people.

## Commuters varying their commuting mode

In **Chart 1** above, 13% of commuters had one mode that they primarily used for commuting as well as a distinct secondary mode. The combinations of primary and secondary modes used will now be considered.

The secondary modes of travel for commuters who primarily walk or cycle to and from work are shown in **Chart 3**. Some of the secondary modes have been grouped together, therefore the 'active travel' category relates to cycling for people who primarily commute by foot, and walking for people who primarily commute by bike. There is a distinction in the secondary mode of travel, however, as pedestrians are more likely to be car passengers, and cyclists are more likely to be car drivers.

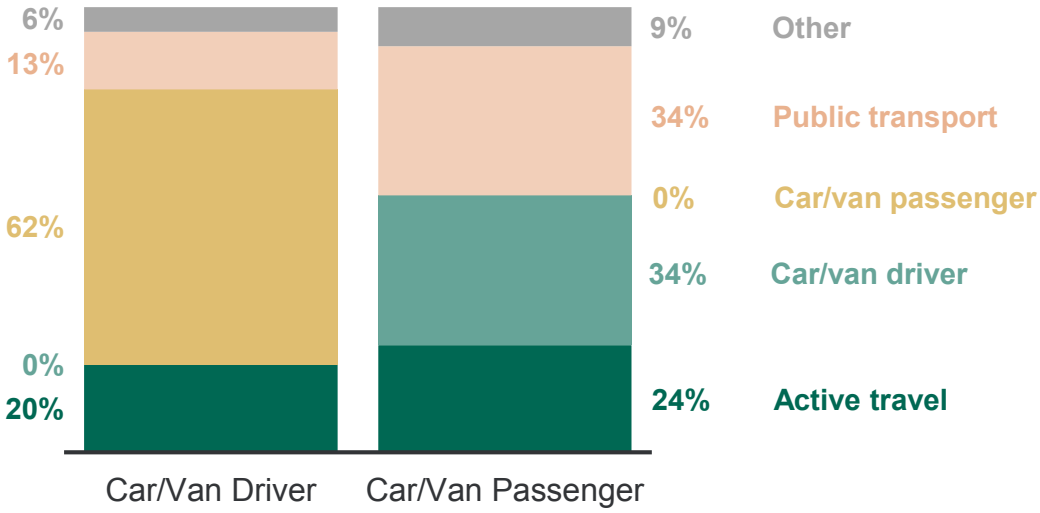
**Chart 3: Secondary modes of travel for commuters who usually walk or cycle to work: England, 1998 to 2016**




Of the people who primarily use active travel to get to work, a high proportion use a car as a secondary mode. There is a distinction in the secondary mode of travel, however, as pedestrians are more likely to be car passengers and cyclists are more likely to be car drivers. Care must be taken in interpreting this finding however, as the fact that many commuter cyclists occasionally drive to work does not necessarily mean that cycling is a feasible option for most people who always drive to and from work. It does however suggest that if bad weather prevents commuters from using active travel, then a substantial proportion would travel using a private car or van instead. A similar percentage of walking and cycling commuters use public transport as a secondary mode, although pedestrians are more likely to use local (non-London) buses and cyclists are more likely to use the underground or rail.

The choice of secondary mode for people who primarily commute by driving or as a passenger in a car is shown in **Chart 4**.

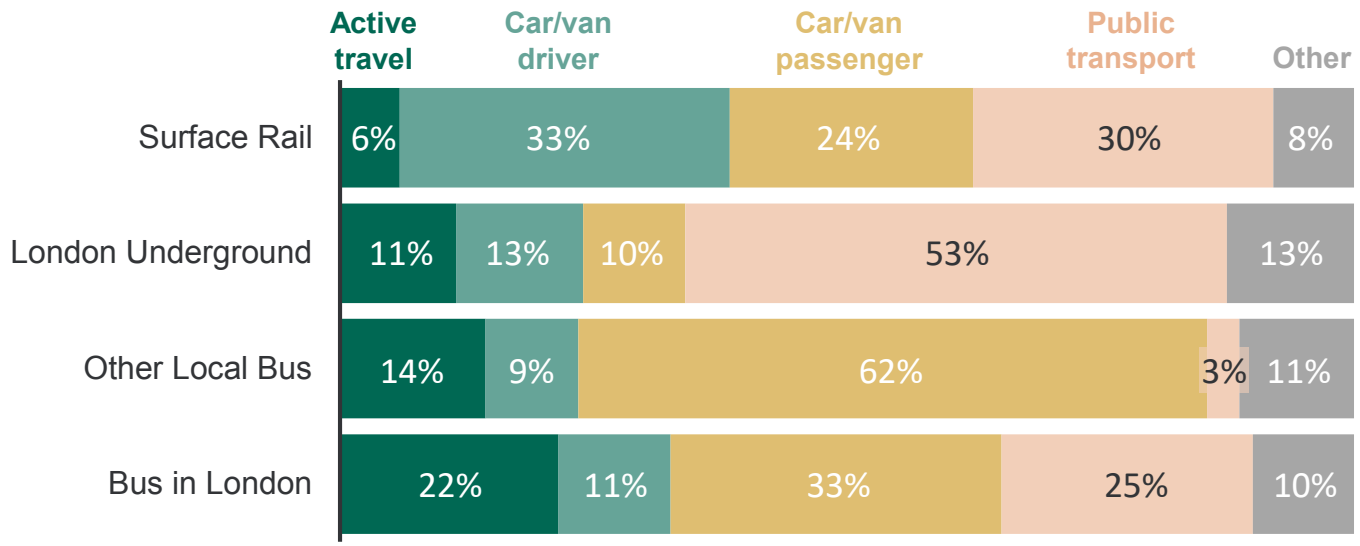
**Chart 4: Secondary modes of travel for workers who usually commute by car: England, 1998 to 2016**




