13. Evidence from household travel surveys

13.1 Introduction

This chapter presents evidence on changes in travel patterns drawn from a baseline household travel survey that took place in all three towns in Autumn 2004 and a final household travel survey, again in all three towns, conducted in Autumn 2008.

The household travel surveys were undertaken by Socialdata & Sustrans (who were also responsible for the delivery of the personal travel planning programme in Peterborough and Worcester). Reports comparing the results in 2008 and 2004 are available for each town (Socialdata & Sustrans, 2009a, 2009b, 2009c). These reports contain extensive analysis of a wide variety of aspects of travel behaviour in the three towns. Data summary tables are included in appendices to Socialdata & Sustrans (2009a, 2009b, 2009c) for the 2008 household travel survey, and equivalent data tables are included as appendices to Socialdata & Sustrans (2005a, 2005b, 2005c) for the 2004 household travel survey.

In addition to the baseline and final household travel surveys, Socialdata & Sustrans carried out several interim household surveys in each of the towns in order to evaluate the effects of certain phases of the personal travel planning interventions. The interim surveys involved smaller numbers of people, being typically somewhat over a third of the size of the 2004 and 2008 surveys, and being split between a sample in a personal travel planning 'target area' and a sample drawn from the rest of the town to act as a control. Although the analysis in this chapter draws primarily upon the data from the 2004 and 2008 surveys, we have made some use of the data from the interim surveys in order to paint an indicative picture of how trip rates by each mode changed over time.

The results given by Socialdata & Sustrans in their analysis of the baseline and final surveys are weighted, and although use of weightings is not uncommon in analysis of these types of surveys, the approach to weighting used by Socialdata & Sustrans has been questioned by Bonsall and Jopson (2007). For this reason, we obtained unweighted datasets kindly provided by Socialdata & Sustrans, and repeated many of the analyses using both the weighted and unweighted datasets. Although (as would be expected) weighting does make a difference to the results, often of the order of a percentage point or so in the changes observed from 2004 to 2008, there did not appear to be any consistent pattern of change which would cause concern of bias (sometimes weighting moved the results in one direction, sometimes in the other), and the general picture produced was broadly similar. We have not taken a view ourselves on weighting in general, and these weightings in particular, and report both results below. Details of the approach to weighting adopted by Sustrans and Socialdata are available in Socialdata & Sustrans (2009d).

The household surveys were self-completion mail-back one-day travel diaries carried out in a format and using protocols which Socialdata has developed over some years. Information on sample sizes and response rates, a discussion on the question of weighting, and some issues of definitions and statistical reliability, are reported in the annex to this chapter.

In their analysis of the survey returns, Socialdata concentrated on 'day-to-day personal travel behaviour', excluding trips over 100km and commercial (i.e. non-personal) trips[1]. In the following discussion, any analysis of the data by Socialdata that we report therefore takes this approach. In our own analysis, we have generally tended to look at trips of 50km or less, since this distance band most closely relates to travel within the towns, but have also, where appropriate, included trips up to 100km or, in a few instances, trips of all lengths.

In the following sections, we first give an overview of the results for the three towns taken together. We then give a summary of the results for each of the towns taken separately. This is followed by more detailed examination of the evidence in relation to the following questions:

- Which car driver trips were most affected, in terms of trip lengths (i.e. did the interventions have more effect on short car trips than on longer car trips)?
- Which trip purposes were most affected?
- Were certain demographic or socio-economic groups more influenced than others?
- What was the estimated change in overall distance driven by car by the whole population of each town?

Detailed data tables are given in the annex at the end of the chapter.

13.2 Overview of key results

Taking the three towns together, from 2004 to 2008, weighted, all trips, there was a reduction of 9% in car driver trips (and also 9% for car driver trips less than 50km long) and a reduction of 5% in car driver distance (7% for car driver trips less than 50km long). The results from the unweighted dataset were similar[2].

At the aggregate level (all towns, all people, all modes, trips of up to 50km) there was a reduction in the number of car trips per person, and a net increase in trips by other modes, though somewhat smaller: in other words the reduction in car trips seems only partly shifted to other modes, and there was a net reduction in the total number of trips. This is shown in Table 13.1.

Thus at first sight we can say that roundly two thirds of the reduction in car trips came from drivers, and one third from car passengers. While most of the reduction in car use was due to mode switch, a small percentage (7% across all the towns, but ranging from 4% in Worcester to 11% in Darlington) came from a net reduction in the number of trips.

There was little change in the average distance travelled per person or per trip, at the aggregate level. One interpretation of this would be that the overall locations of destinations were broadly stable, but closer examination suggests that this cannot be the case as the proportion of trips in each distance band was very far from stable, as discussed below. (It is

[1] A commercial trip is defined as one undertaken exclusively as a professional service (e.g. as a taxi driver, freight driver etc).

[2] Using the unweighted dataset, car driver trips fell by 8% (and 9% for trips less than 50 km long), and car driver distance fell by 3% (and 5% for trips less than 50 km long).

not possible from the data to identify 'the same trips', because the samples of people chosen were different, so only indirect evidence is available on this point.)

There was a strong systematic effect such that the percentage reduction in car driver trips was greater, the shorter the trip. Figures from both the unweighted and weighted datasets for each distance category are summarised in Tables 13.2 and 13.3.

Table 13.1: Change in number of trips per 100 people per day, 2004 to 2008

	Darlington	Peterborough	Worcester	Total all towns
car driver	*-11.3*	*-12.4*	*-10.7*	*-11.5*
car passenger	*-4.5*	*-5.1*	*-2.2*	*-4.0*
all car	-15.8	-17.5	-13.0	-15.4
all non car	+14.0	+16.3	+12.5	+14.3
total	**-1.8**	**-1.1**	**-0.5**	**-1.1**
total as % of change in 'all car'	11%	6%	4%	7%

Notes: Data are for trips of up to 50km, weighted. The unweighted data show a similar pattern in general terms, although different in detail. 'Total all towns' figures are derived from an aggregated dataset, using data from all three towns with no weighting by population size.

Table 13.2: Changes in car driver trips and distance: combined dataset for three towns (unweighted)

	Up to 1km	1.1 -3 km	3.1 – 5km	5.1 – 10km	10.1 – 50km	Over 50km	**Total**
change in car driver trips	-21%	-14%	-9%	-4%	-3%	-1%	**-8%**
change in car driver km	-19%	-14%	-9%	-5%	-4%	+1%	**-3%**
% of reduction in car driver km in each distance category	***2%***	***12%***	***24%***	***18%***	***43%***	**-**	***100%***

Table 13.3: Changes in car driver trips and distance: combined dataset for three towns (weighted)

	Up to 1km	1.1 -3 km	3.1 – 5km	5.1 – 10km	10.1 – 50km	Over 50km	**Total**
change in car driver trips	-22%	-14%	-10%	-6%	-3%	0%	**-9%**
change in car driver km	-21%	-15%	-10%	-7%	-5%	-2%	**-5%**
% of reduction in car driver km in each distance category, considering only trips of 50km or less	***2%***	***10%***	***23%***	***19%***	***47%***	**-**	***100%***
% of reduction in car driver km in each distance category, considering trips of all lengths	***2%***	***9%***	***19%***	***16%***	***40%***	***14%***	***100%***

Roundly speaking, and looking at both the weighted and unweighted results, there was a reduction of 20% in car driver trips of less than a kilometre; 15% for trips of 1-3km; 10% for trips of 3-5km; and 5% for trips of 5-10km (these representing the distances of the majority of trips that stayed within the towns). There was also a reduction of around 3% in car driver trips for longer journeys of 10-50km, this being the distance corresponding with the town and surrounding region. There was little or no reduction in car driver trips over 50km (though the pattern in this distance band showed considerable instability between the towns, due to the small number of trips over 50km in the individual town data).

This overall pattern of a greater impact on within-town travel is consistent with what might be expected from the focus of the policy initiatives in the towns, which was on regular, and generally shorter trips (e.g. to work, school, shop etc) and with greater emphasis on mode shift to foot, cycle and bus than to train.

It does seem to be the case that the strongest effect on the *number* of trips was on shorter distance car trips. However, of course it does not follow that the change in these short distance car trips had the most effect on traffic levels (as measured by vehicle kilometres driven); a smaller reduction in longer trips can have a bigger effect than a larger reduction in the very short trips. This is seen clearly in the results (Tables 13.2 and 13.3). The car driver trips whose reduction contributed most to a reduction in traffic were those in the 10-50km distance band, although there were also significant contributions from the 3-5km and 5-10km distance bands.

Thus, the largest behaviour changes were seen in short car driver trips, but the largest reduction in traffic came from medium and longer distance car trips. This is particularly notable given that the towns are not large cities, and the policy focus had been mostly on shorter internal trips.

The household surveys showed substantial increases in walking, cycling and public transport trips, though the pattern varied considerably between the towns. In general, the increases in walking as a main mode were seen most strongly for short trips, and increases in public transport use for rather longer trips, as would be expected. However, when looking at the reductions in car use and increases in walking, cycling and public transport use separately in each distance category, it does not appear that there is a simple shift from car to other modes for the same journeys, since the total number of trips in each distance band is not constant. This suggests that some destination-switching must also be occurring at the aggregate level – whether because the same individuals are changing destination or because different individuals are making the trips – though geographically-based panel information would be necessary to test this fully.

In summary, we see evidence of changes in behaviour that are broadly compatible with policy intentions in the three towns, and also (as will be seen in subsequent chapters) with other sources of data, but the picture is more complex than a simple mode shift of an unchanged trip pattern.

Now we proceed to report the results in more detail for the three towns separately.

13.3 Headline results for the three towns

13.3.1 Darlington

In Darlington, looking at the unweighted dataset, there was a reduction in the number of car driver trips per person of 8% (or 7% for car driver trips less than 50km long). Car driver distance declined by 6% for trips less than 50km long[3]. The weighted dataset showed similar results, with car driver trips falling by 10% (and also 10% for trips of less than 50km), and car driver distance declining by 7% for trips of less than 50km.

Looking at other travel modes, the most striking change was in the number of cycle trips, which increased by 89% (unweighted) or 113% (weighted) between 2004 and 2008. Walking showed a more moderate increase of 11% (unweighted) or 13% (weighted), while bus travel decreased by 6% (weighted)[4].

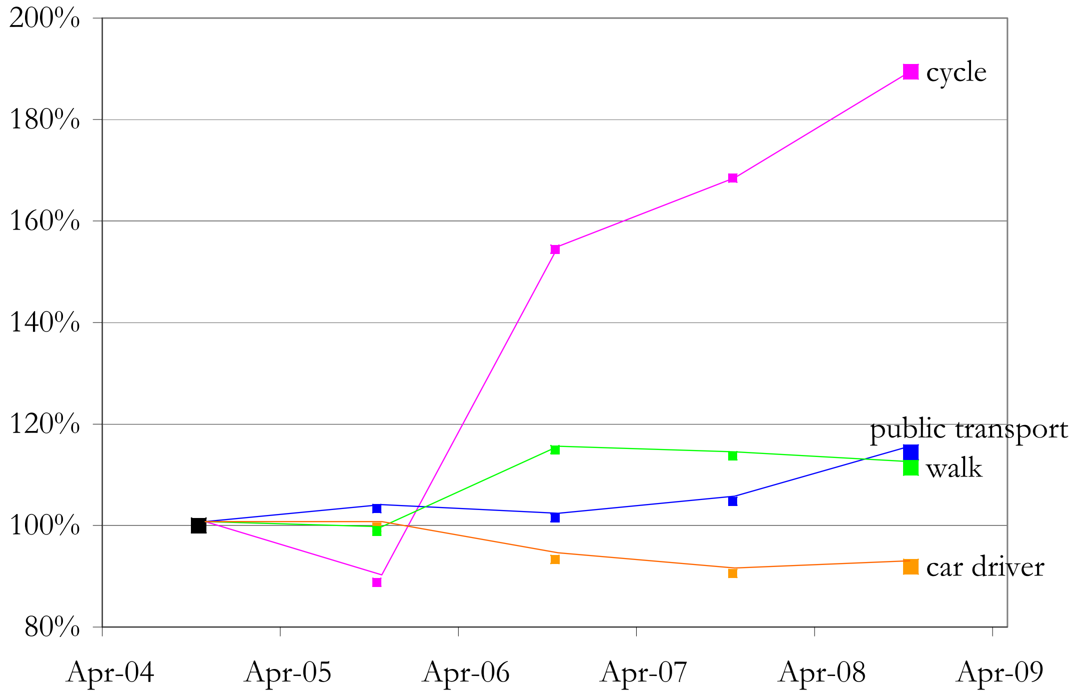
More detailed results, including number of trips per person per day for each mode, %-point changes in mode share, and changes in distance travelled by each mode, are reported in the annex to this chapter, at A13.2 and A13.3.

While the 2004 and 2008 household surveys give snapshots of trip rates by mode in Darlington at two moments in time, it is also possible to gain some sense of how trip rates may have changed over this four-year period from three interim household surveys which were conducted by Socialdata at the same time of year (autumn) in 2005, 2006 and 2007. These were primarily carried out so as to compare changes in travel patterns as a result of the three phases of personal travel planning. In order to derive results for the whole town it is necessary to make a series of assumptions as to the representativeness of control (non personal travel planning area) samples, and similarity of behaviour change in different areas of the town. The results thus derived, as illustrated in Figure 13.1, should therefore be treated as indicative only.