The dominating feature is that 62% of commuters who primarily drive to work travel as a passenger in a car as their secondary mode. The commuters who are primarily car passengers are less dependent on the car with 34% using public transport as their secondary mode (compared with 13% of drivers). The 'other' category is dominated by motorcycles for drivers and taxis for passengers.

Public transport categories have been combined for the visualisation of secondary commuting modes above, but the choice of secondary mode differs markedly between commuters primarily commuting using each of the four main types of public transport in England **(Chart 5)**.

**Chart 5: Secondary modes of travel for workers who usually commute by public transport: England, 1998 to 2016**

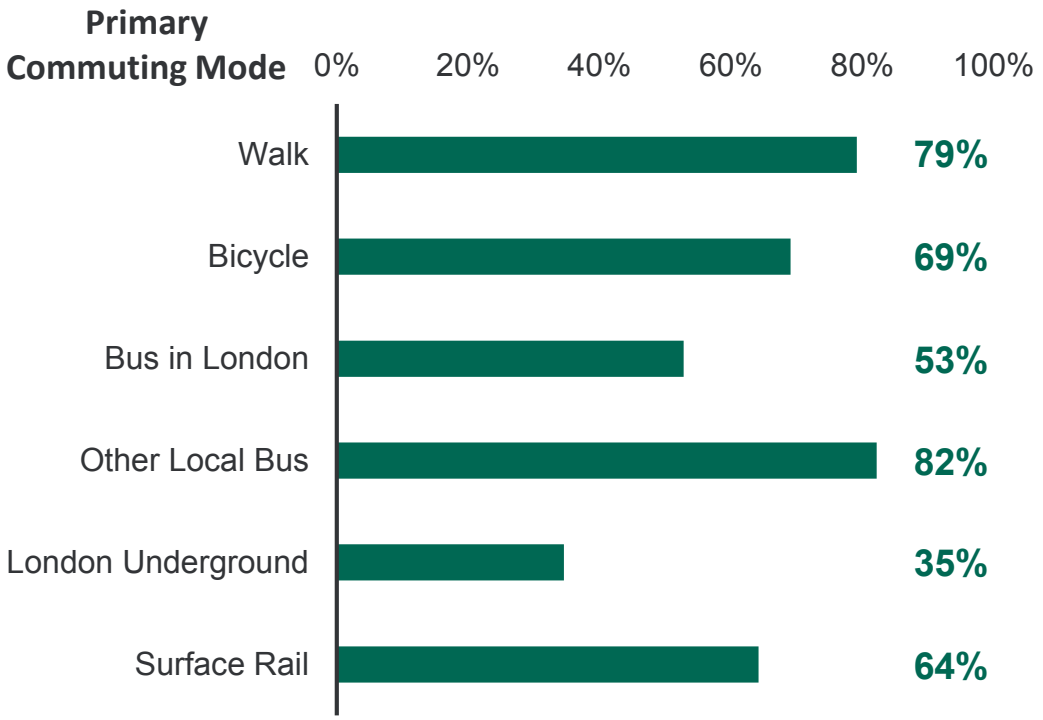


For commuters who primarily use local buses (excluding London), 71% used a car as their secondary commuting mode in the weekly diary, in most cases as a passenger.

The equivalent percentage was much lower for users of buses in London, where more people use active travel and other forms of public transport as their secondary mode. Over half of the commuters who primarily use the London Underground used another form of public transport as their secondary mode for commuting. The higher use of public transport as a secondary mode in London could be due to the abundance of alternative public transport options and integrated ticketing in London.

Although fewer of the commuters with one primary and one secondary mode drive their car to work compared with commuters always using the same mode, the dominance of the car is still visible. **Chart 6** shows the percentage of commuters who use active or public transport as their primary mode, but use private motorised transport (as a driver or passenger) or taxis as their secondary mode. For all modes other than the London Underground, more than half of the commuters use private motorised vehicles as their secondary commuting mode.

**Chart 6: Percentage of commuters whose secondary mode is a private motorised vehicle or taxi by each primary commuting mode: England, 1998 to 2016**




The group of commuters with two primary modes (used for the same number of commuting trips) during the week was relatively small. These commuters have similar mode characteristics to the group with one primary and one secondary commuting mode, although there are fewer people who

drive a car to work and higher percentages of people commuting as a car passenger or using local buses.

## Conclusions

This article uses NTS diary and survey data to show that the majority of workers always use the same mode for their commuting trips. This proportion has been growing over time. Current trends, including people working until later in life and increasing levels of self-employment, may increase this proportion further in the future. The lack of variability in commuting mode suggests that many commuters in England would not be particularly resilient to the sudden unavailability of a travel mode. Most commuters would not have recent or regular experience in commuting using an alternative mode should their primary mode be unavailable for any reason. By not using other modes frequently for commuting, it could also be argued that there are greater barriers to these people changing their commuting behaviour, particularly due to a lack of information about facilities and processes relating to other modes and perhaps a lack of suitable equipment. Single mode commuters also predominantly drive their car to work, although this proportion has decreased from three-quarters to two-thirds between 1998 and 2016.

In all, 17% of commuters did vary their commuting mode during the surveyed week and thus have a higher level of mode-related resilience than under the standard assumption that commuters do not vary their mode. Commuters who have a primary commuting mode as well as a secondary mode are less likely to drive a car to work. There is still a reliance on the private car within this group however, particularly as a secondary travel mode. People primarily commuting by local bus outside of London, for example, rely heavily on private motorised transport and taxis as secondary modes. The equivalent percentage in London is much lower, perhaps due to a greater number of public transport alternatives and/or higher levels of satisfaction with bus travel in London as reported in the NTS.

## Driving in the hours of darkness

***by C G B (Kit) Mitchell***

## Introduction

It is well known that as people age they tend to reduce the amount they drive in darkness. Numerous surveys show that night driving is one of the most frequently cited aspects of driving that older drivers claim to reduce or stop completely[1,2]. There is considerable research on the safety of driving in darkness, on the distribution of accidents by time of day, and on the effect of street lighting on road safety, but there is little research on the amount of driving during darkness by different groups of people.

This paper uses data from the National Travel Survey (NTS)[3] to explore how much men and women drive in darkness and how this changes with the age of the driver. The data for this paper was provided by staff of the Department of Transport for a study for the RAC Foundation[4].

This article is based on trips, mileage and licence holding broken down by for men and women, age group and the time the trip took place. Multiple survey years were combined to increase the sample size and data for 2014-2016 is compared with 2002-2004 to see the change over time.

Trips and miles per licence holder has been calculated from per person figures using the percentage of each group of people with a full driving licence, from the NTS. Charts are drawn using the midpoint of each age band.

### "Hours of darkness"

Trips from the NTS were categorised based on the start time of the trip and the start and end time of the hours of darkness provided by HM Nautical Almanac Office.

They are derived from the calculated rising and setting times of the sun and do not account for local weather conditions at the time of the trip.

The times used were for Leicester in 2016, as a reasonably central point for the country.

## All trips

**Chart 1** below shows that relatively few journeys are driven during the hours of darkness. The number per licence remains rather constant at 100–120 per year up to age 55 to 60, after which it drops steadily with increasing age. The number of trips made by women during darkness reduces after age 55, while for men it reduces after age 60. Perhaps more importantly, **Chart 2** shows the percentage of car driver trips that are made during the hours of darkness. The percentage reduces steadily with increasing age, with women up to the age of 70 making a smaller proportion of their journeys in darkness than men in that age range. Figure 2 also shows the percentages of trips by all means of transport made in darkness; these are virtually identical to the percentages for car driver trips[5].