Inspection of Figure 13.1 suggests that the pronounced growth in cycling in Darlington may not in fact have got underway until around 18 months after the start of the Sustainable Travel Town work. However, from October 2005 onwards (in fact, from the start of the Cycling Demonstration Town programme in Darlington), growth was continuous and quite rapid. It continued beyond the final phase of personal travel planning in summer 2007.

[3] Reductions in car driver distance for trips in all distance bands are not quoted here and in sections 13.3.2 and 13.3.3, because changes in a very small number of long trips captured by the household survey can distort the overall results.
[4] The unweighted dataset suggests an increase in bus trips of 11%. However, our analysis of bus patronage data suggests that the result from the weighted dataset is more plausible.

Figure 13.1: Percentage changes in Darlington in trips per person by mode, relative to October 2004 baseline



Note: Data points in October 2005, 2006 and 2007 are from interim surveys. These had a smaller sample size than the main surveys, and were hence subject to higher statistical error, as well as having some differences in definition. Each interim survey was of approximately 1000 residents in a personal travel planning target area, and approximately 500 residents elsewhere in the town (designed as a control for measuring relative change in trip patterns as a result of personal travel planning). The Socialdata & Sustrans interim survey reports quote changes in trips per person by 'public transport' (not bus), use unweighted data, and exclude trips of over 100km. For consistency, the same conventions have been used in presenting the baseline and final figures shown here.

13.3.2 Peterborough

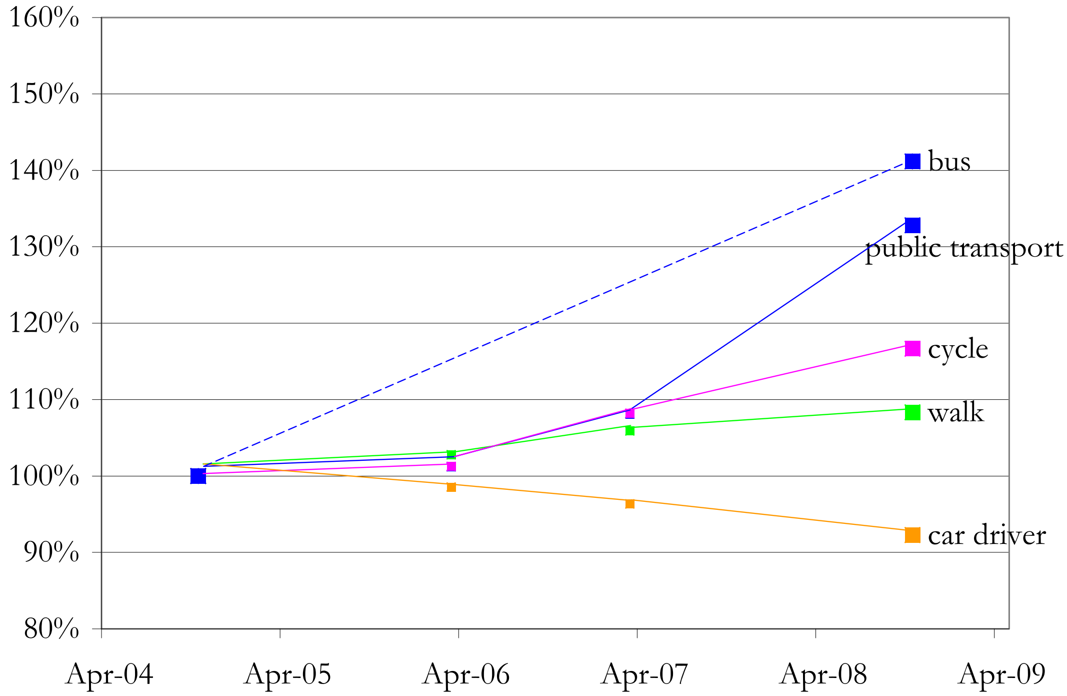
In Peterborough, looking at the unweighted dataset, there was a reduction in the number of car driver trips of 8% (and also 8% for car driver trips less than 50km long). Car driver distance declined by 7% for trips less than 50km long. The weighted dataset showed similar results, with car driver trips falling by 9% (10% for trips of less than 50km), and car driver distance declining by 10% for trips of less than 50km.

Looking at other travel modes, the biggest change was in bus trips, which increased by 42% (unweighted) or 38% (weighted) between 2004 and 2008. Walking showed a more moderate increase of 8% (unweighted) or 14% (weighted), as did cycling, which increased by 16% (unweighted) or 11% (weighted).

More detailed results, including number of trips per person per day for each mode, %-point changes in mode share, and changes in distance travelled by each mode, are reported in the annex to this chapter, at A13.2 and A13.3.

As in Darlington, the 2004 and 2008 household surveys give snapshots of trip rates by mode at two moments in time, but it is also possible to gain some sense of how trip rates may have changed over this four-year period from two interim household surveys, which were conducted by Socialdata in Spring 2006 and Spring 2007. For the same reasons as described in section 13.3 in relation to Darlington, the resulting graph, shown in Figure 13.2, should be treated as indicative only.

Figure 13.2: Percentage changes in Peterborough in trips per person by mode, relative to October 2004 baseline



Note: Data points in 2006 and 2007 are from interim surveys. These had a smaller sample size than the main surveys, and were hence subject to higher statistical error, as well as having some differences in definition. Each survey was of approximately 1,000 residents in a personal travel planning target area, and approximately 500 residents elsewhere in the town (designed as a control for measuring relative change in trip patterns as a result of personal travel planning). The Socialdata & Sustrans interim survey reports quote changes in trips per person by 'public transport' (not bus), use unweighted data, and exclude trips of over 100km. For consistency, the same conventions have been used in presenting the baseline and final figures shown here.

13.3.3 Worcester

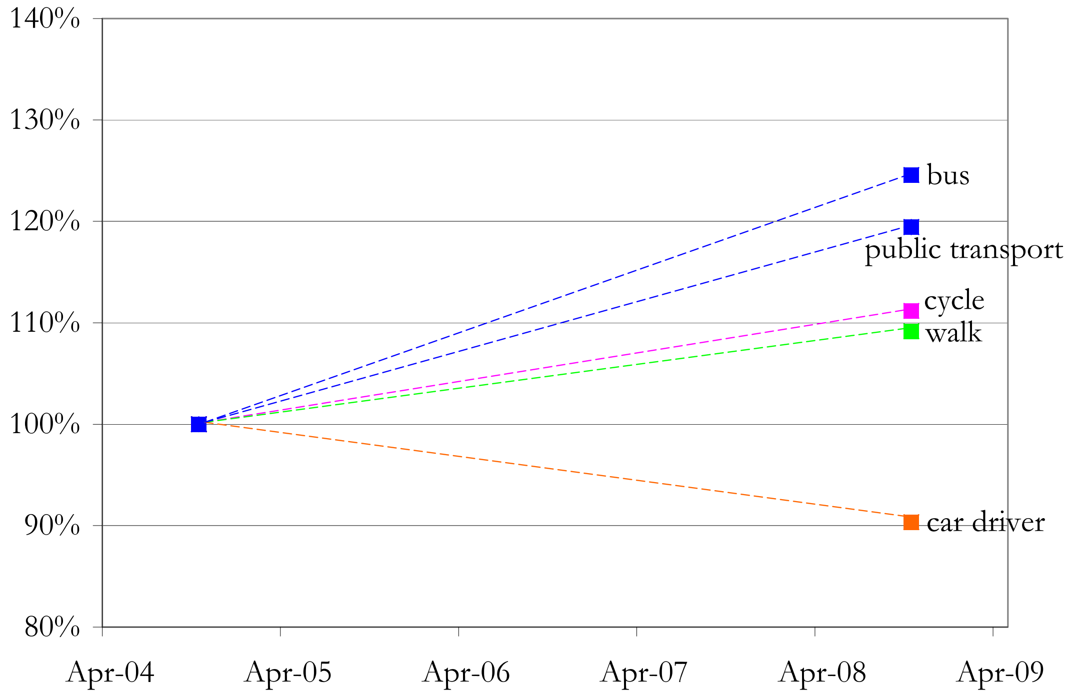
In Worcester, the unweighted dataset shows a reduction in the number of car driver trips of 10% (and also 10% for car driver trips less than 50km long). However, car driver distance declined by rather less, at just 3% for trips less than 50km long. This seems to reflect the fact that a high proportion of the change in behaviour was in the replacement of the shortest car trips, as will be evident from trip length data, discussed in more detail later. The weighted dataset showed similar results, with car driver trips falling by 7% (8% for trips of less than 50km), and car driver distance declining by 3% for trips of less than 50km.

Looking at other travel modes, Worcester differed from the other two towns in that no single mode dominated the increase in sustainable travel. Bus trips increased by 25% (unweighted) or 38% (weighted); cycling trips by 11% (unweighted) or 23% (weighted); and walking trips by 9% (unweighted) or 12% (weighted).

As with the other towns, more detailed results, including number of trips per person per day for each mode, %-point changes in mode share, and changes in distance travelled by each mode, are reported in the annex to this chapter, at A13.2 and A13.3.

Although interim travel surveys were conducted in Worcester, they took a different form to those in Darlington and Peterborough, and it is hence not possible to examine how trip rates by the different modes changed in the period between the baseline and the final surveys. Figure 13.3 therefore simply shows the change in each of the main modes between 2004 and 2008.

Figure 13.3: Percentage changes in Worcester in trips per person by mode, relative to October 2004 baseline



Note: No interim data available for Worcester. For consistency with graphs for Darlington and Peterborough, changes are for unweighted data and exclude trips of over 100km.

13.4 Evidence on the type of behaviour change

As we have already noted in section 13.2, the picture that emerges from the household travel surveys is more complex than a simple shift of an unchanged trip pattern from car to other modes. Instead, there seems to be evidence of a combination of changes, affecting both short and, to a lesser but still important extent, longer car journeys, and possibly including destination-switching (i.e. replacing long trips with shorter trips); mode-switching; and perhaps not travelling at all, or 'trip evaporation'.

In order to examine the evidence for these changes, we prepared detailed trip length/travel mode matrices, using a combined dataset, which pooled the data from the three towns, and also for each town individually. The matrices (at A13.5 in the annex to this chapter) show two things:

- The change in *number of trips* per 100 residents per day by each mode, in each of eight journey distance bands, between 2004 and 2008 (Tables 13.13 to 13.16 using the unweighted dataset and Tables 13.21 to 13.24 using the weighted dataset);
- The change in *total distance travelled* (in km per 100 persons per day) by each mode, in each of the eight journey distance bands, between 2004 and in 2008 (Tables 13.17 to 13.20 using the unweighted dataset and Tables 13.25 to 13.28 using the weighted dataset).

The tables using the weighted datasets are based on special tabulations kindly prepared for us by Socialdata. All the datasets used for the matrices include trips of all distances and for all purposes. The key points to emerge from the matrices are set out below.

A differential impact on car trips, according to journey distance
As previously noted (and shown in Tables 13.2 and 13.3), figures aggregated across the three towns for changes in car driver trips following the Sustainable Travel Town work, show that percentage reductions in trips were generally greater for shorter journeys. Looking at the combined dataset, the picture that emerges is – roundly speaking – a reduction of about 20% in the shortest car driver trips (under 1km); 15% for trips of 1-3km; 10% for trips of 3-5km; 5% for trips of 5-10km; and 3% for trips of 10-50km. This pattern is evident both in terms of numbers of trips and distance travelled. However, as illustrated by Tables 13.2 and 13.3 above, the smaller reductions in the number of medium and longer trips (especially those in the 10-50km band) were the most important in terms of their effect on traffic levels. Hence, it is too simple to say (as is sometimes argued) that smarter choice initiatives only affect short car trips.

Indications of destination-switching
There were reductions in trips and distance by car (as driver and as passenger) across most of the journey distance bands. However, these were often *not* fully offset by corresponding increases in trips and distance by other modes within the same band. This suggests that mode-switching is, on its own, an inadequate explanation for the behaviour change that took place, and there may also be either destination-switching (or trip 'evaporation', discussed below) taking place.

For example, in Darlington:

- the reduction in car driver/passenger trips in the 3-5km and 5-10km bands is only partly accounted for by more cycle/bus/walk trips (so that there is a reduction in the number of trips in this distance band overall); whereas
- the reduction in car driver/passenger trips in the 1-3 km band is *more than* offset by an increase in walking, cycling and bus travel (so that there is an increase in the number of trips in this distance band overall).

The simplest (although not the only) explanation for this pattern is that some residents have replaced medium-length car trips (3-10km) with slightly shorter (1-3km) trips by foot, bike or bus. Intuitively, it seems plausible that this might happen as a result of greater familiarity with a local neighbourhood, including local shops, parks and other facilities, as a result of the types of information offered to Darlington residents through the personal travel planning programme (which included, for example, local community guides with maps and information about neighbourhood facilities).

Indications of trip evaporation
In Peterborough and Worcester, there is less clear evidence of destination-switching, although it is still possible that this took place. Tentatively, however, there are indications of a degree of 'trip evaporation'– that is, of journeys that might previously have been made by car not being made at all. This may explain the large reduction in car driver/passenger trips in the shortest distance category (<1km), which was not fully offset by an increase in walking.

At the aggregate level (looking at all trips of <50km), there is further evidence of trip evaporation, most clearly seen in Table 13.1 above, where the reduction in all car trips is slightly greater than the increase in all non-car trips. This shows that a small percentage of this reduction was the result of trips not being made at all.

Possibility of trip generation
Finally, we should note that the smarter choice measures implemented by the towns might also, in theory, be expected to have resulted in a degree of trip generation – for example, due to extra walking or cycling trips for leisure. Given that there has been a net reduction in the total number of trips by all modes, any such trip generation must have been more than offset by trip evaporation.

The analyses above are all based on differences between the patterns observed in 2004 and the patterns observed with a comparable but different sample of people in 2008. This is conventionally interpreted as 'behavioural change'. However, a word of caution is necessary, in that mode-switching, destination-switching and trip evaporation cannot be directly observed with this sort of data. A fuller understanding of the relative importance of mode-switch, destination-switch and trip evaporation might be possible with use of panel data, although even if this were available its interpretation would require allowance for the natural extent of behavioural churn, and the process of aging and changes in circumstances which mean that even the same individuals are not identical after a four-year period. In other words, both panels and independent samples have particular advantages and disadvantages, and there are differences of view amongst practitioners as to which are preferable. Nevertheless, we can say that the changes in travel patterns by the populations of the Sustainable Travel Towns do appear to be more complex than mode switch alone.

13.5 Relation between trip purpose and behaviour change

The tables at section A13.6 in the annex summarise the change in 'car as driver' mode share between 2004 and 2008 in each of the towns for different trip purposes. The main point to emerge here is that the journey purposes where car use declined most consistently across the towns were leisure and shopping, with travel to work also affected but to a lesser degree.

Thus, 'car as driver' mode share fell for leisure trips in all three towns (by 12-15%, or between 4 and 6%-points, in both weighted and unweighted datasets). Similarly, car use for shopping trips fell in all towns (by 8-14%, or between 3 and 6%-points). The change in 'car as driver' mode share for travel to work appears somewhat smaller, but is still downward in two out of three of the towns (a reduction of 0-5%, or between 0 and 3%-points).

For the other trip purposes, the change in 'car as driver' mode share shows a wider range, or increases in some towns and decreases in others.

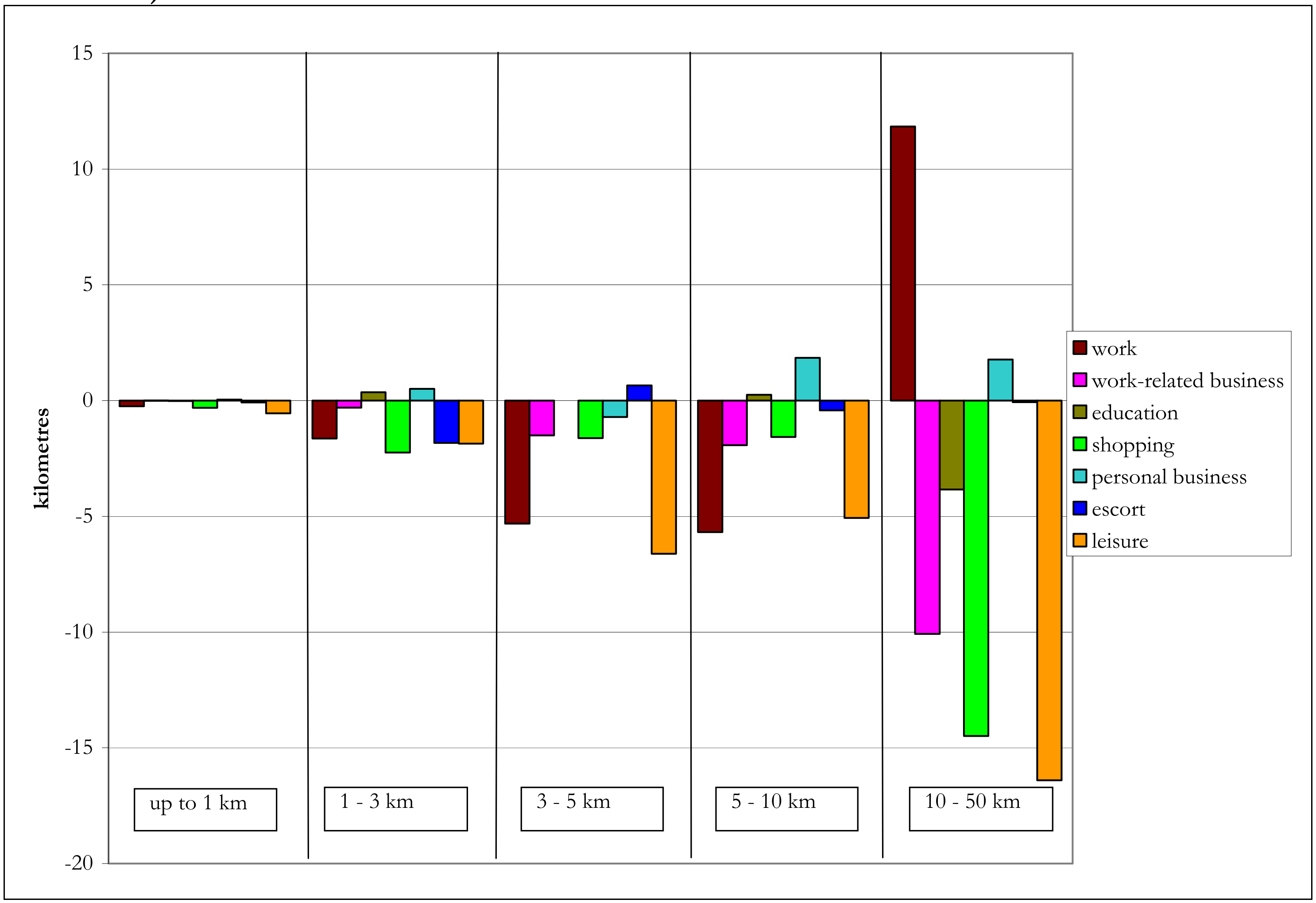
It is also instructive to examine changes in car use as measured by car driver distance for each journey purpose, disaggregated into journey distance bands. This is illustrated for the combined dataset in Figure 13.4, and town by town for the four journey purposes with the largest changes in Figure 13.5.

From inspection of these Figures, it is apparent that there were reductions in car driver distance for most journey purposes, and across most of the journey distance bands, in most of the towns. The biggest reductions in car driver distance appear to have been for leisure and shopping trips, but there were also substantial reductions in car driver distance for work-related business and for commuting in some distance bands and some towns.

The notable exception to the general pattern is car driver distance for the journey to work, which fell in all three towns across the shorter distance bands (largely representing trips to work by residents who worked within their towns), but increased in the 10-50 km distance band in one of the towns, Worcester. This perhaps illustrates a limitation of Smarter Choice Programmes operating at the town-level as opposed to the regional level.

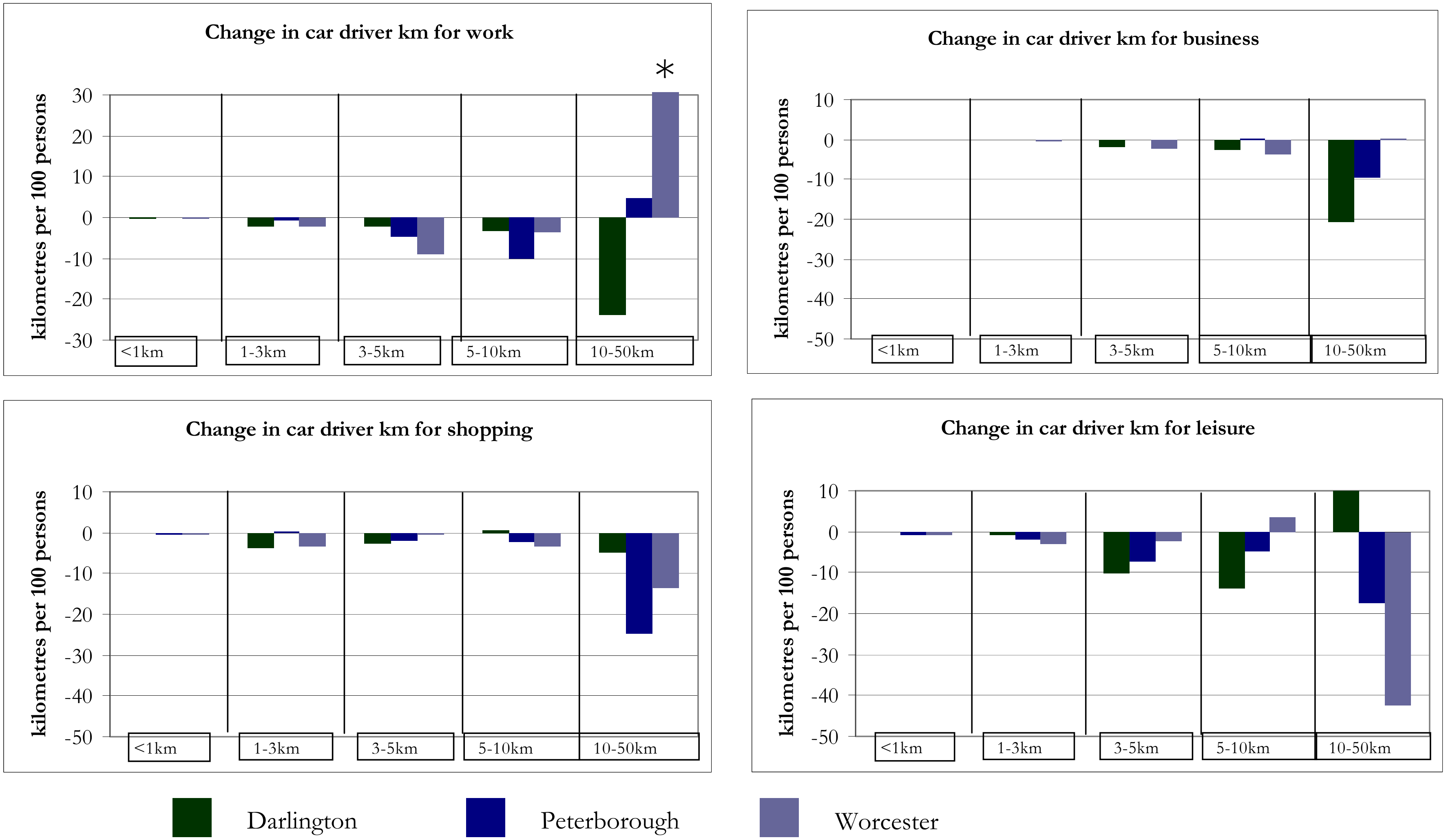
Using the combined dataset, the journey purposes that showed the largest *percentage* reduction in distance travelled as a car driver (for trips<50 km) were education (-25%); work-related business (-23%); shopping (-14%) and leisure (-12%). However, education trips accounted for only a small proportion of total distance travelled. Hence, the largest contribution to the reduction in *total car driver distance* for trips of <50 km came from leisure trips (which contributed 45% of the total savings in car driver distance), shopping trips (30%) and work-related business (21%).

Figure 13.4: Change in car driver km per 100 persons per day, according to distance band and journey purpose (aggregated data for all towns)



Note: Data is from weighted dataset; aggregated for all three towns.

Figure 13.5: Change in car driver kilometres per 100 persons per day in each town for selected journey purposes



Notes: * all graphs are to same scale to aid comparison, but change in kilometres per 100 persons per day for commuting in the 10-50 km distance band in Worcester is larger than shown, at +56 km. Figures use weighted datasets.

For work and education trips, we are able to compare the changes in mode share shown in the household survey with the data reported in Chapters 11 and 12 from workplace and school travel surveys. The changes in mode share for these trip purposes, as indicated by the household travel surveys, are shown in Tables 13.31 and 13.32 in the annex.

Travel to work

For the journey to work, comparisons are only possible for Peterborough, since the other towns had insufficient workplace travel monitoring surveys. Here, the household travel surveys suggest that there was a fall in the proportion of 'car as driver' trips to work from 64% to 61% (weighted dataset) or 65% to 63% (unweighted dataset – not shown) between 2004 and 2008, across all Peterborough households.

Meanwhile, the results of the workplace travel surveys reported in Chapter 11 suggest that – for the 19 companies with 'before' and 'after' monitoring data – the number of cars per 100 staff fell from 76 to 73 (a fall of about 4%) between the date of the first survey (between 2005 and 2007) and the date of the most recent survey (2007 to 2009).

Two main points emerge from this. First, it appears that the initial (and final) level of car use may have been somewhat greater amongst the organisations that became engaged in workplace travel planning, than amongst the workforce as a whole.

Second, the average reduction in car use amongst the 19 organisations appears to be broadly comparable to that indicated by the household travel surveys for the workforce as a whole. Roughly speaking, the workplace travel surveys at the 19 organisations suggest an average reduction in car use of 4% (although with some organisations achieving significantly more), while the household travel surveys suggest a town-wide reduction of 5% (weighted dataset) or 3% (unweighted dataset), although over a slightly longer time period.

In other words, it appears likely that commuting to work by car declined in Peterborough in *both* those organisations which had become engaged in workplace travel planning, and those organisations which had not done so. This may perhaps indicate that measures other than workplace travel planning (e.g. the overall travel awareness campaign; personal travel planning; public transport information and marketing) had an effect on travel patterns for the journey to work. It seems plausible that the organisations with modest changes in car use may be showing the effects of a combination of town-wide measures, while the organisations with above-average reductions in car use may be demonstrating the effects of more intensive implementation of workplace travel planning (although workplace-level evaluation would be necessary to confirm this).