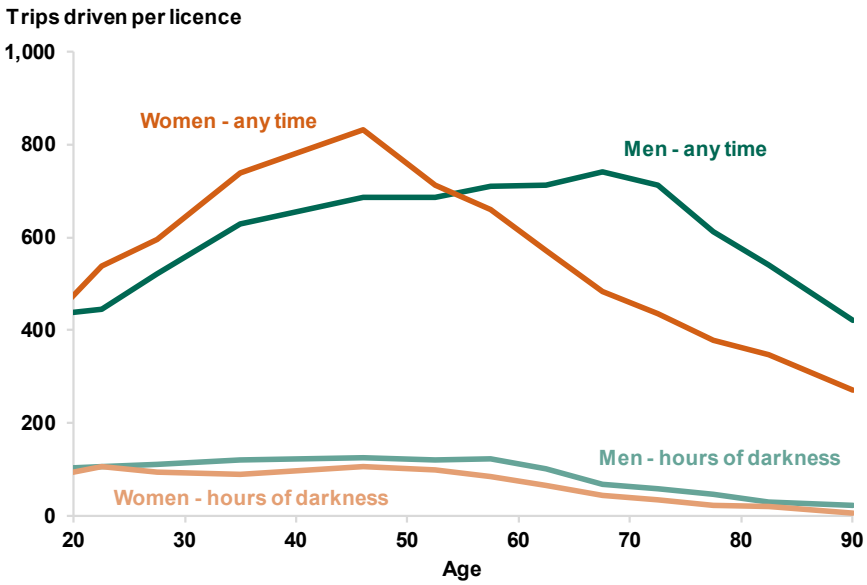



**Chart 1: Car driver trips per licence per year in total and during the hours of darkness: England, 2014–16**

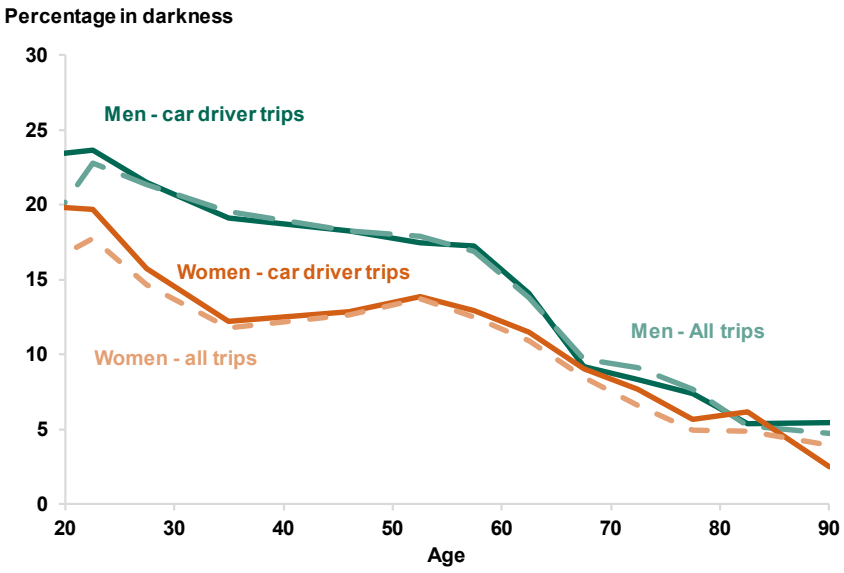



**Chart 2: Percentage of car driver trips during hours of darkness: England 2014–16**

## Travel for different purposes

As examples of travel for particular purposes, **Chart 3** shows the percentage of car driver trips for sport and entertainment that are made during the hours of darkness, and **Chart 4** the percentage of trips to visit friends at home. In each case, the percentage drops steadily with increasing age, and in the case of visiting friends, the percentage of trips for women is lower than that for men at all ages. As with **Chart 2**, the percentages of trips by all means of travel for sport and entertainment and to visit friends at home are very similar to the percentages of car driver trips.

For all age groups the percentage of trips driven during darkness is similar to the percentage of all trips made during the hours of darkness. This indicates that older people are not switching to alternative modes for trips in darkness. However, we cannot tell from this if the reduction in travel during darkness is due to a reduction in activities requiring travel at these times, or older people forgoing activities to avoid travel at these times.