Travel to school

For education trips, the household travel survey results may be compared with data from school travel surveys in all three towns. In doing this, it is important to keep in mind that the household travel survey category 'trips to education' included trips to college, which were not covered by the school travel surveys. It should also be remembered that the household travel surveys record behaviour change over a period of exactly four years, while the school travel surveys record behaviour change over slightly different periods for different schools, but generally slightly less than four years.

In broad terms (although not always in the detail), the household survey results corroborate the results from the school travel surveys, as follows:

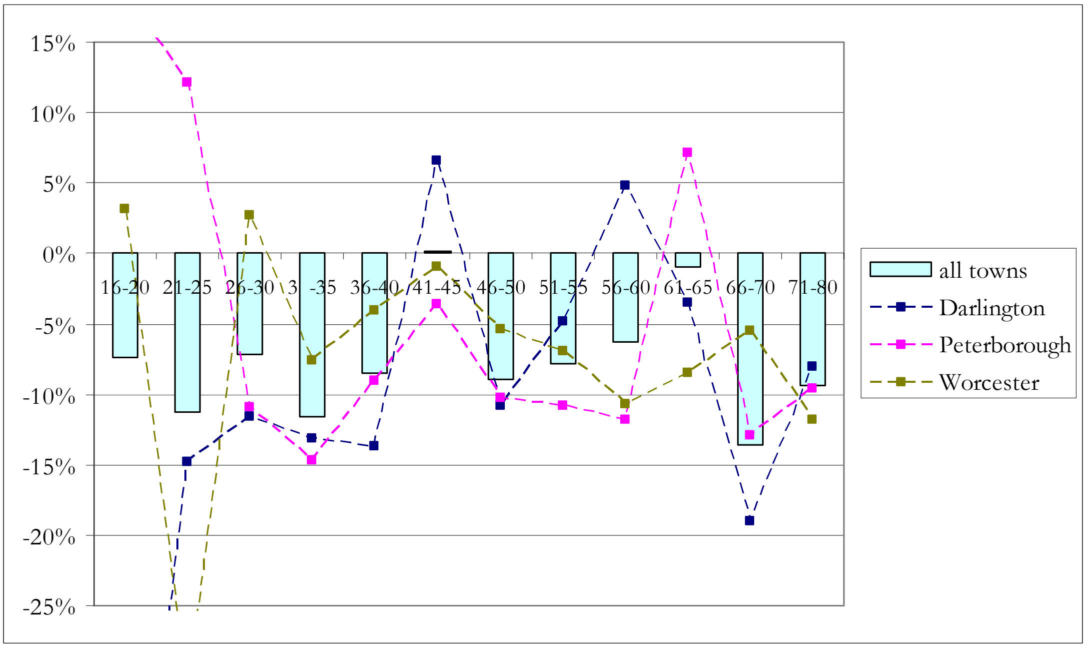
- Both surveys confirm that Darlington started with the lowest level of car use for trips to school, but was still able to achieve a reduction in car mode share. Its main success was in increasing cycle trips to school from a low base to the highest level of all three towns.
- Peterborough achieved a large reduction in car use from a high base. The household survey shows that this was principally achieved through a modal shift to walking (as also shown by school travel analysis) and public transport.
- Worcester also achieved a large reduction in car use from a high base. This was achieved largely through an increase in walking (evident in both data sources) and to some extent cycling (evident only from the school travel surveys).

13.6 Relation between demographic characteristics and mode change

The household survey datasets provide an opportunity to examine at a fairly crude level the question of who has changed their behaviour as a result of the interventions in the three Sustainable Travel Towns, and, in particular, whether some demographic or socio-economic groups have cut their car use more than others. A fuller understanding of how different groups have changed their behaviour would require panel data, but we can nevertheless draw the following conclusions from examination of the combined unweighted dataset for all three towns (Annex A13.7):

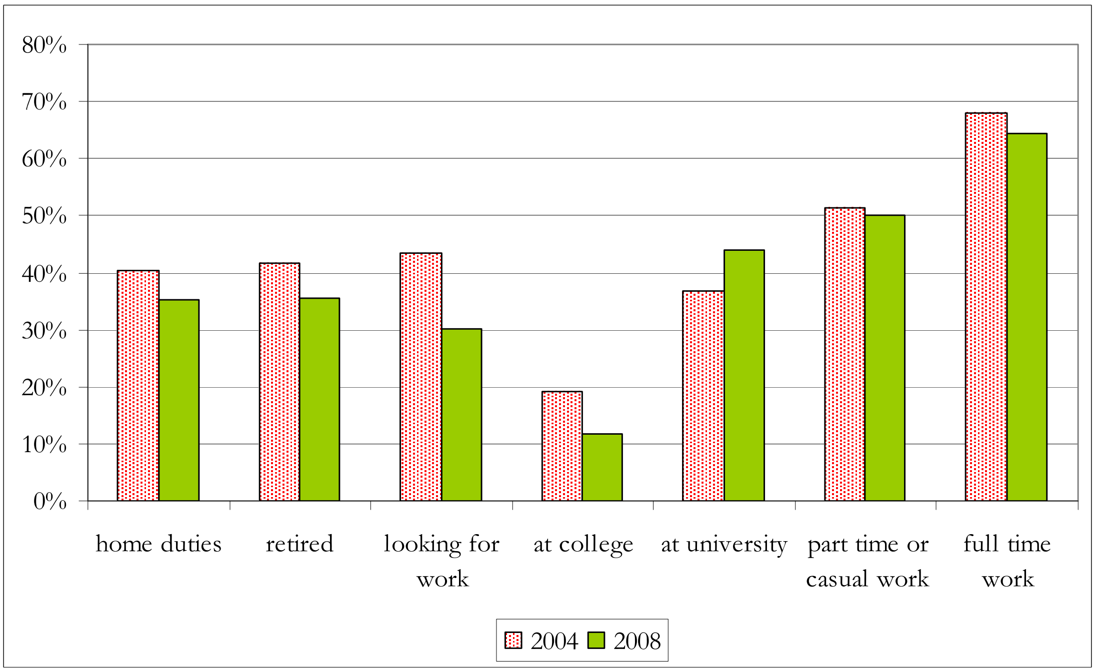
- Both men and women have reduced their car use. For men, the proportion of trips made as a car driver fell by 7% (or 4%-points), while for women, the proportion fell from a lower base by 6% (or 2%-points).
- There was a reduction in car driver mode share within most age groups, typically of around 6-12%. However, in all three towns, and in the combined dataset, it appeared that the cohort of 41-45 year olds were less likely to reduce their car use. In two of the towns, and in the combined dataset, there were indications that 61-65 year olds were also less likely to reduce their car use. This is illustrated in Figure 13.6.
- Some socio-economic groups appear to have been more receptive than others to interventions to encourage less car use. Car driver mode share fell most amongst college students (-38%) and people looking for work (-30%), although these figures should be treated with some caution because the number of trips was fairly small. There were moderate reductions in car driver trips amongst retired people (-15%) and people on 'home duties' (-12%). Finally, car driver trips fell least amongst people in full-time work (-5%) or part-time/casual work (-2%). This is illustrated in Figure 13.7.

Figure 13.6: Change in car driver trips (per cent) according to age group



Note: Data from unweighted dataset, all car driver trips. 'All towns' figures are derived from an aggregated dataset, using data from all three towns with no weighting by population size.

Figure 13.7: Car driver mode share (%) in 2004 and 2008, according to employment status



Notes: Data from unweighted dataset, aggregated dataset for all towns, all car driver trips. Figures for university students are based on a small number of trips (300, of which ~100-130 as a car driver) and hence may not be reliable.

Thus, in general, it seems that car driver trips fell least (in percentage terms) amongst those groups who used their cars more intensively – 41-45 year olds (with a car driver mode share of 62% in the 2004 combined dataset) and people in full-time work (with a car driver mode share of 68% in the 2004 combined dataset). However, even quite small percentage reductions in car driver trips in these groups may have a significant benefit – a small reduction in a large number of car trips may have a similar or bigger effect than a large reduction in a small number of car trips.

Looking at the breakdown of car trips by socio-economic group, it appears that, roughly speaking, around four-tenths of the reduction in car driver trips may have come from people in full-time work, and a similar proportion from retired people, with a tenth of the reduction coming from people on 'home duties' and the remainder coming from people who were looking for work, at college, or in part-time/casual work (Table 13.4). It is perhaps slightly unexpected that changes in travel patterns amongst retired people may have played such a significant role in the observed behaviour change in the three Sustainable Travel Towns, and it seems likely that the changes to the concessionary travel scheme introduced in 2006 may have contributed to this change.

Table 13.4: Contribution to reduction in car driver trips, 2004 – 2008, by employment status

	proportion of all car driver trips in 2004	% change in car use 2004-2008	contribution to overall change in car use	% contribution to overall fall in car use
home duties	6%	-12%	-0.7%	10%
retired	20%	-15%	-3.0%	39%
looking for work	1%	-30%	-0.4%	5%
at college	1%	-38%	-0.3%	4%
at university	1%	+20%	-	-
part-time or casual work	15%	-2%	-0.3%	4%
full-time work	56%	-5%	-2.8%	37%
total	100%		-7.5%	100%

Note: Data from unweighted dataset, all towns combined, all car driver trips except those made by people who did not indicate their employment status.

It is also of interest that the biggest behaviour change appears to have been amongst groups who were either at a point of change in their lives, or on a reduced income, or both: that is, people who were at college, looking for work, or at an age of 66-70 when they may have been recent retirees[5]. Without panel data, it is impossible to answer the question of what interventions were most important in stimulating change in these particular groups. However, it is intuitively plausible, and consistent with previous research, that people who are in either of these situations are likely to be more receptive to changing their travel habits, if offered appropriate help and information.

[5] The reduction in car driver trips amongst 66-70 year olds is *not* related to the reduction in car use that might be expected amongst individuals as they age (as might, perhaps, be inferred if the 2004 and 2008 data were from panel surveys, with individuals four years older in the 'after' survey). Rather, the data suggest that the cohort of individuals aged 66-70 in 2008 drove their cars 14% less often than the cohort of individuals aged 66-70 in 2004.

13.7 Estimated change in overall distance driven by car by whole population

The change in car driver distance (per person) between the 2004 and 2008 surveys, together with population estimates for each year, allows us to derive an estimate for the change in total distance driven by the resident population of each town (Table 13.5). This figure might be expected to be comparable to the change in local traffic levels.

For this calculation, we looked at car driver distance for journeys of 50km or less, since the journeys in this distance band might be expected to have been influenced by the Sustainable Travel Town work. We did not assume any reduction in distance driven on trips over 50km.

In Darlington, there was little change in population during the course of the Sustainable Travel Town programme, and so the change in distance driven by all residents (net of population growth) is rather similar to the change in car driver distance per person. However, in the other two towns, there was net population growth between 2004 and 2008, particularly prominent in Peterborough. As a result, the reduction in car travel per person recorded in the surveys will have been offset to some extent by the greater number of people, and the observed change in traffic levels on the road would be expected to be less than the recorded change in car travel per person. (That is, for example, if car travel per person had gone down by 5% but population had gone up by 5%, we would expect broadly no change in traffic counts.) Taking all three towns together, car driver distance per person fell by just under 7%, and after allowing for population increases the car distance driven by residents would be expected to have fallen by just under 4%.

Table 13.5: Estimated change in town-wide car driver kilometres

	Darlington	Peterborough	Worcester	all towns
2004 population	*85,459*	*140,540*	*92,678*	*318,677*
2007 population index, compared to 2004	*100.2*	*106.1*	*101.1*	*103.0*
2004: distance as a car driver (km per person per day)	9.6	9.9	11.4	10.3
2008: distance as a car driver (km per person per day)	8.9	9.0	11.1	9.6
change in distance driven per person (trips <50km)	-7.1%	-10.0%	-2.9%	-6.5%
change in distance driven by all residents, 2008 relative to 2004 (trips <50km)	-6.9%	-4.5%	-1.9%	-3.7%

Notes: Most recent population figures are for mid-2007. Darlington population figures are from Small Area Population Estimates supplied by ONS; figures for Peterborough and Worcester supplied by the local authorities. Distances are those for trips of 50km or less; zero change assumed in distance driven on trips of over 50km. Calculation uses weighted dataset. 'All towns' figures are derived from an aggregated dataset, using data from all three towns with no weighting by population size.

13.8 Summary and conclusions from the household surveys

The main conclusions from the household surveys are as follows:

- The main effect of the interventions in the three towns was on trips of 50km or less. In general, greater numbers of shorter distance car trips were affected than longer distance ones.
- However, the relatively smaller percentage effect on medium and longer distance car trips (especially in the 10-50km band) contributed nearly half of the total effect on traffic levels.
- Overall, across the three towns, car driver trips fell by 8-9%, and car driver distance on the affected trips (i.e. those of up to 50km) fell by 5-7% (with the variation depending upon whether weighted or unweighted datasets are used).
- As a result of population growth in two of the towns (particularly Peterborough), the estimated effect on local traffic levels is somewhat lower, at about 4% across the three towns.
- Behaviour change almost certainly involved mode-switching, with evidence for some trip evaporation and indications of variation in distance bands which may be taken as evidence of destination switching.
- There was a greater percentage effect on leisure and shopping trips than on other trip purposes.
- Certain demographic/socio-economic groups appear to have reduced their car use more than others. Behaviour change was greatest amongst college students and people looking for work; moderate amongst retired people and people on 'home duties'; and least amongst those in full-time or part-time/casual employment.
- However, reduced car use by people in full-time employment still contributed over a third of the total effect on traffic levels.

13.9 References

Bonsall P and Jopson A (2007b) *Audit of travel surveys conducted for Peterborough City Council in connection with the sustainable travel initiative* University of Leeds Institute for Transport Studies

Socialdata & Sustrans (2005a) *Darlington: Sustainable Travel Demonstration Town travel behaviour research, baseline survey 2004* Report for Darlington Borough Council

Socialdata & Sustrans (2005b) *Peterborough: Sustainable Travel Demonstration Town travel behaviour research, baseline survey 2004* Report for Peterborough City Council

Socialdata & Sustrans (2005c) *Worcester: Sustainable Travel Demonstration Town travel behaviour research, baseline survey 2004* Report for Worcestershire County Council

Socialdata & Sustrans (2006a) *Darlington: Sustainable Travel Demonstration Town interim travel behaviour research* Report for Darlington Borough Council

Socialdata & Sustrans (2006b) *Peterborough: Sustainable Travel Demonstration Town interim evaluation of ITM programme (stage 1)* Report for Peterborough City Council

Socialdata & Sustrans (2007a) *Darlington: Sustainable Travel Demonstration Town second interim evaluation* Report for Darlington Borough Council

Socialdata & Sustrans (2007b) *Peterborough: Sustainable Travel Demonstration Town interim evaluation of ITM programme (stages 2 and 3)* Report for Peterborough City Council

Socialdata & Sustrans (2008) *Darlington: Sustainable Travel Demonstration Town third interim travel behaviour research* Report for Darlington Borough Council

Socialdata & Sustrans (2009a) *Darlington: Sustainable Travel Demonstration Town travel behaviour research, final evaluation* Report for Darlington Borough Council

Socialdata & Sustrans (2009b) *Peterborough: Sustainable Travel Demonstration Town travel behaviour research, final evaluation* Report for Peterborough City Council

Socialdata & Sustrans (2009c) *Worcester: Sustainable Travel Demonstration Town travel behaviour research, final evaluation* Report for Worcestershire County Council

Socialdata & Sustrans (2009d) *Worcester – Sustainable Travel Demonstration Town travel behaviour research: methods report* Report for Worcestershire County Council

Annex

A13.1 Details of the household travel surveys

Table 13.6 summarises the sample sizes and response rates for the 2004 and 2008 household surveys in the three towns.

Table 13.6: Sample sizes and response rates for household travel surveys

	Darlington	Peterborough	Worcester
baseline survey (2004)			
number of returns (people)	4269	4461	4125
response rate	59%	60%	59%
final survey (2008)			
number of returns (people)	4178	4396	4072
response rate	60%	62%	63%

Notes: Response rate = households making survey returns as a percentage of households successfully contacted (i.e. as a percentage of gross number of households after adjusting for sample loss due to incomplete address, unknown address, address without letterbox, no private address, company address, house unoccupied, addressee deceased, householder moved away, householder absent for a longer period.)

The surveys consisted of a questionnaire sent to each household in the sample together with a set of individual travel diaries for all household members for one nominated day of the week (covering every day including weekends). Data was collected on activities performed by all household members (including children) at all out-of-home destinations on the nominated travel day. Households were encouraged to complete the survey by letter and telephone contact, and were asked to return the survey to Socialdata by post. The survey area covered all residential households in each of the three towns, with samples randomly selected and stratified to provide reliable data at ward level.

A13.2 Changes in numbers and proportions of trips by mode of travel

We examined data on the mean number of trips per person per day made by each mode, and the mode share, as presented by Socialdata & Sustrans in their baseline and final reports on the three towns (2005a, 2005b, 2005c, 2009a, 2009b, 2009c, with the relevant data summarised in each case in their Table 14 and Figure 3.1)[6]. We also prepared our own tables, using the unweighted datasets supplied to us by Socialdata.

The data collected by the household travel survey includes information on the mode of travel used for each stage of a trip (for example, walk – bus – train – walk), but for this analysis only the 'main mode' was taken into account[7].

Table 13.7 summarises the figures from the unweighted datasets, while Table 13.8 summarises the trip data presented by Socialdata & Sustrans in their baseline and final

[6] Socialdata & Sustrans also report mode choice data in the form of 'trips per person per *year*', using the assumption that, on average, a person spends 341 days of the year at home.

[7] Socialdata uses the following hierarchy to determine which is the main mode for a particular trip: 1 aeroplane; 2 ferry; 3 train (regional); 4 work/school bus; 5 other public transport; 6 bus; 7 company car as driver; 8 private car as driver; 9 family car as passenger; 10 company car as passenger; 11 other car as passenger; 12 taxi; 13 motorcycle; 14 other motorised transport; 15 bicycle; 16 walk.

reports, using the weighted datasets. (A discussion of the relative merits of using, or not using, weightings, is at A13.8.)

There are some differences in the absolute numbers of trips per person per day by each mode, and modal shares, between the two analyses. However, the percentage point change in mode share between 2004 and 2008 is generally similar for the weighted and the unweighted datasets.

Table 13.7: Mean number of trips per person per day, by main mode, and change in mode share between 2004 and 2008, using unweighted *dataset*

Main mode	Darlington	Peterborough	Worcester
walk	2004: 0.71 2008: 0.79 from 24% to 27%	2004: 0.60 2008: 0.65 from 21% to 22%	2004: 0.70 2008: 0.76 from 24% to 26%
bicycle	2004: 0.04 2008: 0.08 from 1% to 3%	2004: 0.14 2008: 0.16 from 5% to 6%	2004: 0.08 2008: 0.09 from 3% to 3%
motorcycle	2004: 0.01 2008: 0.01 from 0% to 0%	2004: 0.01 2008: 0.01 from 0% to 0%	2004: 0.01 2008: 0.01 from 0% to 0%
car (driver)	2004: 1.33 2008: 1.23 from 45% to 41%	2004: 1.36 2008: 1.25 from 46% to 43%	2004: 1.40 2008: 1.26 from 47% to 43%
car (passenger)	2004: 0.57 2008: 0.47 from 19% to 16%	2004: 0.61 2008: 0.55 from 21% to 19%	2004: 0.59 2008: 0.57 from 20% to 19%
bus and other public transport	2004: 0.31 2008: 0.35 from 11% to 12%	2004: 0.17 2008: 0.24 from 6% to 9%	2004: 0.16 2008: 0.21 from 6% to 7%
other (taxi, aeroplane, ferry, other motorised transport)	2004: 0.02 2008: 0.03 from 1% to 1%	2004: 0.04 2008: 0.02 from 1% to 1%	2004: 0.01 2008: 0.01 from 1% to 1%
total	2004: 3.00 2008: 2.97	2004: 2.92 2008: 2.90	2004: 2.97 2008: 2.91

Note: Figures based on analysis of unweighted datasets, and include trips of all lengths and all trip purposes (including commercial trips).

Table 13.8: Mean number of trips per person per day, by main mode, and change in mode share between 2004 and 2008, using weighted dataset

Main mode	Darlington	Peterborough	Worcester
walk	2004: 0.76 2008: 0.86 from 25% to 29%	2004: 0.65 2008: 0.74 from 22% to 25%	2004: 0.75 2008: 0.84 from 25% to 28%
bicycle	2004: 0.04 2008: 0.09 from 1% to 3%	2004: 0.15 2008: 0.17 from 5% to 6%	2004: 0.08 2008: 0.09 from 3% to 3%
motorcycle	2004: 0.01 2008: 0.01 from 0% to 0%	2004: 0.01 2008: 0.01 from 1% to 0%	2004: 0.01 2008: 0.01 from 0% to 0%
car (driver)	2004: 1.23 2008: 1.09 from 41% to 37%	2004: 1.28 2008: 1.16 from 43% to 39%	2004: 1.35 2008: 1.25 from 45% to 42%
car (passenger)	2004: 0.62 2008: 0.56 from 21% to 19%	2004: 0.68 2008: 0.64 from 23% to 22%	2004: 0.64 2008: 0.62 from 21% to 20%
bus and other public transport	2004: 0.35 2008: 0.36 from 12% to 12%	2004: 0.19 2008: 0.24 from 6% to 8%	2004: 0.18 2008: 0.20 from 6% to 7%
total	2004: 3.01 2008: 2.97	2004: 2.96 2008: 2.96	2004: 3.01 2008: 3.00

Notes: Figures exclude trips over 100km and commercial trips. Data are taken from Socialdata & Sustrans (2005a, 2005b, 2005c, 2009a, 2009b, 2009c), Table 14 and Figure 3.1.

A13.3 Changes in distance travelled according to mode

We then looked at data on the mean distance travelled per person per day by each mode, and the percentage change in distance travelled by each mode between the baseline survey in 2004 and the final survey in 2008. As before, these figures are presented by Sustrans / Socialdata in their baseline and final reports on the three towns (2005a, 2005b, 2005c, 2009a, 2009b, 2009c, with the relevant data summarised in each case in their Table 24). We also prepared our own tables, using the unweighted datasets supplied to us by Socialdata.

Table 13.9 summarises the distance data from the unweighted datasets, including trips of all lengths. In referring to this table, it should be borne in mind that a small number of long-distance trips can have a disproportionate, and distorting, effect on the figures. Table 13.10 again summarises the distance data from the unweighted datasets, but this time excluding any distance travelled on trips which were longer than 100km. Finally, Table 13.11 summarises the distance data using the weighted datasets, as presented by Socialdata & Sustrans in their baseline and final reports, and excluding any distance travelled on trips which were longer than 100km[8]. As with the trip mode share analysis, there are some differences in absolute distances travelled between the weighted and unweighted datasets, but the changes from 2004 to 2008 are generally quite similar for both datasets.

[8] In their reports, Socialdata & Sustrans' convention is to report trips and distance for trips up to 100km. In our own analysis, we have generally looked at trips up to 50km, since this distance band most closely relates to travel within the towns and surrounding sub-regions. Changes in distance for other journey distance bands may be examined using the matrices in A13.5.

Table 13.9: Distance in kilometres per person per day, and change in distance travelled, using unweighted dataset and including trips of all lengths

Main mode	Darlington	Peterborough	Worcester
walk	2004: 0.9km 2008: 1.0km +15%	2004: 0.7km 2008: 0.8km +14%	2004: 0.8km 2008: 1.0km +25%
bicycle	2004: 0.2km 2008: 0.3km +76%	2004: 0.4km 2008: 0.6km +49%	2004: 0.3km 2008: 0.3km -14%
motorcycle	2004: 0.1km 2008: 0.1km +124%	2004: 0.2km 2008: 0.1km -24%	2004: 0.1km 2008: 0.2km +105%
car (driver)	2004: 15.7km 2008: 15.1km -4%	2004: 17.0km 2008: 16.9km -1%	2004: 19.4km 2008: 18.5km -5%
car (passenger)	2004: 6.3km 2008: 5.4km -15%	2004: 7.0km 2008: 7.4km +5%	2004: 6.6km 2008: 7.2km +10%
bus and other public transport	2004: 4.1km 2008: 5.8km +43%	2004: 4.0km 2008: 6.2km +55%	2004: 3.4km 2008: 3.7km +9%
total	2004: 30.1km 2008: 28.0km -7%	2004: 31.0km 2008: 33.8km +9%	2004: 32.6km 2008: 32.8km +1%

Table 13.10: Distance in kilometres per person per day, and change in distance travelled, using unweighted dataset and excluding trips over 100km

Main mode	Darlington	Peterborough	Worcester
walk	2004: 0.9km 2008: 1.0km +15%	2004: 0.7km 2008: 0.8km +14%	2004: 0.8km 2008: 1.0km +25%
bicycle	2004: 0.2km 2008: 0.3km +76%	2004: 0.4km 2008: 0.6km +49%	2004: 0.3km 2008: 0.3km -14%
motorcycle	2004: 0.1km 2008: 0.1km +124%	2004: 0.1km 2008: 0.1km +23%	2004: 0.1km 2008: 0.1km +36%
car (driver)	2004: 13.6km 2008: 12.1km -11%	2004: 12.7km 2008: 12.4km -2%	2004: 14.0km 2008: 14.0km 0%
car (passenger)	2004: 5.5km 2008: 4.2km -23%	2004: 4.7km 2008: 5.0km +6%	2004: 4.8km 2008: 4.8km +1.5%
bus and other public transport	2004: 2.3km 2008: 3.0km +31%	2004: 1.2km 2008: 1.9km +56%	2004: 1.6km 2008: 1.9km +13%
total	2004: 22.6km 2008: 21.0km -7%	2004: 20.2km 2008: 21.0km +4%	2004: 21.6km 2008: 22.2km +3%

Note: Figures in Tables 13.9 and 13.10 include trips for all purposes (including commercial trips).