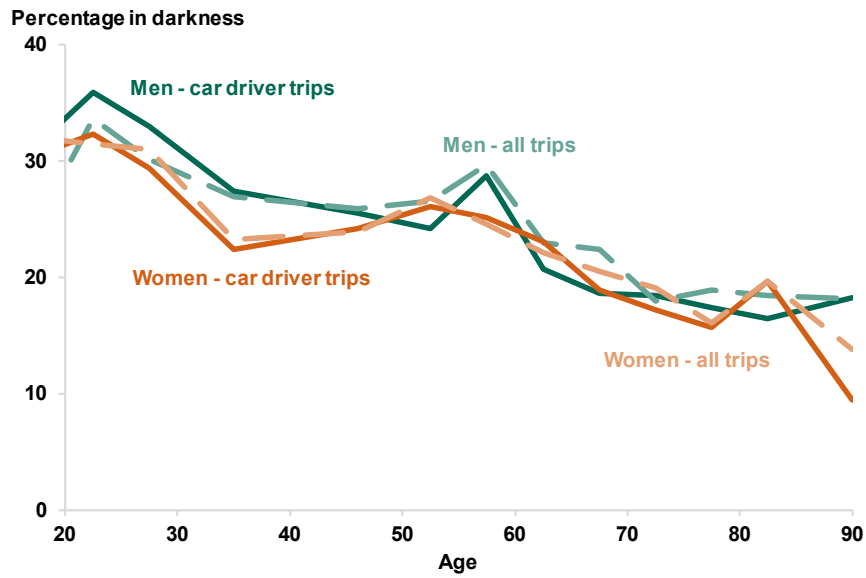



**Chart 3: Percentage of trips during hours of darkness for sport/entertainment: England, 2014–16**

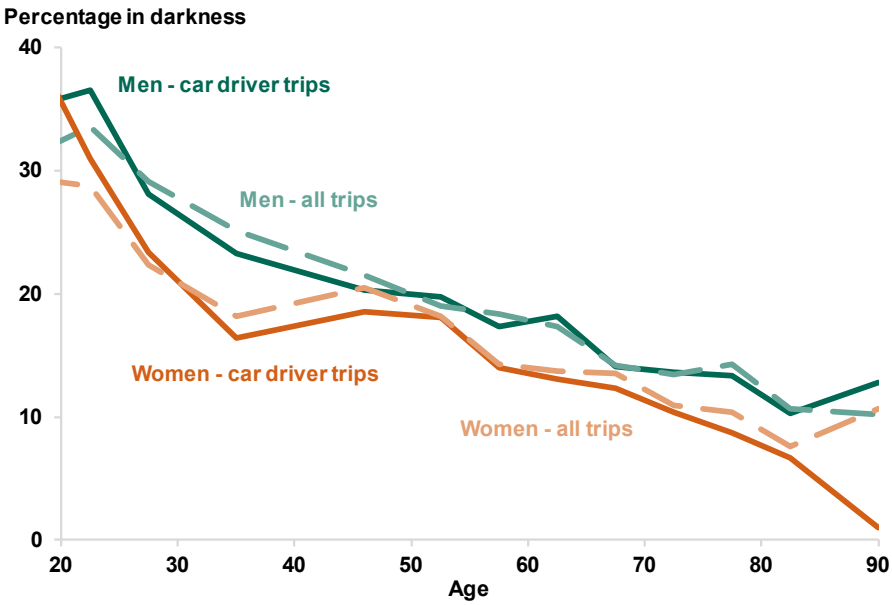


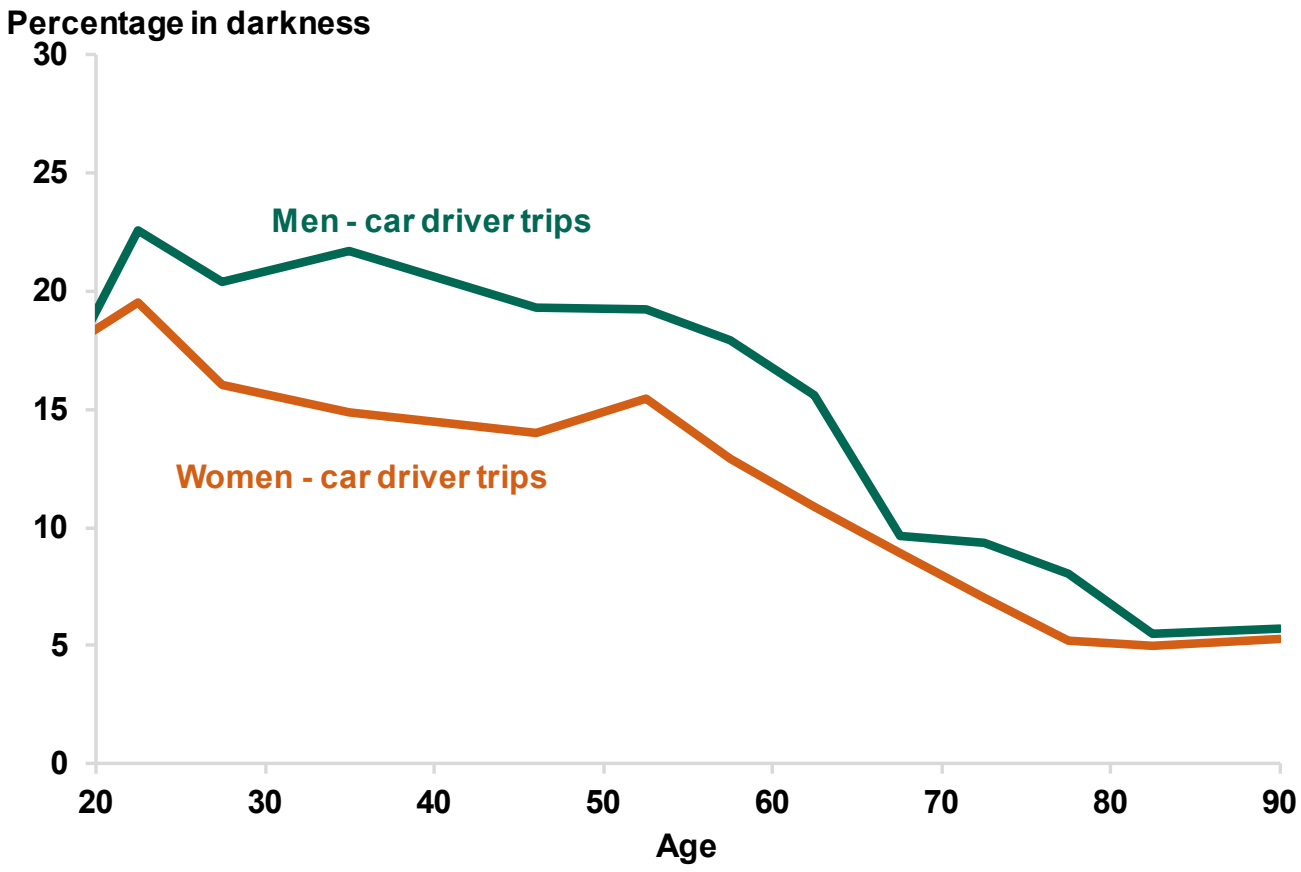

**Chart 4: Percentage of trips during hours of darkness to visit friends at home: England, 2014–16**

## Distance driven in the hours of darkness

The percentage of distance driven in darkness **(Chart 5)** is similar to the percentage of trips shown in **Chart 2**. There is some indication that the percentage of distance for women begins to fall after age 55, whereas for men it falls more significantly after age 65.

In summary, on all measures of travelling during the hours of darkness in 2014-16, as both men and women age they reduce the percentage of trips by all means of transport travelled during darkness and the percentage of trips and of distance driven in the dark. They also reduce the absolute number of trips and distance driven or travelled. There is no evidence of older people using alternative means of travel to avoid driving in the dark.