Table 13.11: Distance in kilometres per person per day, and change in distance travelled, using weighted dataset

Main mode	Darlington	Peterborough	Worcester
walk	2004: 1.5km 2008: 1.8km	2004: 1.2km 2008: 1.6km	2004: 1.4km 2008: 1.7km
bicycle	2004: 0.3km 2008: 0.3km	2004: 0.4km 2008: 0.6km	2004: 0.3km 2008: 0.3km
motorcycle	2004: 0.1km 2008: 0.2km	2004: 0.1km 2008: 0.1km	2004: 0.1km 2008: 0.1km
car (driver)	2004: 12.2km 2008: 10.9km	2004: 12.7km 2008: 12.0km	2004: 14.2km 2008: 13.4km
car (passenger)	2004: 5.4km 2008: 4.6km	2004: 5.2km 2008: 5.1km	2004: 5.0km 2008: 5.9km
bus and other public transport	2004: 2.2km 2008: 2.7km	2004: 1.4km 2008: 2.0km	2004: 1.8km 2008: 1.9km
total	2004: 21.7km 2008: 20.5km	2004: 21.0km 2008: 21.4km	2004: 22.8km 2008: 23.3km

Notes: Figures exclude trips over 100km and commercial trips. Data are taken from Socialdata & Sustrans (2005a, 2005b, 2005c, 2009a, 2009b, 2009c), Table 24. Data for walking includes walking legs of cycle, motorbike, car and public transport trips. Percentage changes in distance travelled were not given by Socialdata and are not added here.

A.13.4 Changes in overall activity

Although the household travel survey data indicates quite substantial changes in mode share between 2004 and 2008, there were relatively few changes in overall activity. Nevertheless, as Table 13.12 shows, there appears to have been a small reduction in the number of activities per person per day, and in trips per person per day. This is consistent with the observation, in sections 13.2 and 13.4, that there was some trip 'evaporation'.

Table 13.12: Changes in average number of activities per person per day, and trips per person per day, between baseline and final household travel surveys

	Darlington	Peterborough	Worcester
activities per person per day (weighted)	2004: 1.72 2008: 1.67	2004: 1.70 2008: 1.67	2004: 1.74 2008: 1.70
trips per person per day (weighted)	2004: 3.01 2008: 2.97	2004: 2.96 2008: 2.96	2004: 3.01 2008: 3.00
trips per person per day (unweighted)	2004: 3.00 2008: 2.97	2004: 2.92 2008: 2.90	2004: 2.97 2008: 2.91
travel time in minutes per pers per day (weighted)	2004: 57 2008: 58	2004: 52 2008: 56	2004: 60 2008: 59

Notes: Figures are averages for all persons (including those who did not travel on the survey day), and for all days (including weekends). Source: Table 1 in appendices to Socialdata & Sustrans reports (2005a, 2005b, 2005c, 2009a, 2009b, 2009c); unweighted figures for trips per person per day from our own analysis of Socialdata datasets.

A13.5 Trip length/main mode matrices

Table 13.13: Change in number of trips per 100 persons per day: combined dataset for three towns (unweighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	1.7	4.0	0.8	0.1	0.0	0.0	0.0	0.0	**6.4**
cycle	0.0	1.5	0.4	0.2	0.2	0.0	0.0	0.0	**2.3**
car driver	-1.7	-3.8	-3.7	-1.1	-0.9	-0.1	0.0	0.0	**-11.4**
car passenger	-1.9	-2.1	-1.9	0.3	0.0	-0.3	0.1	0.0	**-5.7**
bus	-0.3	0.8	1.6	1.1	1.0	0.2	0.1	-0.1	**4.4**
train (regional)	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.1	**0.4**
other	-0.1	0.1	0.0	-0.1	0.2	0.0	-0.1	-0.1	**-0.1**
total	**-2.2**	**0.4**	**-2.9**	**0.4**	**0.7**	**-0.2**	**0.4**	**0.0**	**-3.6**

change in car driver trips	-21%	-14%	-9%	-4%	-3%	-3%	+1%	+3%	**-8%**
	-9%								

Notes: Total number of trips per 100 persons per day was 296 in 2004 and 292 in 2008. Dataset included 12,855 people and 38,017 trips in 2004; and 12,646 people and 36,980 trips in 2008.

Table 13.14: Change in number of trips per 100 persons per day: Darlington (unweighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	3.3	5.0	-0.2	0.0	0.0	0.0	0.0	0.0	**8.0**
cycle	-0.1	2.2	1.1	0.2	0.1	0.0	0.0	0.0	**3.6**
car driver	-0.3	-3.0	-3.4	-1.4	-1.2	-1.4	0.0	0.3	**-10.5**
car passenger	-1.7	-1.7	-3.3	-0.4	-0.2	-1.4	0.0	0.1	**-8.6**
bus	-0.7	1.6	1.8	-0.4	0.8	0.2	-0.1	0.0	**3.2**
train (regional)	0.0	0.0	0.0	0.0	0.4	0.2	0.1	0.2	**0.7**
other	-0.3	0.2	0.4	0.4	0.4	-0.1	0.0	-0.4	**0.6**
total	**0.2**	**4.2**	**-3.6**	**-1.5**	**0.2**	**-2.6**	**0.1**	**0.2**	**-3.0**

change in car driver trips	-3%	-10%	-8%	-8%	-4%	-29%	+5%	+123%	**-8%**
	-7%								

Notes: Total number of trips per 100 persons per day was 300 in 2004 and 297 in 2008. Dataset included 4,269 people and 12,788 trips in 2004; and 4,178 people and 12,397 trips in 2008.

Key for all tables:
- (yellow) change of at least +1 trip between 2004 and 2008
- (purple) change of at least -1 trip between 2004 and 2008

Notes for all tables: 'Bus' includes travel by works or school bus; 'other' is motorcycle, taxi, aeroplane, ferry, other public transport (not bus, regional train or work/school bus), or other motorised transport. 'Change in car driver trips' is percentage change in trips relative to 2004 baseline, for trips as a car driver in each respective distance category (top row), and for all car driver trips of up to 50km (bottom row).

Table 13.15: Change in number of trips per 100 persons per day: Peterborough (unweighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	total
walk	2.6	1.6	0.8	0.1	0.0	0.0	0.0	0.0	**5.0**
cycle	-0.2	1.0	0.5	0.4	0.6	0.1	0.0	0.0	**2.3**
car driver	-2.3	-2.3	-2.6	-2.3	-1.3	0.6	-0.1	0.1	**-10.3**
car passenger	-3.0	-0.9	-1.6	-0.7	-0.04	0.8	0.1	0.0	**-5.5**
bus	0.1	0.7	2.0	2.2	1.2	0.1	0.1	0.0	**6.3**
train (regional)	0.0	0.0	0.0	-0.1	0.2	0.1	0.9	0.0	**1.1**
other	0.1	0.1	-0.2	-0.8	0.2	-0.1	-0.3	0.0	**-1.1**
total	**-2.7**	**0.3**	**-1.1**	**-1.1**	**0.8**	**1.6**	**0.8**	**0.0**	**-2.2**

change in car driver trips	-32%	-11%	-7%	-6%	-5%	+17%	-5%	+27%	**-8%**
	-8%								

Notes: Total number of trips per 100 persons per day was 291 in 2004 and 290 in 2008. Dataset included 4,461 people and 12,984 trips in 2004; and 4,396 people and 12,732 trips in 2008.

Table 13.16: Change in number of trips per 100 persons per day: Worcester (unweighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	total
walk	-0.9	5.4	1.7	0.2	0.0	0.0	0.0	0.0	**6.4**
cycle	0.3	1.2	-0.4	-0.2	0.0	0.0	0.0	0.0	**0.9**
car driver	-2.5	-6.1	-5.3	0.5	-0.1	0.4	0.1	-0.4	**-13.5**
car passenger	-0.8	-3.8	-0.6	2.0	0.3	-0.2	0.3	0.1	**-2.8**
bus	-0.2	0.0	0.9	1.6	1.2	0.1	0.2	-0.1	**3.6**
train (regional)	0.0	0.0	-0.1	0.0	-0.2	-0.3	-0.3	0.2	**-0.6**
other	-0.1	0.1	-0.2	0.0	0.1	0.3	0.0	0.1	**0.1**
total	**-4.2**	**-3.2**	**-4.1**	**4.0**	**1.1**	**0.4**	**0.3**	**-0.2**	**-5.9**

change in car driver trips	-29%	-22%	-13%	+2%	0%	+11%	+6%	-44%	**-10%**
	-10%								

Notes: Total number of trips per 100 persons per day was 297 in 2004 and 291in 2008. Dataset included 4,125 people and 12,245 trips in 2004; and 4,072 people and 11,851trips in 2008.

Table 13.17: Change in distance per 100 persons per day (km): combined dataset for three towns (unweighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	2.6	8.4	2.5	0.8	0.0	0.0	0.0	0.0	**14.3**
cycle	0.1	3.3	1.5	0.8	2.7	1.6	0.0	0.0	**10.0**
car driver	-1.1	-7.0	-14.0	-10.3	-24.8	0.6	2.5	5.4	**-48.8**
car passenger	-1.1	-3.7	-7.4	1.8	-4.2	-14.5	26.6	3.3	**0.9**
bus	-0.1	2.7	6.3	7.5	22.2	8.5	9.5	-6.7	**49.8**
train (regional)	0.0	0.0	0.0	-0.3	2.6	0.1	38.1	53.7	**94.1**
other	-0.1	0.3	-0.1	-1.2	5.2	-0.5	-13.2	-72.2	**-81.8**
total	**0.3**	**3.9**	**-11.3**	**-0.8**	**3.6**	**-4.2**	**63.5**	**-16.5**	**38.5**

change in car driver km	-19%	-14%	-9%	-5%	-4%	0%	+1%	+4%	**-3%**
	-5%								

Notes: Total distance travelled per 100 persons per day was 3118km in 2004 and 3156km in 2008. Dataset included 12,855 people and 38,017 trips in 2004; and 12,646 people and 36,980 trips in 2008.

Table 13.18: Change in distance per 100 persons per day (km): Darlington (unweighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	3.7	10.4	-1.4	0.1	0.4	0.0	0.0	0.0	**13.2**
cycle	0.0	4.6	4.3	1.0	2.4	0.0	0.0	0.0	**12.3**
car driver	-0.1	-5.9	-13.3	-14.1	-28.7	-87.7	4.7	88.9	**-56.3**
car passenger	-0.9	-2.9	-12.9	-4.4	-4.9	-97.5	13.2	13.3	**-97.0**
bus	-0.4	5.1	6.9	-3.6	27.9	13.3	-13.4	46.3	**82.1**
train (regional)	0.0	0.0	-0.1	0.0	12.0	13.5	9.4	80.0	**114.9**
other	-0.2	0.5	0.9	2.3	9.9	-6.4	0.0	-281.0	**-274.0**
total	**2.0**	**11.8**	**-15.5**	**-18.6**	**18.9**	**-164.8**	**13.9**	**-52.4**	**-204.8**

change in car driver km	-2%	-10%	-8%	-11%	-4%	-27%	+4%	+119%	**-4%**
	-6%								

Notes: Total distance travelled per 100 persons per day was 3005 in 2004 and 2801 in 2008. Dataset included 4,269 people and 12,788 trips in 2004; and 4,178 people and 12,397 trips in 2008.

Key for all tables:

(yellow)	change of at least +10km between 2004 and 2008
(blue)	change of at least -10km between 2004 and 2008

Notes for all tables: 'Bus' includes travel by works or school bus; 'other' is motorcycle, taxi, aeroplane, ferry, other public transport (not bus, regional train or work/school bus), or other motorised transport.
'Change in car driver km' is percentage change in km relative to 2004 baseline, for trips as a car driver in each respective distance category (top row), and for all car driver trips of up to 50km (bottom row).

Table 13.19: Change in distance per 100 persons per day (km): Peterborough (unweighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	2.1	3.5	3.4	1.0	0.0	0.0	0.0	0.0	**10.0**
cycle	0.0	2.8	1.9	2.9	8.7	4.7	0.0	0.0	**21.1**
car driver	-1.4	-4.4	-9.0	-17.7	-40.0	46.1	-12.4	31.1	**-7.7**
car passenger	-1.9	-2.0	-6.1	-4.1	-21.4	63.0	20.0	-12.2	**35.3**
bus	0.1	1.9	7.6	15.2	19.9	3.7	18.1	-21.6	**44.8**
train (regional)	0.0	0.0	0.1	-0.6	4.3	8.4	142.0	14.2	**168.4**
other	0.1	0.3	-0.7	-5.6	1.6	-9.6	-38.0	57.3	**5.4**
total	**-0.9**	**2.2**	**-2.7**	**-9.0**	**-26.9**	**116.4**	**129.7**	**68.6**	**277.3**

change in car driver km	-29%	-11%	-6%	-6%	-8%	+17%	-4%	+26%	**0%**
	-7%								

Notes: Total distance travelled per 100 persons per day was 3098km in 2004 and 3375km in 2008. Dataset included 4,461 people and 12,984 trips in 2004; and 4,396 people and 12,732 trips in 2008.

Table 13.20: Change in distance per 100 persons per day (km): Worcester (unweighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	2.2	11.6	5.5	1.3	-0.5	0.0	0.0	0.0	**20.2**
cycle	0.2	2.5	-1.9	-1.6	-3.5	0.0	0.0	0.0	**-4.4**
car driver	-1.8	-11.0	-20.1	1.1	-4.4	42.4	15.3	-108.6	**-87.0**
car passenger	-0.4	-6.4	-3.0	14.4	15.1	-12.5	47.1	9.6	**63.8**
bus	-0.1	1.1	4.3	10.6	18.9	8.7	23.8	-44.7	**22.5**
train (regional)	0.0	0.0	-0.2	-0.2	-8.9	-22.5	-45.3	69.2	**-7.8**
other	0.0	0.1	-0.7	0.0	4.4	15.2	0.0	3.0	**21.9**
total	**0.0**	**-2.1**	**-16.1**	**25.7**	**21.1**	**31.2**	**41.0**	**-71.5**	**29.2**

change in car driver km	-29%	-21%	-12%	+1%	-1%	+15%	+5%	-45%	**-4%**
	-3%								

Notes: Total distance travelled per 100 persons per day was 3255km in 2004 and 3284km in 2008. Dataset included 4,125 people and 12,245 trips in 2004; and 4,072 people and 11,851trips in 2008.

Table 13.21: Change in number of trips per 100 persons per day: combined dataset for three towns (weighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	0.5	6.6	1.8	0.2	0.0	0.0	0.0	0.0	**9.1**
cycle	0.0	2.1	0.3	0.1	0.3	0.0	0.0	0.0	**2.8**
car driver	-1.8	-3.5	-3.8	-1.4	-0.9	0.1	0.0	-0.1	**-11.4**
car passenger	-2.6	-1.4	-1.6	1.6	0.1	-0.1	0.1	0.0	**-4.1**
bus	-0.4	-0.4	0.9	0.8	1.1	0.1	0.1	-0.1	**2.1**
train (regional)	0.0	0.0	0.0	-0.1	0.2	0.0	0.4	0.1	**0.6**
other	0.1	0.2	0.1	-0.2	0.1	-0.1	-0.1	-0.1	**0.1**
total	**-4.3**	**3.5**	**-2.3**	**1.1**	**0.8**	**0.1**	**0.5**	**-0.2**	**-0.8**

change in car driver trips	-22%	-14%	-10%	-6%	-3%	-4%	-1%	-17%	**-9%**
	-9%								

Note: Total number of trips per 100 persons per day was 304 in 2004 and 303 in 2008.

Table 13.22: Change in number of trips per 100 persons per day: Darlington (weighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	2.3	6.5	0.8	-0.1	0.0	0.0	0.0	0.0	**9.6**
cycle	-0.1	3.3	1.4	0.4	0.2	0.0	0.0	0.0	**5.1**
car driver	-0.2	-3.5	-3.8	-2.4	-1.4	-1.2	0.0	0.0	**-12.5**
car passenger	-1.6	-1.1	-3.3	0.0	1.6	-1.0	-0.1	0.0	**-5.6**
bus	-1.1	-0.9	0.5	-1.0	0.7	0.2	-0.1	-0.1	**-1.9**
train (regional)	0.0	0.0	0.0	0.0	0.3	0.3	0.1	0.2	**0.9**
other	-0.2	0.1	0.6	0.2	0.2	-0.1	0.0	-0.3	**0.5**
total	**-0.9**	**4.5**	**-3.8**	**-2.9**	**1.5**	**-1.9**	**-0.1**	**-0.2**	**-3.8**

change in car driver trips	-2%	-13%	-10%	-15%	-5%	-30%	-2%	+9%	**-10%**
	-10%								

Note: Total number of trips per 100 persons per day was 304 in 2004 and 300 in 2008.

Key for all tables: change of at least +1 trip between 2004 and 2008; change of at least -1 trip between 2004 and 2008

Notes for all tables: 'Bus' includes travel by works or school bus; 'other' is motorcycle, taxi, aeroplane, ferry, other public transport (not bus, regional train or work/school bus), or other motorised transport.
'Change in car driver trips' is percentage change in trips relative to 2004 baseline, for trips as a car driver in each respective distance category (top row), and for all car driver trips of up to 50km (bottom row).

Table 13.23: Change in number of trips per 100 persons per day: Peterborough (weighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	1.1	4.8	2.8	0.3	0.0	0.0	0.0	0.0	**9.0**
cycle	-0.3	1.3	-0.1	0.2	0.5	0.0	0.0	0.0	**1.6**
car driver	-2.4	-2.0	-4.2	-1.7	-2.2	0.8	-0.2	0.2	**-11.6**
car passenger	-5.2	-0.2	-0.6	1.5	-0.6	0.7	0.0	-0.2	**-4.5**
bus	0.0	0.0	1.5	2.2	1.6	0.0	0.3	0.0	**5.7**
train (regional)	0.0	0.0	0.0	-0.2	0.4	0.2	1.3	-0.1	**1.7**
other	0.7	0.2	0.1	-0.7	0.0	-0.3	-0.3	-0.1	**-0.4**
total	**-6.1**	**4.0**	**-0.4**	**1.6**	**-0.2**	**1.6**	**1.2**	**-0.2**	**1.4**

change in car driver trips	-34%	-10%	-12%	-5%	-9%	+21%	-8%	+49%	**-9%**
	-10%								

Note: Total number of trips per 100 persons per day was 302 in 2004 and 303 in 2008.

Table 13.24: Change in number of trips per 100 persons per day: Worcester (weighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	-1.9	8.6	1.7	0.3	0.0	0.0	0.0	0.0	**8.7**
cycle	0.3	1.9	-0.4	-0.2	0.1	0.0	0.0	0.0	**1.7**
car driver	-2.9	-5.1	-3.4	-0.2	0.9	0.8	0.1	-0.6	**-10.3**
car passenger	-0.9	-3.1	-0.8	3.4	-0.8	-0.2	0.3	0.1	**-2.0**
bus	-0.2	-0.3	0.6	1.2	1.0	0.0	0.2	-0.1	**2.4**
train (regional)	0.0	0.0	0.0	0.0	-0.2	-0.5	-0.4	0.3	**-0.9**
other	-0.1	0.2	-0.3	-0.1	0.2	0.2	0.0	0.0	**0.3**
total	**-5.8**	**2.2**	**-2.6**	**4.6**	**1.1**	**0.4**	**0.2**	**-0.2**	**-0.1**

change in car driver trips	-32%	-19%	-8%	-1%	+3%	+19%	+7%	-52%	**-7%**
	-8%								

Notes: Total number of trips per 100 persons per day was 306 in 2004 and 306 in 2008.

Table 13.25: Change in distance per 100 persons per day (km): combined dataset for three towns (weighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	total
walk	2.5	13.3	6.0	1.2	-0.4	0.0	0.0	0.0	**22.7**
cycle	0.1	4.5	1.0	0.6	3.8	1.0	0.0	0.0	**10.9**
car driver	-1.2	-7.0	-15.2	-12.6	-31.4	18.3	-5.6	-23.3	**-77.9**
car passenger	-1.5	-3.1	-5.9	12.0	-0.8	-9.8	22.9	-13.1	**0.7**
bus	-0.3	0.3	3.3	6.2	20.1	4.2	16.5	-30.0	**20.3**
train (regional)	0.0	0.0	0.0	-0.5	3.6	1.4	51.3	49.7	**105.4**
other	0.0	0.4	0.4	-1.9	2.7	-3.0	-13.5	-50.9	**-65.9**
total	**-0.4**	**8.3**	**-10.3**	**5.0**	**-2.4**	**12.1**	**71.6**	**-67.6**	**16.2**

change in car driver km	-21%	-15%	-10%	-7%	-5%	+7%	-2%	-15%	**-5%**
	-7%								

Note: Total distance travelled per 100 persons per day was 3068km in 2004 and 3084km in 2008.

Table 13.26: Change in distance per 100 persons per day (km): Darlington (weighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	total
walk	3.0	13.1	1.9	-0.7	0.3	0.0	0.0	0.0	**17.6**
cycle	0.0	6.6	5.4	1.8	4.5	0.0	0.0	0.0	**18.4**
car driver	0.0	-7.5	-15.4	-21.6	-23.2	-74.4	-1.4	4.0	**-139.6**
car passenger	-0.7	-2.0	-14.1	-2.5	43.4	-78.1	13.0	-3.0	**-44.1**
bus	-0.8	0.5	1.8	-7.9	25.0	10.3	-19.7	-36.8	**-27.7**
train (regional)	0.0	0.0	0.0	0.2	6.0	22.2	16.4	68.6	**113.4**
other	-0.2	0.3	1.7	0.8	3.5	-5.4	4.3	-129.6	**-124.7**
total	**1.3**	**10.9**	**-18.7**	**-29.9**	**59.6**	**-125.4**	**12.4**	**-96.8**	**-186.7**

change in car driver km	0%	-14%	-10%	-18%	-4%	-27%	-1%	+4%	**-9%**
	-7%								

Note: Total distance travelled per 100 persons per day was 2835 in 2004 and 2648 in 2008.

Key for all tables:

yellow	change of at least +10km between 2004 and 2008
blue	change of at least -10km between 2004 and 2008

Notes for all tables: 'Bus' includes travel by works or school bus; 'other' is motorcycle, taxi, aeroplane, ferry, other public transport (not bus, regional train or work/school bus), or other motorised transport.
'Change in car driver km' is percentage change in km relative to 2004 baseline, for trips as a car driver in each respective distance category (top row), and for all car driver trips of up to 50km (bottom row).

Table 13.27: Change in distance per 100 persons per day (km): Peterborough (weighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	2.4	9.9	10.6	2.3	-0.4	0.0	0.0	0.0	**24.8**
cycle	0.1	3.1	-0.5	1.3	6.6	2.8	0.0	0.0	**13.4**
car driver	-1.4	-4.0	-17.0	-12.6	-64.1	62.0	-32.7	48.4	**-21.4**
car passenger	-3.4	-1.8	0.3	13.7	-38.7	62.2	6.0	-45.9	**-7.5**
bus	0.0	0.5	5.2	17.2	24.4	-1.2	45.4	-21.5	**70.1**
train (regional)	0.0	0.0	0.1	-1.5	12.3	18.7	186.1	-9.9	**205.7**
other	0.3	0.4	0.4	-5.9	-1.7	-16.2	-43.0	-35.6	**-101.2**
total	**-1.9**	**8.0**	**-0.9**	**14.4**	**-61.5**	**128.3**	**161.9**	**-64.4**	**183.8**

change in car driver km	-31%	-10%	-12%	-5%	-12%	+23%	-11%	+49%	**-1%**
	-10%								

Note: Total distance travelled per 100 persons per day was 3117km in 2004 and 3301km in 2008.

Table 13.28: Change in distance per 100 persons per day (km): Worcester (weighted data)

main mode	up to 1km	1.1-3km	3.1-5km	5.1-10km	10.1-50km	50.1-100km	100.1 - 200km	over 200km	**total**
walk	2.2	17.1	5.3	2.1	-1.1	0.0	0.0	0.0	**25.6**
cycle	0.1	3.8	-1.9	-1.5	0.0	0.0	0.0	0.0	**0.5**
car driver	-2.1	-9.7	-12.9	-3.9	-4.8	66.3	18.6	-129.2	**-77.8**
car passenger	-0.5	-5.6	-4.2	25.0	-5.1	-17.1	50.9	11.6	**55.0**
bus	-0.1	0.1	3.1	8.7	10.5	3.6	22.6	-31.9	**16.4**
train (regional)	0.0	0.0	-0.1	-0.1	-8.3	-38.5	-59.0	94.4	**-11.6**
other	-0.1	0.5	-1.0	-0.5	6.5	13.8	0.0	13.9	**33.1**
total	**-0.5**	**6.2**	**-11.8**	**29.8**	**-2.4**	**28.2**	**33.0**	**-41.2**	**41.3**

change in car driver km	-33%	-19%	-8%	-2%	-1%	+22%	+6%	-48%	**-4%**
	-3%								

Note: Total distance travelled per 100 persons per day was 3257km in 2004 and 3298km in 2008.

A13.6 Trip purpose

Table 13.29: Change in 'car as driver' mode share by trip purpose for 2004 and 2008 surveys, unweighted dataset

Trip purpose	Darlington	Peterborough	Worcester	All towns
work	-5% or -3%points *(from 65% to 62%)*	-3% or -2%points *(from 65% to 63%)*	-1% or -1%point *(from 65% to 64%)*	-4% or -3%points *(from 65% to 62%)*
work-related business	+6% or +5%points *(from 81% to 86%)*	-1% or -1%point *(from 83% to 82%)*	-7% or -6%points *(from 83% to 77%)*	-7% or -6%points *(from 82% to 77%)*
education	+19% or +1%point *(from 5% to 5%)*	+32% or +2%points *(from 5% to 7%)*	-34% or -2%points *(from 6% to 4%)*	+1% or 0%points *(from 5% to 5%)*
shopping	-8% or -3%points *(from 37% to 33%)*	-14% or -6%points *(from 41% to 36%)*	-8% or -3%points *(from 40% to 37%)*	-10% or -4%points *(from 39% to 35%)*
personal business	-6% or -3%points *(from 45% to 42%)*	-8% or -4%points *(from 47% to 43%)*	-8% or -4%points *(from 47% to 43%)*	-8% or -3%points *(from 46% to 43%)*
escort	-6% or -4%points *(from 69% to 65%)*	+3% or +2%points *(from 62% to 64%)*	-4% or -3%points *(from 66% to 64%)*	-2% or -1%point *(from 66% to 64%)*
leisure	-12% or -4%points *(from 38% to 34%)*	-12% or -5%points *(from 41% to 36%)*	-15% or -6%points *(from 41% to 35%)*	-13% or -5%points *(from 40% to 35%)*
all purposes	-7% or -3%points *(from 45% to 41%)*	-7% or -3%points *(from 46% to 43%)*	-8% or -4%points *(from 47% to 43%)*	-7% or -3%points *from 46% to 43%)*

Notes: Results for work-related business and personal business should be treated with caution as the number of trips on which the figures are based is small. 'All towns' figures are derived from an aggregated dataset, using data from all three towns with no weighting by population size.