**Chart 5: Percentage of distance driven during hours of darkness for all purposes 2014–16**



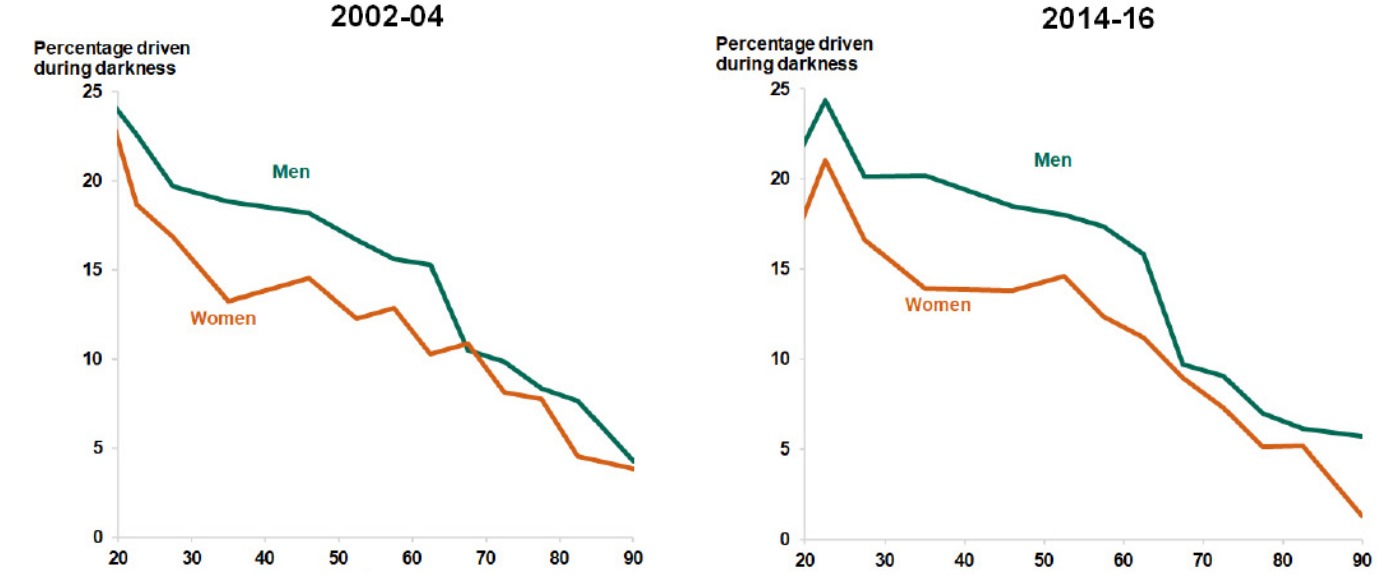

The NTS does not collect information which would show how much of the reduction in travelling in the dark by older people is because they have less need to travel at night and how much is to avoid the stress of travelling in the dark, at the cost of foregoing activities that happen at night.

## Changes between 2002-04 and 2014-16

**Chart 6** shows the miles driven in total and in darkness in 2002-04 and 2014-16, per licence holder. **Chart 7** shows the corresponding percentages of the total distance driven that are during the hours of darkness.

**Chart 6: Distance driven during the hours of darkness: England, 2002-04 and 2014-16**


**Chart 7: Percentages of the distance driven during the hours of darkness: England 2002-04 and 2014-16**




The total distance driven by men, and also the distance driven during the hours of darkness, reduced from 2002-04 to 2014-16. The distance driven by women was largely unchanged. However, the percentages of the distance driven during the hours of darkness were generally similar in 2002-04 and 2014-16 for each of men and women separately. These figures show an example of the fact that car use by young men has been reducing for some time.

## Driving on lit roads

The NTS provides no information on whether driving during the hours of darkness is on lit or unlit roads. However, the Stats19 police recorded casualty data does record whether the accidents in which the casualties occurred happened on lit or unlit roads. Chart 8 shows that in 2012-16, between 70 and 78 percent of slight casualties during darkness occurred on lit roads. Because the accident rate may well be different between unlit and lit roads, this does not mean that 70 to 78 percent of driving is on lit roads. There is a small but consistent reduction in the percentage on lit roads after the age of 40, and no real difference between the percentages for men and women.


Source: Stats19 collision data for 2012-16

**Chart 8: Percentage of slight injury car collisions in darkness that occurred on lit roads: England, 2012–16**

### Slight injuries

In Stats19 data a slight injury are defined as an injury of a minor character such as a sprain (including neck whiplash injury), bruise or cut which are not judged to be severe, or slight shock requiring roadside attention. This definition includes injuries not requiring medical treatment.

## Conclusions

The article shows how travel reduces during the hours of darkness. For both men and women in England the number of car driver trips and miles driven in darkness reduces for ages over 55-60. The percentage of trips and miles driven in darkness are similar for men and women, and reduce with increasing age, particularly after age 55. Since the percentages of trips and miles in darkness are similar for car drivers and for travel by all modes, showing that older people are not switching to modes other than driving for night-time journeys.

The distance driven by men, both overall and during darkness, reduced from 2002-04 to 2014-16. However, the percentage of distance driven that was during darkness was generally similar in both time periods.

There are no NTS data on the percentage of night driving that is on lit roads. However, between 70% and 78% of all slight injury car collisions in darkness occur on lit road, which provides some very imperfect indication of the proportion of night driving that is on lit roads.

## Using National Travel Survey data to explore the relationship between healthy mobility and road safety

This article is based on trips in Great Britain made by people resident in England using 2015 data from the National Travel Survey.

The article also uses data sourced from the Department for Transport's Road Accident and Safety Statistics series. For more details on the Stats19 data collection methodology please consult the technical note: https://www.gov.uk/government/publications/road-accidents-and-safety-statistics-guidance.

For further information on the Road Accident and Safety Statistics, please consult the guidance note: https://www.gov.uk/government/collections/road-accidents-and-safety-statistics.

## References


1. Jacobsen, L. P. (2004). Safety in numbers: more walkers and bicyclists, safer walking and bicycling. Injury prevention, 127-127.

2. We modelled four scenarios with: 25%; 50%; 75%; and 100% of trips replaced. The 50% update scenario figure is used as an illustration.

3. For example see the 2015 British Social Attitudes survey: DfT (2017). British social attitudes survey (ATT03). Retrieved from Gov.uk: https://www.gov.uk/government/statistical-data-sets/att03-attitudes-and-behaviour-towards-roads-and-road-travel

4. The choice of 8km as the maximum length of a short car trip was based on previous studies: Transport for London (2017). Analysis of cycling potential 2016. Retrieved May 2017, from tfl.gov.uk: http://content.tfl.gov.uk/analysis-of-cycling-potential-2016.pdf and Schepers JP and Heinen E (2013). How does a modal shift from short car trips to cycling affect road safety? Accident Analysis & Prevention, 50, 1118-1127.We also considered multi-stage trips where the first stage is less than 8km and made by car; however because there were only 1,261 such trips we decided to limit the analysis to single-stage trips of less than 8km made by car.

5. https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland

6. Full details are included in the TRL report, publication forthcoming: Smith L, S Chowdhury S,

Hammond J. Healthy mobility and road safety RPN4208.

7. Hospital, survey and compensation claims data all indicate a higher number of casualties than those suggested by Stats19: DfT. (2017). Reported road casualties in Great Britain: 2016 annual report. Retrieved from Gov.uk: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/648081/rrcgb2016-01.pdf

For more details please see the TRL publication: Smith L, Chowdhury S and Hammond J (2019). Healthy mobility and road safety. Published Project Report PPR865: Crowthorne, Transport Research Laboratory.

## Variability in commuting mode in England

This article is based on trips in Great Britain made by people resident in England using data from the National Travel Survey between 1998 and 2017.

Information for this analysis uses a trip as the primary unit of interest – a trip has one or more modes, one or more stages, a single purpose, and we have also allocated it to a broad area type.

The following describes how modes have been classified and groups for this analysis. (Note that for other published statistics, different classifications may have been used.)

### Mode classifications for this analysis

- Walk: Walks of over a mile. Shorter walks have been excluded
- Bicycle: A bicycle is any pedal cycle capable of use on the public road, but not children's bicycles or tricycles that are intended as toys.
- Car/van: both include 4-wheeled and 3-wheeled cars, 4x4 vehicles, light vans and lorries.
- Bus: includes all 'local' bus services, but excludes express services, excursions and tours (non-local bus).
- Coach: non-local bus/coach, including express services, excursions and tours.
- Rail: National Rail and London Overground (In other analyses "Rail" may also include the London Underground)
- Tube/LR: London Underground, light rail, trams. (In other analyses, light rail and trams are sometimes classified as "Other")
- Taxi: taxis/minicabs (In other analyses, taxis and minicabs are sometimes classified as "Other")
- Other transport: all other modes – private/hire bus, two-wheeled motor vehicles, domestic air travel, minibuses etc.
- Multi-mode: a trip that consists of at least two stages using a mixture of modes.
- Main mode: Used in other NTS analysis, but not here, where we have included all modes in each trip. The main mode of a trip is that used for the longest stage of the trip by distance. With stages of equal length the mode of the latest stage is used

## Driving in the hours of darkness

This article uses National Travel Survey data from 2002-2004, and between 2014-2016, to compare trends in driving during hours of darkness.

The "hours of darkness" for each day during the analysis were determined using data from HM Nautical Almanac Office. http://astro.ukho.gov.uk/nao/publicat/na.html. They do not account of local weather conditions.

This article also makes use of Stats19 accident data which is part of the Road Accidents and Safety Statistics series.

https://www.gov.uk/government/collections/road-accidents-and-safety-statistics.

## References


1. Charlton, J., Oxley, J., Scully, J., Koppel, S., Congiu, M., Muir, C & Fildes, B. (2006). Self-regulatory driving practices of older drivers in the Australian Capital Territory and New South Wales MUARC Report No 254, Monash University Accident Research Centre, Clayton, Victoria. Accessed 17 August 2018 from https://www.monash.edu/__data/assets/pdf_file/0005/217265/muarc254.pdf
2. Meng, A. & Siren, A. (2012a). Older drivers' reasons for reducing the overall amount of their driving and for avoiding selected driving situations Journal of Applied Gerontology published online 5 November 2012. https://www.ncbi.nlm.nih.gov/pubmed/25765824
3. National Travel Survey (annual), National Travel Survey Department for Transport, London.
4. https://www.gov.uk/government/collections/national-travel-survey-statistics
5. Mitchell, C G B (2018) Gender Differences in the Behaviour of Older Drivers: Maintaining mobility and safety RAC Foundation, London https://www.racfoundation.org/research/safety/gender-differences-in-the-behaviour-of-older-drivers

## Further reading and references

More details about travel behaviours of English residents can be found in the 2017 National Travel Survey publication:https://www.gov.uk/government/publications/national-travel-survey-2017

Full guidance on the methods used to conduct the survey, response rates, weighting methodology and survey materials can be found in the National Travel Survey Technical Report: 2017 on the above page.

More factsheets on further specific topics from the National Travel Survey can be found at:

https://www.gov.uk/government/publications/nts-factsheets.