Table 13.30: Change in 'car as driver' mode share by trip purpose for 2004 and 2008 surveys, using weighted dataset

Trip purpose	Darlington	Peterborough	Worcester
work	-3%points *(from 62% to 59%)*	-3%points *(from 64% to 61%)*	0%point *(from 63% to 63%)*
work-related business	+1%point *(from 85% to 86%)*	-9%points *(from 90% to 81%)*	-6%points *(from 84% to 78%)*
education	+1%point *(from 3% to 4%)*	+1%point *(from 4% to 5%)*	-1%point *(from 5% to 4%)*
shopping	-3%points *(from 34% to 31%)*	-6%points *(from 39% to 33%)*	-3%points *(from 39% to 36%)*
personal business	-5%points *(from 44% to 39%)*	0%points *(from 45% to 45%)*	-1%point *(from 46% to 45%)*
escort	0%points *(from 62% to 62%)*	-2%points *(from 56% to 54%)*	+6%points *(from 60% to 66%)*
leisure	-6%points *(from 35% to 29%)*	-4%points *(from 37% to 33%)*	-6%points *(from 39% to 33%)*
all purposes	-4%points *(from 41% to 37%)*	-4%points *(from 43% to 39%)*	-3%points *(from 45% to 42%)*

Table 13.31: Change in mode share for travel to work from 2004 and 2008 surveys, using weighted dataset

Trip purpose	Darlington	Peterborough	Worcester
walk	+1%point *(from 14% to 15%)*	+4%points *(from 8% to 12%)*	+1%point *(from 16% to 17%)*
bicycle	+2%point *(from 3% to 5%)*	0%points *(from 9% to 9%)*	+1%point *(from 5% to 6%)*
car (driver)	-3%points *(from 62% to 59%)*	-3%point *(from 64% to 61%)*	0%point *(from 63% to 63%)*
car (passenger)	-2%points *(from 11% to 9%)*	-2%points *(from 11% to 9%)*	-2%points *(from 9% to 7%)*
public transport	+2%points *(from 10% to 12%)*	+1%point *(from 7% to 8%)*	0%points *(from 6% to 6%)*

Table 13.32: Change in mode share for travel to education from 2004 and 2008 surveys, using weighted dataset

Trip purpose	Darlington	Peterborough	Worcester
walk	+4%point *(from 46% to 50%)*	+7%points *(from 41% to 48%)*	+5%points *(from 44% to 49%)*
bicycle	+5%points *(from 1% to 6%)*	0%points *(from 7% to 7%)*	+1%point *(from 2% to 3%)*
car (driver)	+1%point *(from 3% to 4%)*	+1%point *(from 4% to 5%)*	-1%point *(from 5% to 4%)*
car (passenger)	-5%points *(from 30% to 25%)*	-12%points *(from 39% to 27%)*	-6%points *(from 39% to 33%)*
public transport	-5%points *(from 20% to 15%)*	+4%points *(from 9% to 13%)*	+1%point *(from 10% to 11%)*

A13.7 Demographic characteristics

Table 13.33: 'Car as driver' mode share (%) by demographic factors for 2004 and 2008 surveys, and % change in mode share between these dates, using combined data for three towns (unweighted dataset)

	car driver mode share 2004	car driver mode share 2008	% change, 2004-2008
Gender			
male	55%	51%	-7%
female	38%	35%	-6%
Age			
16-20	17%	16%	-7%
21-25	47%	42%	-11%
26-30	61%	57%	-7%
31-35	63%	56%	-12%
36-40	66%	60%	-9%
41-45	62%	62%	0%
46-50	65%	59%	-9%
51-55	60%	55%	-8%
56-60	56%	53%	-6%
61-65	47%	47%	-1%
66-70	48%	41%	-14%
71-80	36%	33%	-9%
Employment status			
home duties	40%	35%	-12%
retired	42%	35%	-15%
looking for work	43%	30%	-30%
at college	19%	12%	-38%
at university	37%	44%	+20%*
part-time or casual work	51%	50%	-2%
full-time work	68%	64%	-5%

Note: * based on a small number of trips (300, of which ~100-130 as a car driver) and hence may not be reliable.

A13.8 Use of weighting factors

The analytical approach adopted by Socialdata involved the use of weighting factors to adjust for various possible biases in the household, person and trip data collected via the surveys (Socialdata & Sustrans 2009d). The use of these weighting factors was examined in some detail by Bonsall and Jopson (2007) in their audit of the travel surveys carried out in Peterborough, and they clarified that weightings were used to adjust for the following potential biases in the survey returns:

- Data were less likely to be obtained from households without a telephone, because these households would not have received any telephone reminders to complete and return their surveys. Responses from households without a telephone were therefore factored up, and responses from those with a telephone were factored down.
- The weighting made an adjustment to allow for lower survey response rates from households who were not interested in the personal travel planning.
- Data were weighted to ensure that they were representative of the population in terms of age, gender, numbers responding from each ward, and number of responses for each day of the week.
- Finally, data about numbers of trips made by members of households without phones were factored up, to allow for the fact that these respondents may be more likely to under-report their travel, even if (by our inference) they complete and return the survey.

Bonsall and Jopson comment that the justification for weighting factors is that, without them, the data might be biased, with (for example) an over-representation of telephone owners or an under-representation of people who had not wanted to be involved in personal travel planning. However, they also point out that the type of weighting used does not necessarily minimise the bias. In particular, where more than one factor is allowed for, they argue that weighting involves a compromise, with equal priority given to all factors, even though a unit error in some factors (e.g. interest in receiving personal travel planning information) has much more potential to bias the results than a unit error in some other factors (e.g. age or gender).

In conclusion, Bonsall and Jopson express unease about the effect of the weighting factors on the results. Their concern relates to whether the weighting factors are entirely logical (and they suggest examples where this may not be the case); the fact that they limit the possibilities of applying conventional statistical tests to the data; and the fact that they make the data processing more opaque than is desirable. Their audits propose that, rather than use weighting factors, it would be preferable to work with raw data and build models to show differences between results obtained from different categories of people and on different days of the week, and then use these models to estimate the results that would have been achieved had there been no bias in responses.

The approach proposed by Bonsall and Jopson is beyond the scope of this study. Instead, we have where possible reported results from the household travel surveys using both *unweighted* data (based on our own analysis of the datasets supplied to us by Socialdata) and *weighted* data (based either on analysis reported by Socialdata & Sustrans in their baseline and final reports to the three towns, or on further special tabulations and analyses that Socialdata kindly agreed to carry out for this study, at our request). In taking this approach, we recognise that the unweighted results are not necessarily any less, or more, 'right' than the results using weighted data, but rather, that each dataset has it own particular advantages and its own particular deficiencies. It is our judgement that this approach has benefits in terms of transparency, and that where the observed behaviour change appears to be broadly similar from analysis of both weighted and unweighted datasets, this lends added confidence to the conclusions drawn.

An additional issue with the weighting is that, as would be expected, it tends to have bigger apparent effects on the results for cases where there are small sample sizes than where there are large. This has turned out to be particularly an issue for the interpretation of changes in the very small numbers of very long journeys, where the choice between weighting or not can change the size and in some cases even the sign of the changes. Bearing in mind the very small numbers, and questionable salience of these trips, we have excluded them from most of the discussion, albeit reporting them where appropriate. Our judgment is that there is nothing in these results for very long journeys which is demonstrated as a problem for smarter choices at the present stage, but it would be expected to become more important as such policy measures are implemented over bigger areas, or nationally, and with policy instruments which actually focus on medium and longer journeys which was not the case for these three towns. There the issue is potentially of importance, and we would argue for careful attention to sample size and methodology in future evaluations.

A13.9 Statistical reliability of the results of the household travel surveys

Representativity
It is impossible to guarantee that any household survey sample is fully representative of the whole study area population, due to inaccuracies in the original sample frame or issues of non- response. As previously described, particular attention was applied by Socialdata & Sustrans in the survey methodology to use a robust sample frame, stratify the samples where appropriate and minimise non-response by repeated reminders to households. In addition, a weighting factor was applied to correct for specific elements of non response (e.g. those households with and without a telephone) and we have presented both the weighted and unweighted data where appropriate. Therefore, subject to the normal caveats relating to sampling frame and non-systematic response bias, the household data set should be capable of producing representative results.

'Importance' as distinct from 'significance'
The objective of the data analysis is to make the best assessment possible of what has happened and why, with a primary emphasis on distinguishing on what is 'important' rather than what (in statistical terms) is 'significant'. We take the view, in line with much current thinking in statistical practice, that these are different. In this study, the main two reasons for that difference are: first, it is relatively easy with large sample sizes to find that differences between sample means are highly significant even when they are so small that no practical consequence follows from them at all; and conversely some differences for which the best estimate is big enough to be highly important nevertheless is subject to wide confidence limits. In many cases therefore we have sought to make judgements from separate data sources which cannot be pooled, and which have quite different patterns of bias, data precision, definitions and gaps. In such cases the overall pattern can be important even when the separate elements do not on their own have a high degree of reliance. For avoidance of misunderstanding, we repeat the necessary caution that statements of the form 'not significantly different from zero' should never be read as 'probably equal to zero' – where the confidence limits around a quantity encompass zero, they will also generally encompass a value twice as high as the observed estimate as well. It is the observed estimate that remains the best one.

Statistical confidence
The household surveys had sample sizes of over 25,000 people and 75,000 trips, divided into the three towns and two time periods. These sample sizes are generous by the standards of much social research (voting intentions are usually based on surveys of about 1000, for example). The sample of people represents between 3-5% of the study

area populations and is sufficient to provide 95% confidence intervals of around +/- 2% in each town for each date.

In many of the key analyses, we are interested in estimating the change in the mean value of some key variables from 2004 to 2008. The following general examples (based on an assumption of a standard deviation equal to the mean, and with all the usual assumptions of distributions of errors) give some rules of thumb about levels of significance:

- With 12,000 in each survey, a difference of 3% in the means is significant at the 95% level, and a difference of 4% would be significant at the 99% level.
- As we progressively disaggregate the data, there is more difficulty in detecting significant differences. Thus for the towns taken separately, where the sample sizes are roundly 4,000 in each survey, a change of 5% is significant at the 95% level on the same assumptions.
- If we then want to disaggregate by one further dimension, we will be down to sample sizes of 500 to 1,000 in each survey. In these cases changes of 10% to 15% will be significantly different from zero at the 95% level. But if we want to disaggregate by a further dimension, down to sample sizes of say 200 in each survey, it will be very difficult to give a good level of confidence to even quite large changes.

The specific results will vary depending on specific values of the means and variances of the samples.

As an overview, with the available household sample sizes we should be able to detect any difference which is big enough to be interesting, at a very high level of confidence, for the combined data set; and with reasonable confidence for one further disaggregation, say town *or* person type *or* journey purpose, but there will be caveats on attribution of those overall figures to specific sub-groups of the population, area and journey purpose for each town separately. A mode which is less widely used, say bicycle, will also have smaller sample sizes and higher variance of observed trips than a mode which is used by the population as a whole, notably walking.

The special case of distance travelled as car driver
Among the many analyses carried out, there is some special interest in distance travelled as car driver, closely equivalent to the amount of car use, since this is the variable that has the most direct link to congestion and carbon impacts. This quantity presents some problems for significance testing, because even when measured perfectly, it typically gives a skewed distribution with high variances: many zeros at one end, and a very long tail of small numbers of very long trips which can have a disproportionate and rather unstable effect on the results.

We have handled these as follows:

- 'Zero trips as car driver' is an interesting quantity, but an unstable one. Consider the case of car owners with a driving licence: the proportion of them recorded as 'non-drivers' will depend almost entirely on the period of time covered by a survey. There will be almost none in a one-year survey, a few in a one month survey, slightly more in a one week survey and quite a lot in a one-day survey. By contrast, the amount of car use averaged over the whole population of interest (including those who do not use a car during the survey period) will be stable to the duration of the survey. Therefore this has been the primary quantity of interest.

- Concerning long trips, these are very small in number, but were outside the scope of the policy measures implemented, though recorded in the household survey. If included they have some effect on the means but their main effect is very substantially to increase the variance of the data. As already discussed, after some preliminary scoping analyses we excluded car driver trips over 50km in length from comparisons of 2004 and 2008.

On this basis[9], the reduction of 5.5% in car driver distance per head from 2004 to 2008 for the pooled (unweighted) data is significantly different from zero (and equivalently, significantly different from 11%) at the 95% level of confidence. Disaggregating the towns, the confidence levels are 90% for Peterborough, 80% for Doncaster, and less for Worcester, entirely in line with the estimated size of the effect in each case of 7.3%, 6.0% and 3.5% respectively. Confidence limits are wider for further levels of disaggregation, and therefore while we report further disaggregation as the best estimates we have, we treat the results with more caution except where supported by other data.

[9] For interest, we record that prima facie the main source of reduction in the number of car driver trips then appears to be an increase of 5.9% in the proportion of drivers making no car driver trips, rather than a more uniform reduction over all levels. This however must be unstable as discussed, and a longer survey would find a lower figure. If the over 50km car trips are included, there is still a reduction in car driver distance overall, but the variances are much higher.