The attitude questions in the NTS differ from those in the travel module of the British Social Attitudes survey, which can be found at: British Social Attitudes Survey, 2016 Report

The NTS also differs from attitude questions on the National Train, Bus and Tram Passenger Surveys, which sample only users of those services, not the general population. Results from those surveys may be found at:

National Rail Passenger Survey

National Bus Passenger Survey

National Tram Passenger Survey

## Other topics covered by the NTS

In addition to the material covered in this publication, the National Travel Survey covers a range of topics, including the following, which are covered by the published NTS data tables:

Daily and monthly trip patterns (Tables NTS0504 - NTS0506)

Motorcylists and household motorcycle ownership (Tables NTS0610 and NTS0207)

Concessionary bus travel (Tables NTS0619 - NTS0621)

Road safety - proportion of people involved in road accidents (Tables NTS0623 - NTS0625)

Accessibility of local services (Tables NTS0801 - NTS0803)

Working from home and deliveries of good and services (Tables NTS0804 - NTS0806)

Annual vehicle mileage, by type and age of vehicle (Tables NTS0901 - NTS0904)

Satellite navigation technology and vehicle parking (Tables NTS0907 and NTS0908)

## Detailed statistical tables

The National Travel Survey web page at: https://www.gov.uk/government/collections/national-travel-survey-statistics provides a set of results tables covering the topics presented in this release and the additional topics above. The full list of table sections is:

Trends in personal travel (Tables NTS0101 to NTS0108)

Driving licence holding and vehicle availability (Tables NTS0201 to NTS0208)

How people travel (Tables NTS0301 to NTS0317)

Why people travel (Tables NTS0401 to NTS0412)

When people travel (Tables NTS0501 to NTS0506)

Travel by age and gender (Tables NTS0601 to NTS0625)

Travel by car availability, income, ethnic group, household type and NS-SEC (Tables NTS0701 to NTS0710)

Accessibility (Tables NTS0801 to NTS0806)

Vehicles (Tables NTS9901 to NTS9915)

Travel by region and Rural-Urban Classification of residence (Tables NTS9901 to NTS9915)

## Related information

**Other travel surveys in Great Britain**. From January 2013, the coverage of the NTS changed to sample residents of England only. This change was agreed following a public consultation in 2011. Details of the consultation outcome can be found at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/230560/NTSconsultationSummaryofresponses.pdf

Related surveys carried out in other areas of Great Britain which cover similar topics (though do not use the same collection methods as NTS) include:

Transport Scotland collect personal travel data for residents of **Scotland** using a one day travel diary in their Scottish Household Survey:

http://www.transportscotland.gov.uk/statistics/scottish-household-survey-travel-diary-results-all-editions

In **Northern Ireland** data are collected via the Travel Survey for Northern Ireland, based on a similar methodology to the NTS (interview and 7-day travel diary):

https://www.infrastructure-ni.gov.uk/articles/travel-survey-northern-ireland

The Welsh Government collect information on active travel as part of the National Survey for **Wales**, although this does not include a travel diary:

http://gov.wales/statistics-and-research/national-survey/

Within England, Transport for London conduct the London Travel Demand Survey for **London** residents which is much bigger than the London sample of the NTS (and uses a different data collection method)

tfl.gov.uk/corporate/publications-and-reports/london-travel-demand-survey

**Other transport statistics**. In addition to National Travel Survey statistics presented here, DfT and others publish a range of statistics related to modes of transport - as signposted throughout this document. Detailed comparisons between the NTS and other sources are not always possible because of differences in collection, coverage and measurement. However, where the NTS and other statistics refer to the same phenomenon, a degree of coherence between different sources can be observed over time, although year-on-year changes can vary.

The full range of statistics published by DfT can be found at https://www.gov.uk/government/organisations/department-for-transport/about/statistics

## Methodology notes

**Strengths and limitations of the NTS:** The NTS is a long-running survey which uses a high-quality methodology to collect a broad range of information on travel behaviours at the England level. The methodology has been broadly unchanged over several decades meaning that trends can be monitored. Figures are weighted to be representative of the population. However, like any statistical source, the NTS has its limitations. For example, as a sample survey resulting figures are estimates with associated sampling error. In addition, figures below national level require several years data to be combined, and figures for geographies below regional level cannot be published.

**Survey methodology:** Since 2002, the Department for Transport has commissioned the National Centre for Social Research (NatCen) as the contractor for the NTS. Full guidance on the methods used to conduct the survey, response rates, weighting methodology and survey materials can be found in the National Travel Survey Technical Report at:
https://www.gov.uk/government/publications/national-travel-survey-2017

A 'Notes and definitions' document which includes background to the NTS, response rates, sample size and standard error information and a full list of definitions can be found at:
https://www.gov.uk/government/publications/national-travel-survey-2017

**Sample sizes** are included in all the individual web tables. As estimates made from a sample survey depend upon the particular sample chosen, they generally differ from the true values for the population. This is not usually a problem when considering large samples but may give misleading information when considering data from small samples, such as cyclists in a particular age group.

A note explaining the methodology used to calculate the 2019 NTS standard errors and tables of standard errors for selected key statistics are published at:
https://www.gov.uk/government/publications/national-travel-survey-2017

**National Statistics** are produced to high professional standards set out in the Code of Practice for Official Statistics. The National Travel Survey was assessed by the UK Statistics Authority against the Code of Practice and was confirmed as National Statistics in July 2011. Details of ministers and officials who receive pre-release access to these statistics up to 24 hours before release can be found in the pre-release access list at:
https://www.gov.uk/government/publications/national-travel-survey-2017